

# Customising dry period length in dairy cows: consequences for energy balance and yield over multiple lactations

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# This presentation

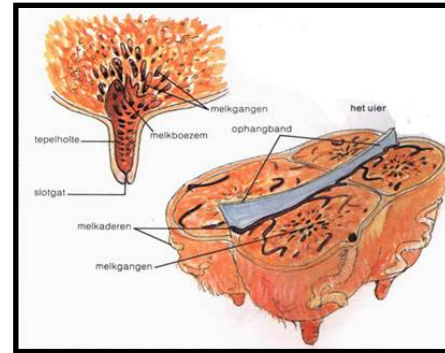
- WHYDRY project: effect of dry period length on the energy balance and health of dairy cows (2010-2014)
- Current work: Customised Dry Period (2013-2017)



# Why a dry period?

Advice to farmers: dry period of 6 till 8 weeks...  
.... to maximize milk yield in the next lactation.

... related with maximal renewal of mammary secretory cell population (Capuco et al., 1997)



## Why **no** or a **short** dry period?

- Less ration– and group transitions
- Improved energy balance in early lactation (due to less milk)
- Improved metabolic status and potential for improved fertility



# Experimental design

## WHYDRY (2010-2014)

- 168 cows (all parities)
- 3 dry period lengths: 0, 30, and 60 days
- 2 lactations
- Used drying–off protocol:
  - 7 d before drying off: dry cow ration
  - 4 d before drying off: once daily milking
  - at drying off: dry cow antibiotics

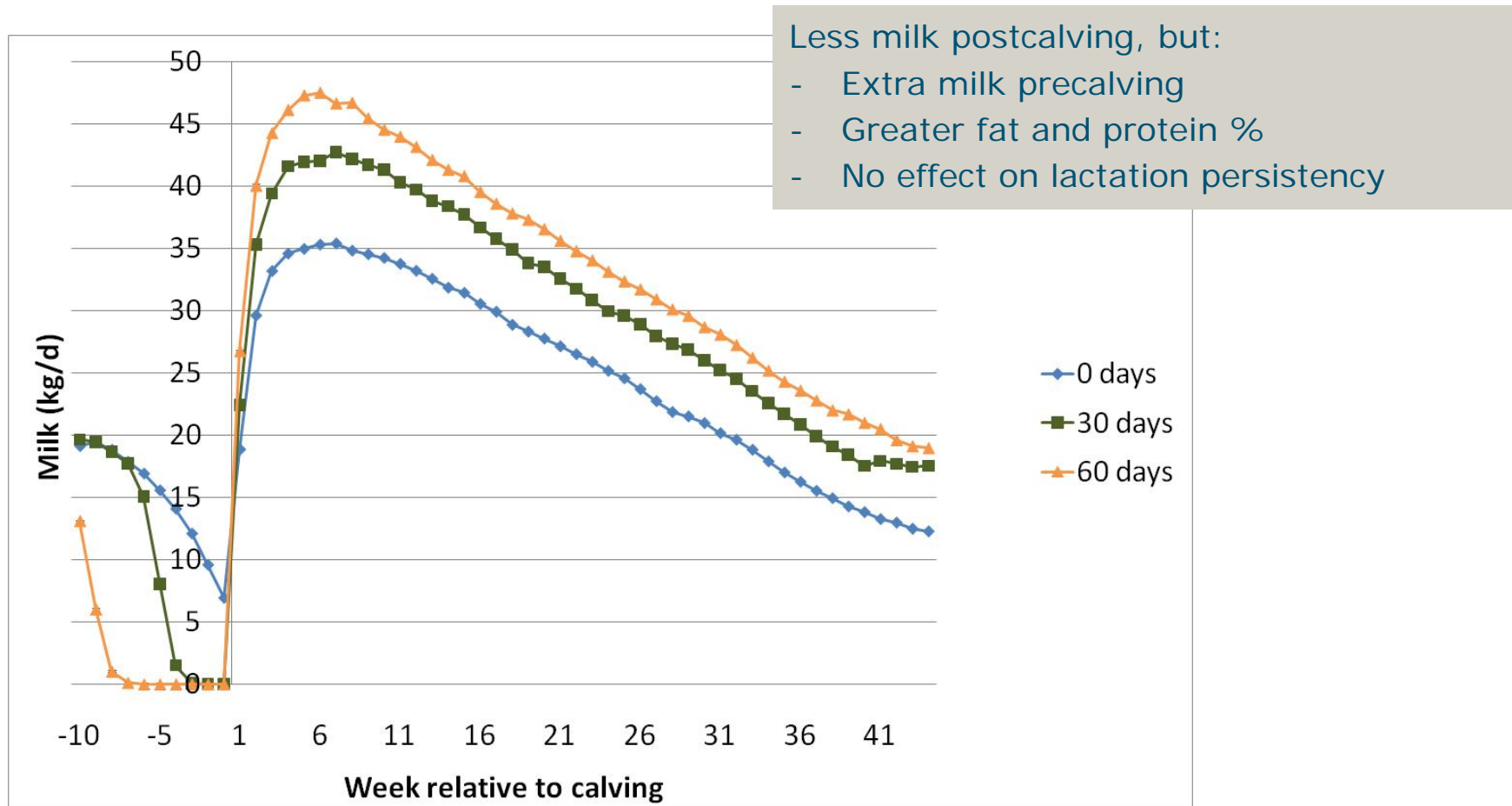
## Customised Dry Period (2013-2017)

- 130 cows (all parities)
- 2 dry period lengths: 0 and 30 days
- 1 lactation
- Used drying–off protocol:
  - 7 d before drying off: dry cow ration
  - 4 d before drying off: once daily milking
  - at drying off: **NO** dry cow antibiotics

Both experiments are paralleled with a **network of dairy farmers**  
(N = 11 and 16 Dutch dairy farms, resp.)

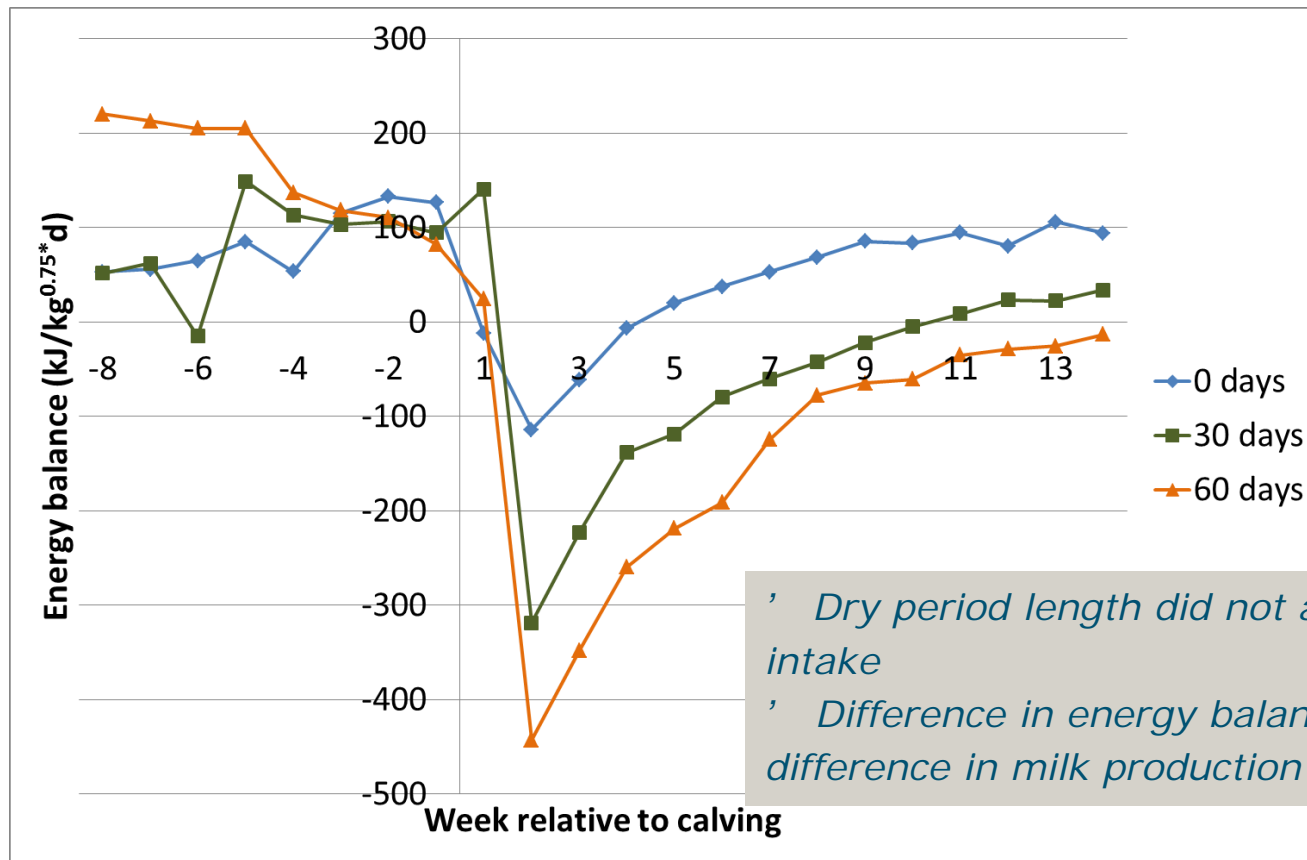
# (Short and) No dry period costs milk

**Fig 1.** Milk production for cows with conventional (60d), short (30d) or no dry period (N=167).



# Short or no dry period results in better energy balance

**Fig 2.** Energy balance for cows with conventional (60d), short (30d) or no dry period (N=167)



' Dry period length did not affect dry matter intake  
' Difference in energy balance due to difference in milk production

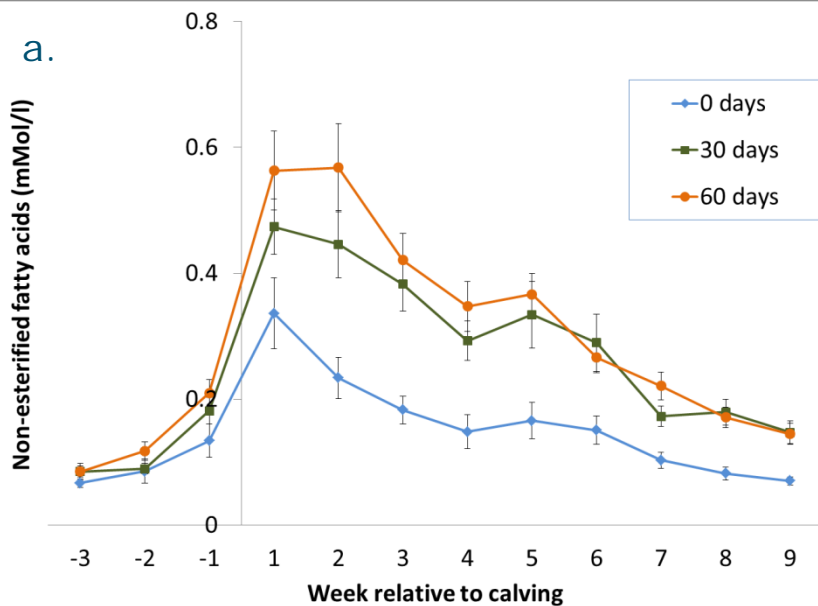
Post calving: Dry period:  $P < 0.01$ ;

(Van Knegsel et al., 2014)

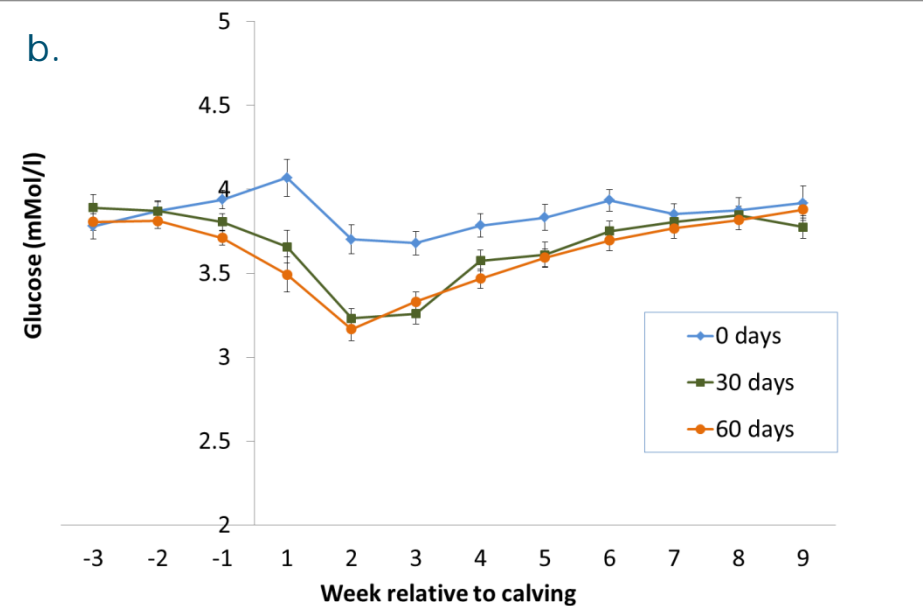


# Energy balance effects reflected in plasma values

**Fig 3.** Plasma **NEFA** (a) and **glucose** (b) concentration for cows with conventional (60d), short (30d) or no dry period (N=92).



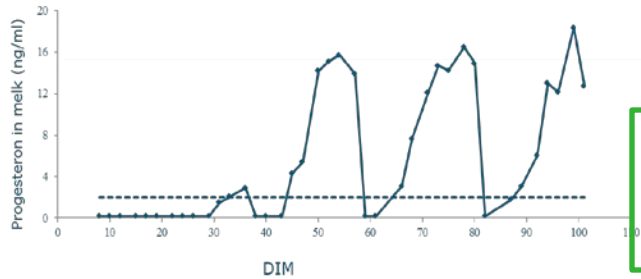
Post calving: Dry period:  $P < 0.01$



Post calving: Dry period:  $P < 0.01$

0 days dry: ' ovulate earlier post calving (23 vs. 28 vs. 29 d)

' had more regular cycles (Chen et al., 2015b)



Variable	Dry period length		
	0 days	30 days	60 days
Normal resumption of ovarian cyclicity (%)	53.2 (25/47) <sup>a</sup>	47.7 (21/44) <sup>ab</sup>	26.0 (13/50) <sup>b</sup>

**Abnormal resumption of ovarian cyclicity:**

**Type I: late ovulation or anovulation (%)**

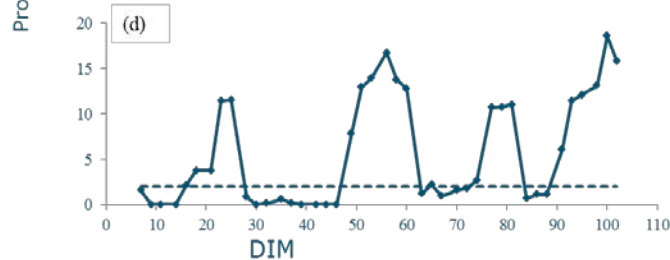
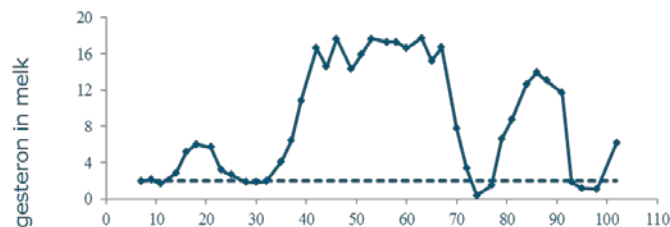
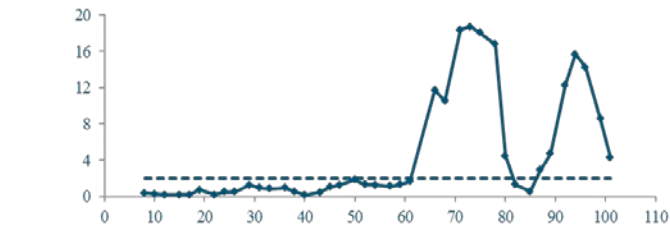
2.1 (1/47)	18.2 (8/44)	16.0 (8/50)
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**Type II: long luteal phase (%)**

44.7 (21/47)	34.1 (15/44)	50.0 (25/50)
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**Type III: cessation of cyclicity (%)**

0.0 (0/47)	0.0 (0/44)	8.0 (4/50)
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# Intercalving interval is shorter for cows with no/short dry period

(Kok et al., in review)

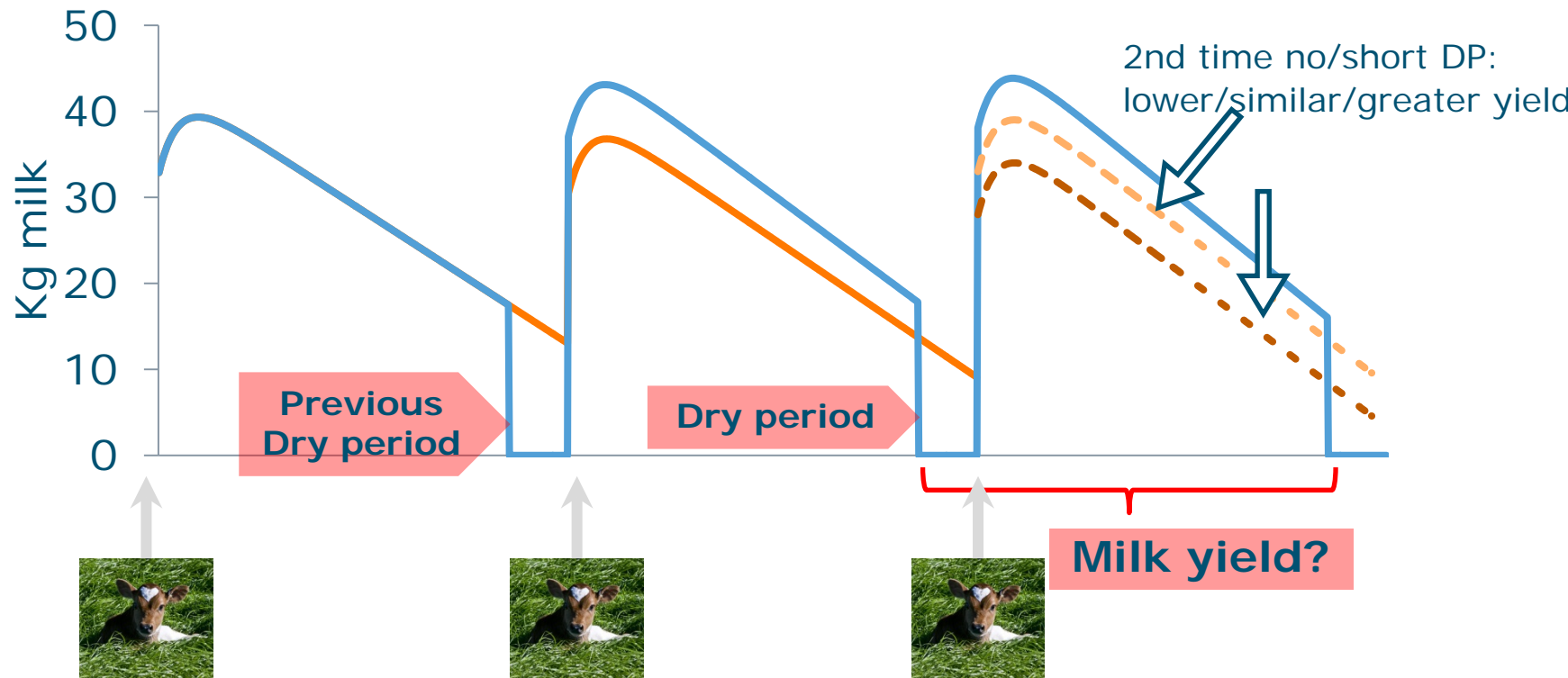
**Table 2. Milk production and intercalving interval** of second parity cows from 16 commercial farms with a shortened/no dry period management strategy.

	Dry period		
	Conventional	Short	No
	FPCM <sup>3</sup>	FPCM <sup>3</sup>	FPCM <sup>3</sup>
305-d milk yield (kg/d)	30.8 <sup>a</sup>	28.4 <sup>b</sup>	23.8 <sup>c</sup>
Effective lactation yield (kg/d) <sup>1</sup>	25.4 <sup>a</sup>	24.9 <sup>a</sup>	22.4 <sup>b</sup>
Intercalving interval (d)	<b>385<sup>a</sup></b>	<b>368<sup>b</sup></b>	<b>359<sup>b</sup></b>

<sup>1</sup>Effective lactation yield = milk yield from 60 d before calving to 60 d before next calving (in kg/d), i.e. lactation yield corrected for milk yield before calving and differences in intercalving interval.

# Effect of short/no dry period over multiple lactations

*Three possible scenarios?*



Aim: Assess the impact of dry period length on yield over multiple lactations

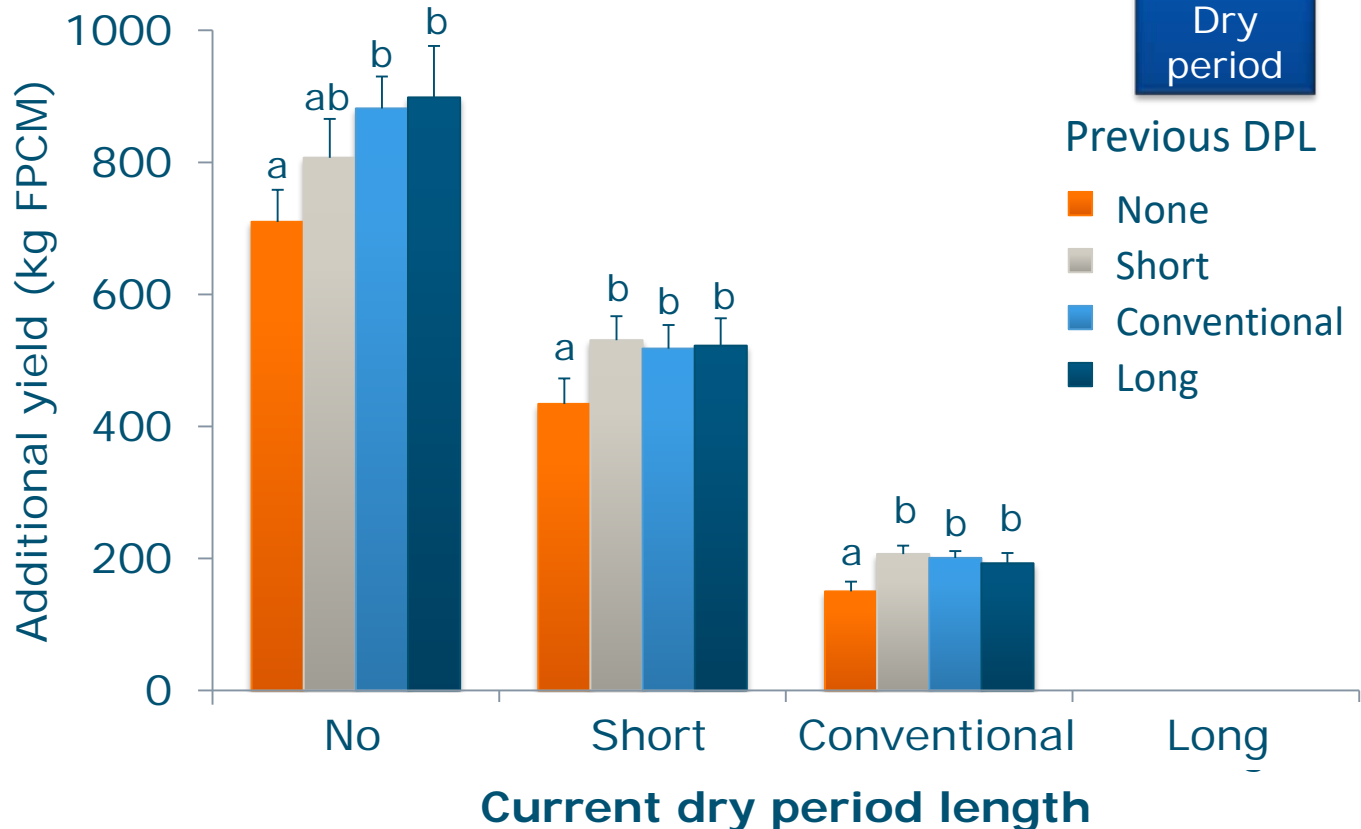
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# Methods – Analysis

- 16 farms, 2007-2015: milk records, dry-off dates
- 1420 lactations with known DPL and previous DPL
  - No                      0-2 wk (89% 0 days)
  - Short                    3-5 wk
  - Conventional        6-8 wk
  - Long                    9-12 wk
- Assess impact of current DPL and **previous DPL**
  - Additional yield in 60 days precalving
  - 305-d yield

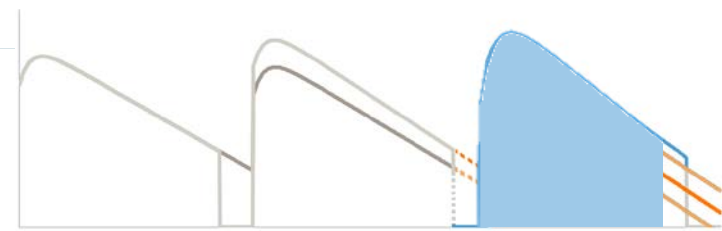
# Results – Additional yield

during the 60 d before calving

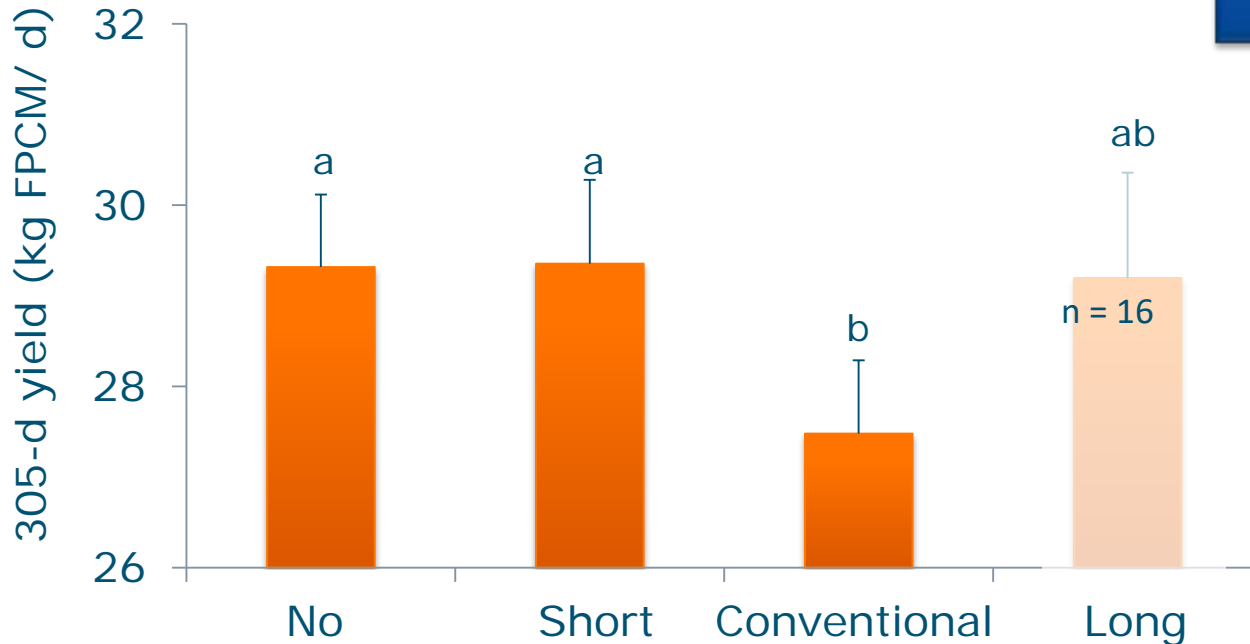


- When previous DP is omitted: additional yield during 60d before current calving is reduced.

# Results – 305-d yield



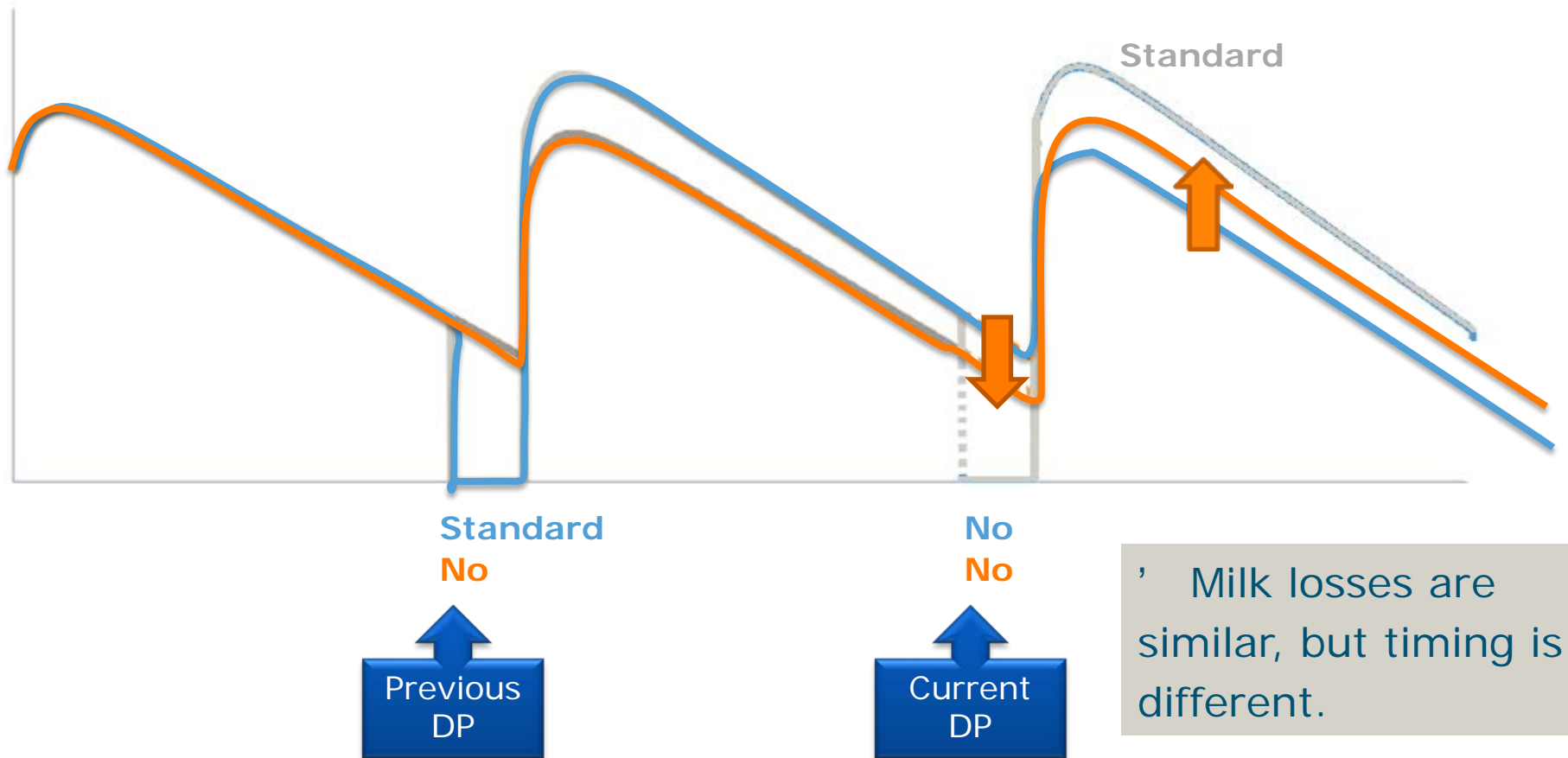
Currently no dry period



Previous dry period length

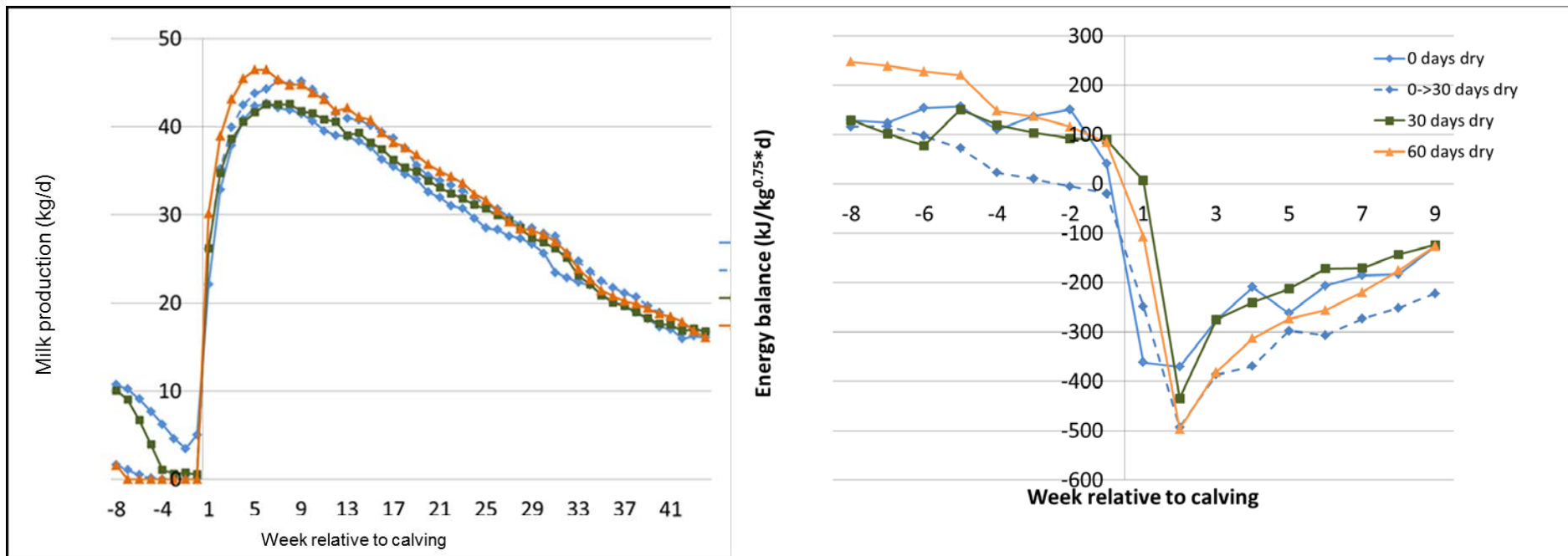
- No effect when previous DP was short, conventional or long (data not shown)
- Increased yield after 2<sup>nd</sup> time no dry period, compared with 1<sup>st</sup> time no dry period.

# Effect of previous DPL in case of no DP



# What are the consequences for EB in the 2<sup>nd</sup> lactation?

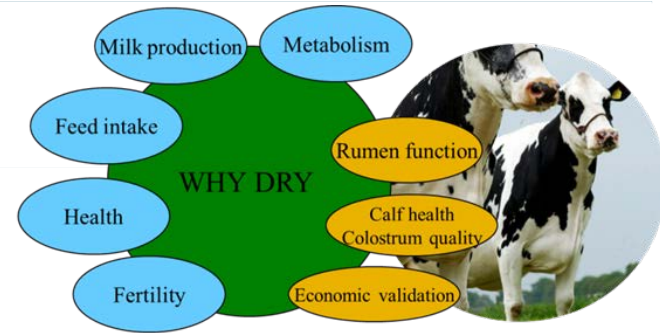
**Milk yield** and **Energy balance** for cows with conventional (60d), short (30d) or no dry period (0d) in the 2<sup>nd</sup> lactation after implementation of dry period length treatments (WHYDRY).



(Chen et al., 2016)



# Conclusion and perspectives



## No dry period:

- significant effects on EB and milk yield
- repeated no DP: similar milk losses, different timing, less beneficial for EB?

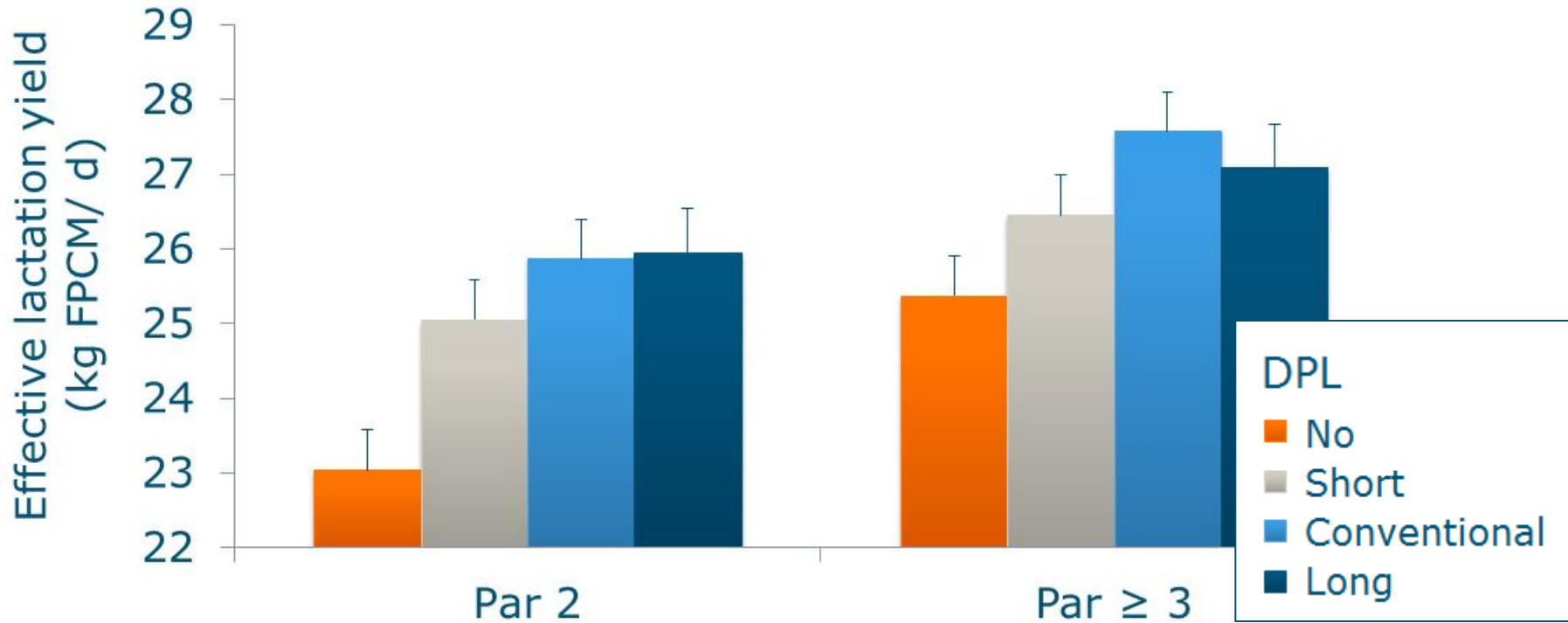
## Short dry period (30d):

- beneficial for EB, limited (no?) reduction in milk yield
- repeated short DP: similar milk losses

## New focus: Customised dry period

- Is the optimal dry period length depended on individual cow characteristics? (parity, body condition, udder health status, genotype, ...)?

# Optimal dry period length depends on age?

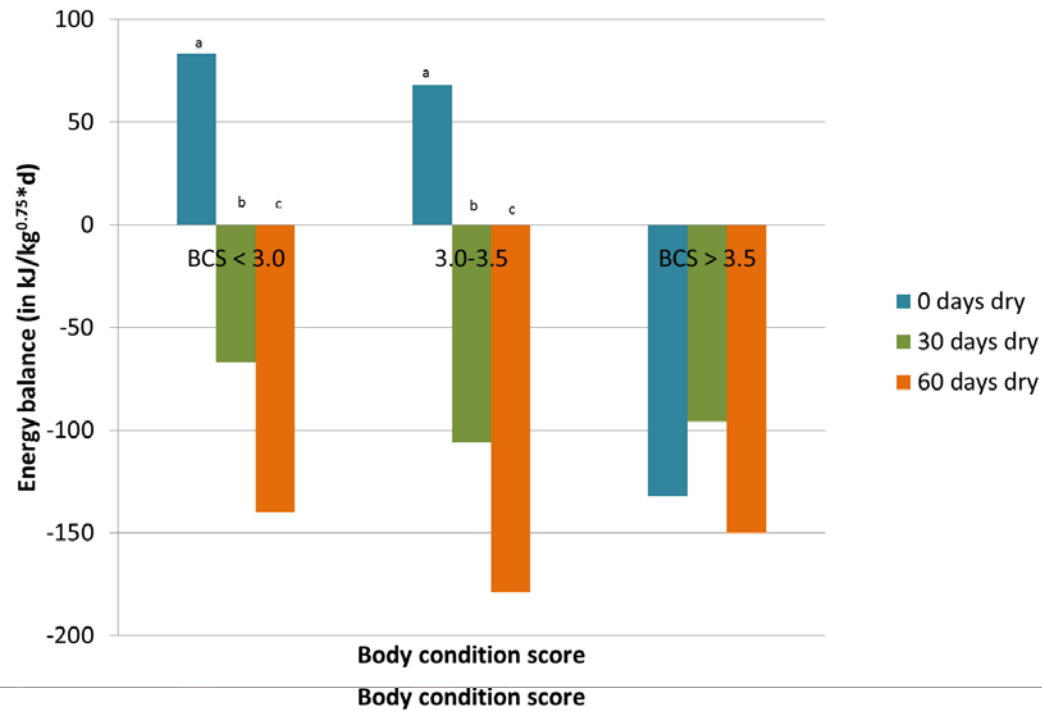
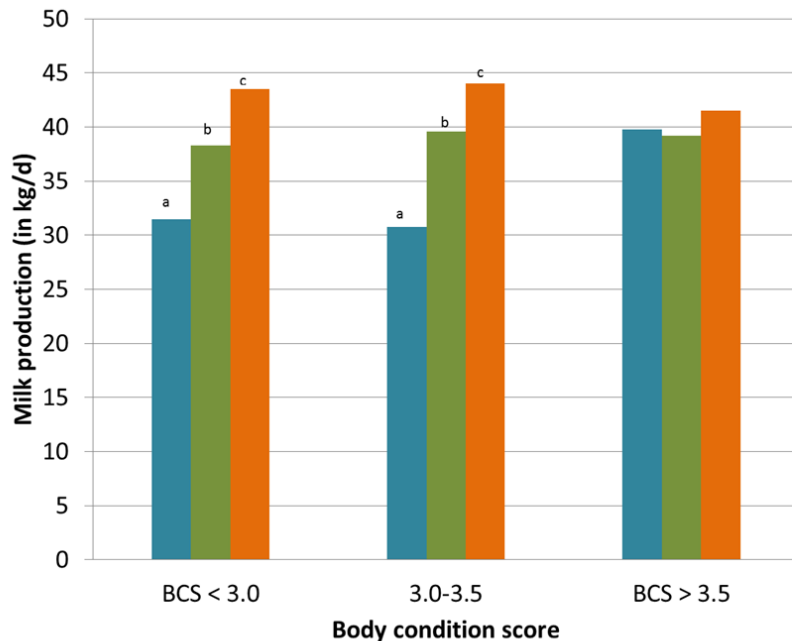


- Data from 16 commercial farms
- Short DP: -1 kg/d
- No DP: -3 kg/d – parity 2 cows  
-2 kg/d – parity >2 cows

(Kok et al., 2016)

# Optimal dry period length depends on BCS?

' Shortening or omitting the dry period has no effect on the energy balance and milk yield after calving in fat cows (BCS > 3.5 before calving).



Currently: ' development of a **decision support tool** to optimize DPL for energy balance and milk yield for individual cows  
' evaluate a customised dry period for **longevity**, and **economic** and **environmental consequences**

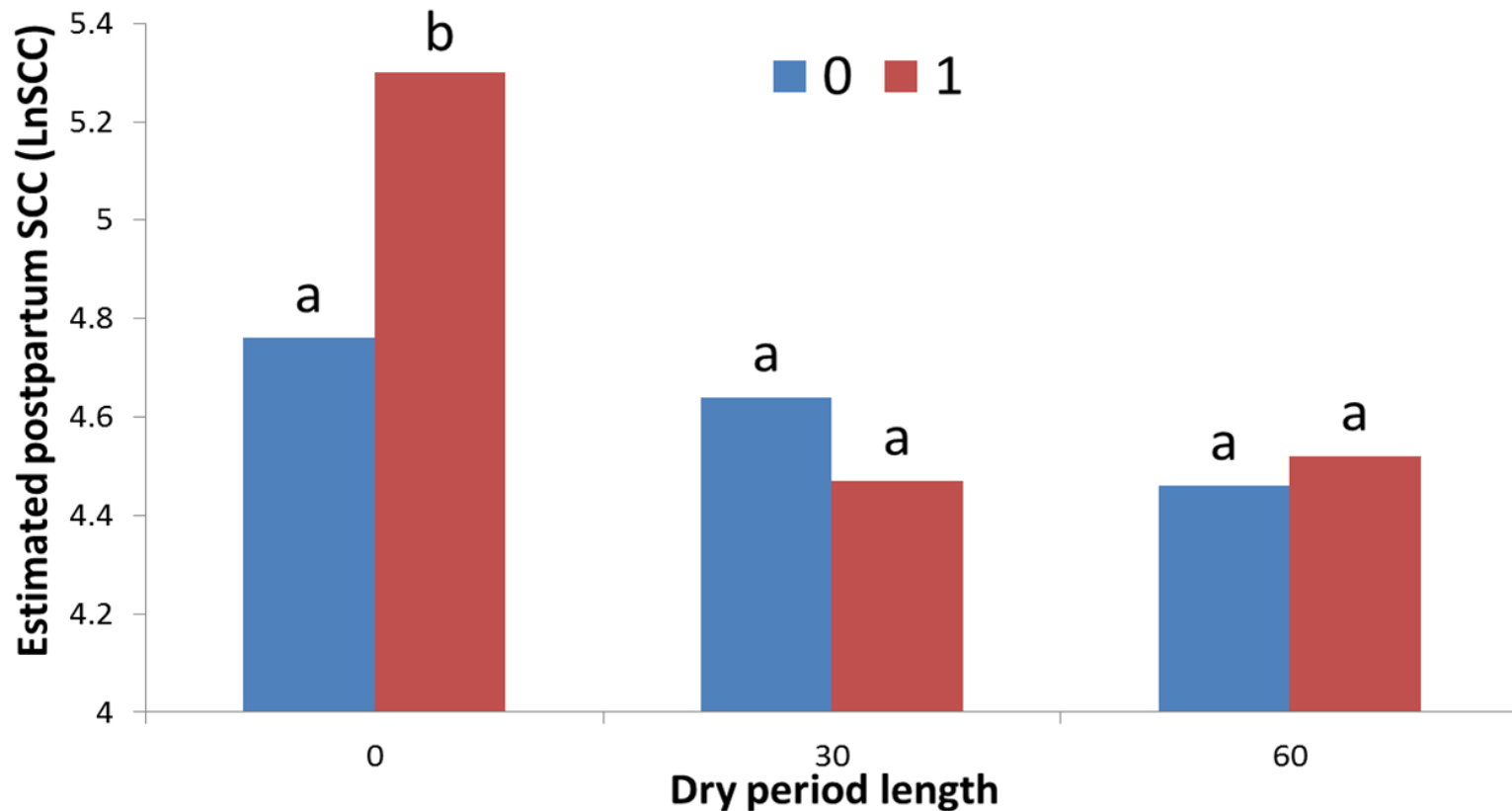
Thank you for your attention



**WAGENINGEN UR**  
*For quality of life*

# Optimal dry period length depends on somatic cell count?

' Omitting the dry period increases SCC in cows which had a **SCC elevation in the previous lactation** .



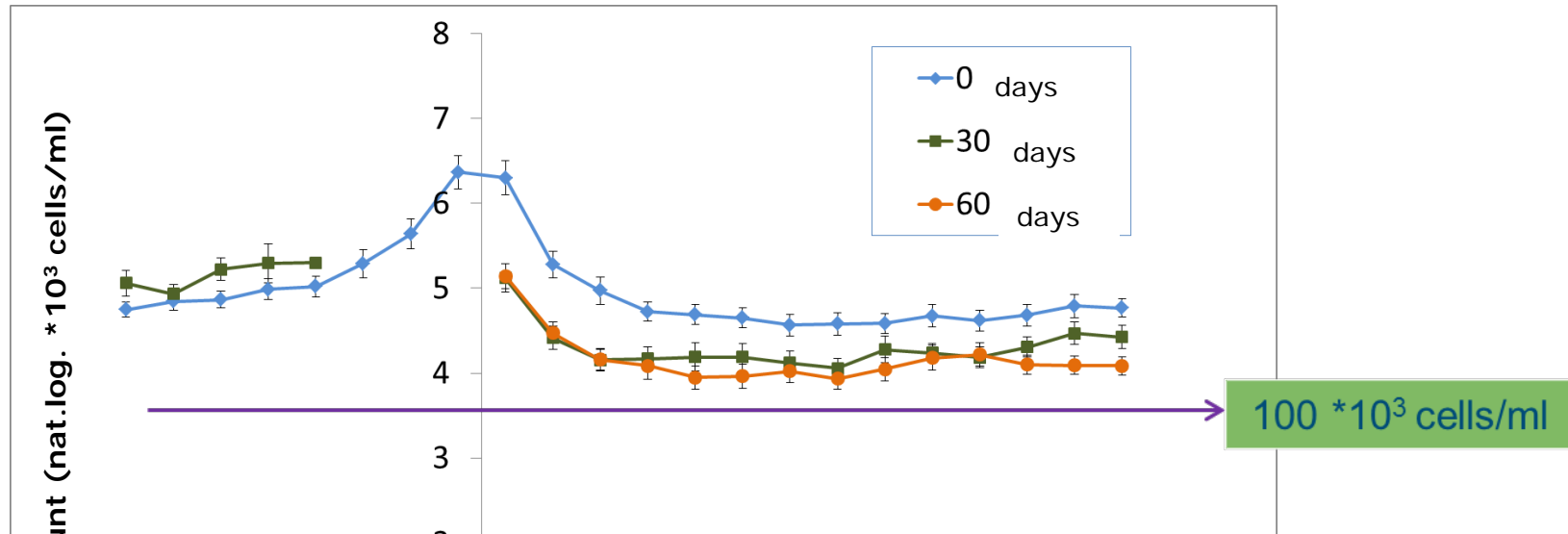
# Difference between young and old cows

**Table 1.** Milk production (FPCM; kg) whole lactation, **young and old cows**,

	Dry period length		
	0 days	30 days	60 days
<i>Total milk production, <b>parity 2</b></i>			
week: -8 till 0	1081	447	0
week: 0 till 44	8083	10451	11110
<b>Total: week -8 till 44</b>	<b>9164</b>	<b>10898</b>	<b>11110</b>
<i>Total milk production, <b>parity &gt; 2</b></i>			
week: -8 till 0	797	442	0
week: 0 till 44	8804	9883	10775
<b>Total: week -8 till 44</b>	<b>9601</b>	<b>10325</b>	<b>10775</b>

# No dry period increases somatic cell count

**Fig 6.** Somatic cell count in milk of cows with conventional (60 d), short (30 d) or no dry period (N=167).



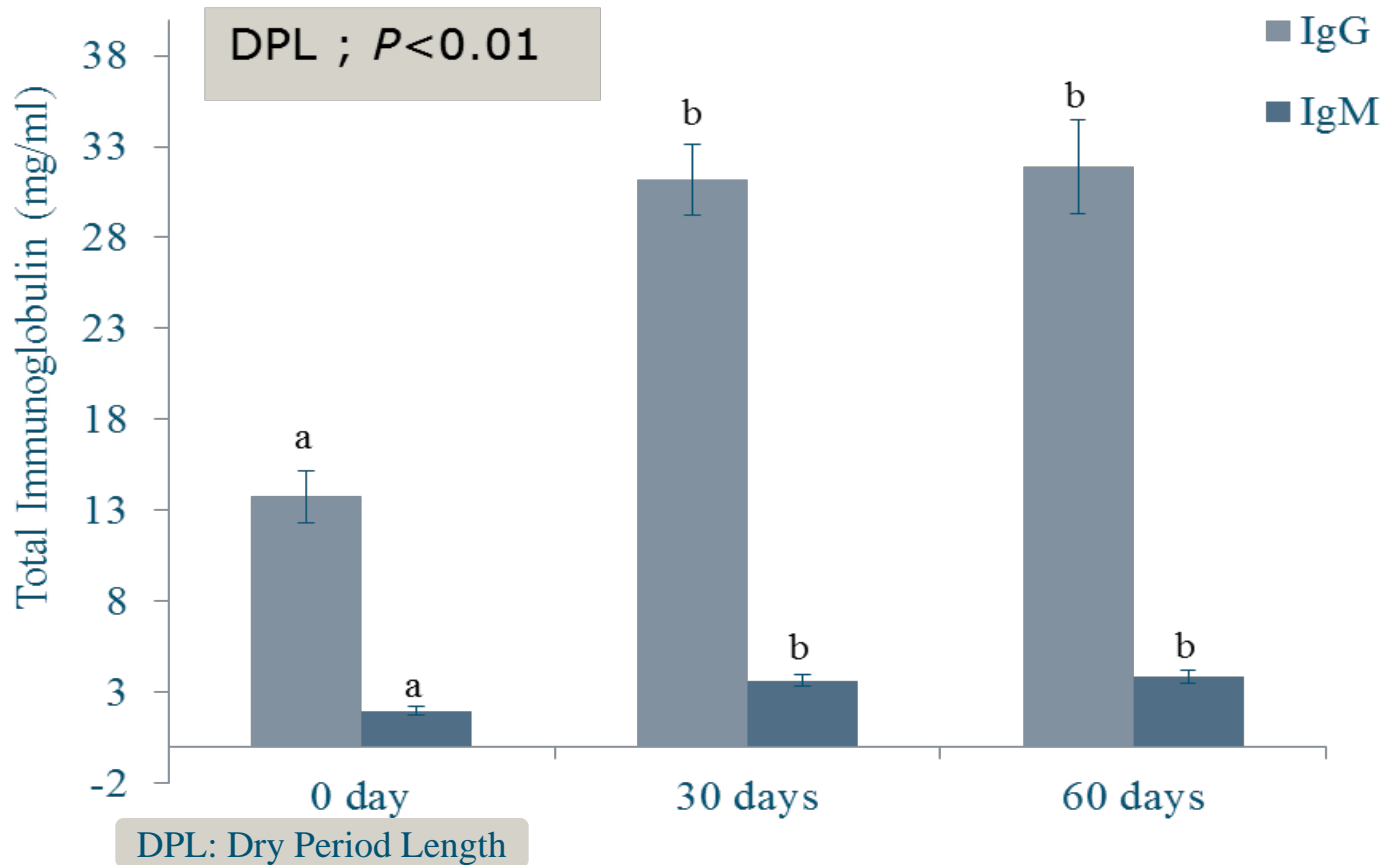
' What is the cause for increase in SCC: omitting the dry period or omitting the antibiotics?  
 ' Is increase in SCC related with reduced mammary health, less milk or altered regeneration profile in the mammary cells?

Mastitis incidence, week 0-14:  
 0 days: 12 (10/56 cows);  
 30 days: 8 (8/55 cows);  
 60 days: 10 (9/56 cows)

Post calving: Dry period length:  $P < 0.01$ ;  
 Ration:  $P = 0.95$

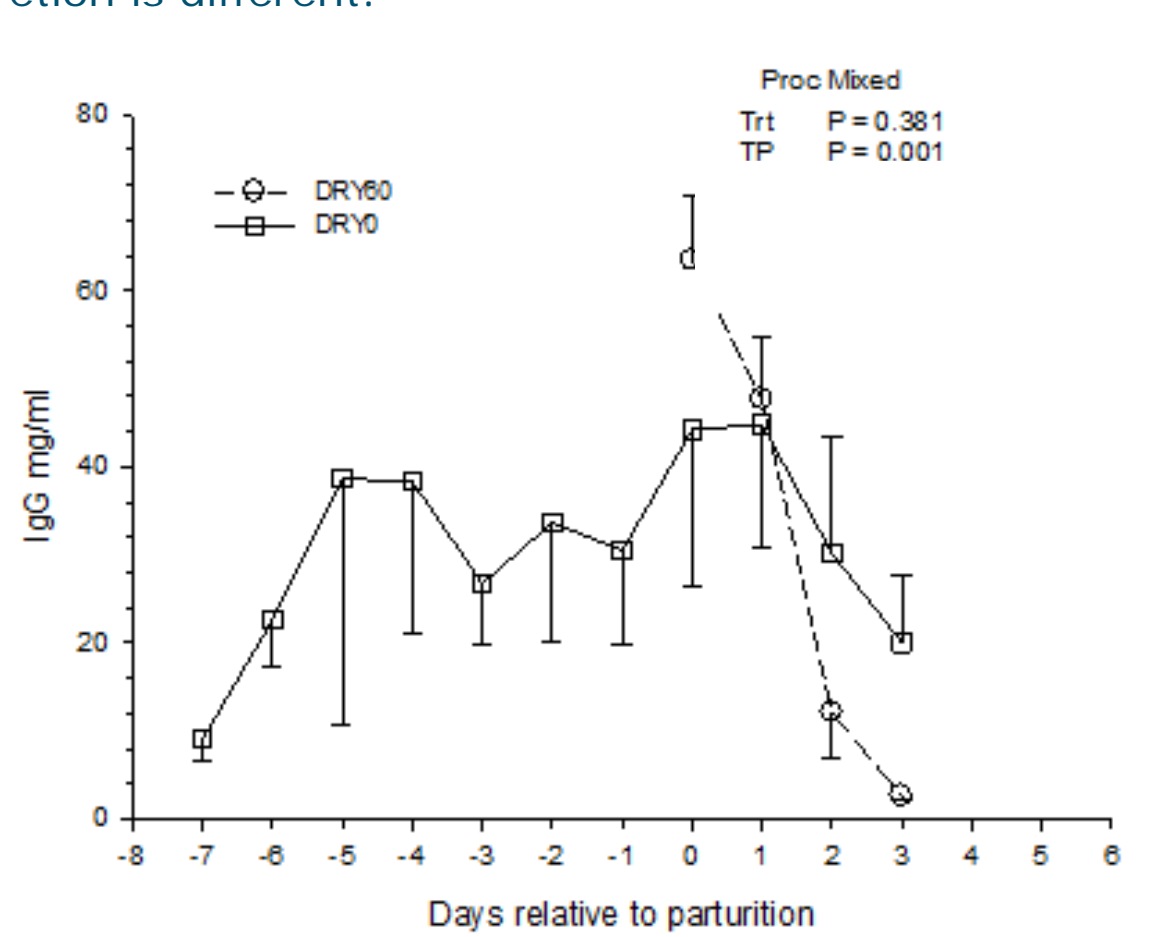


# Lower IgG in colostrum



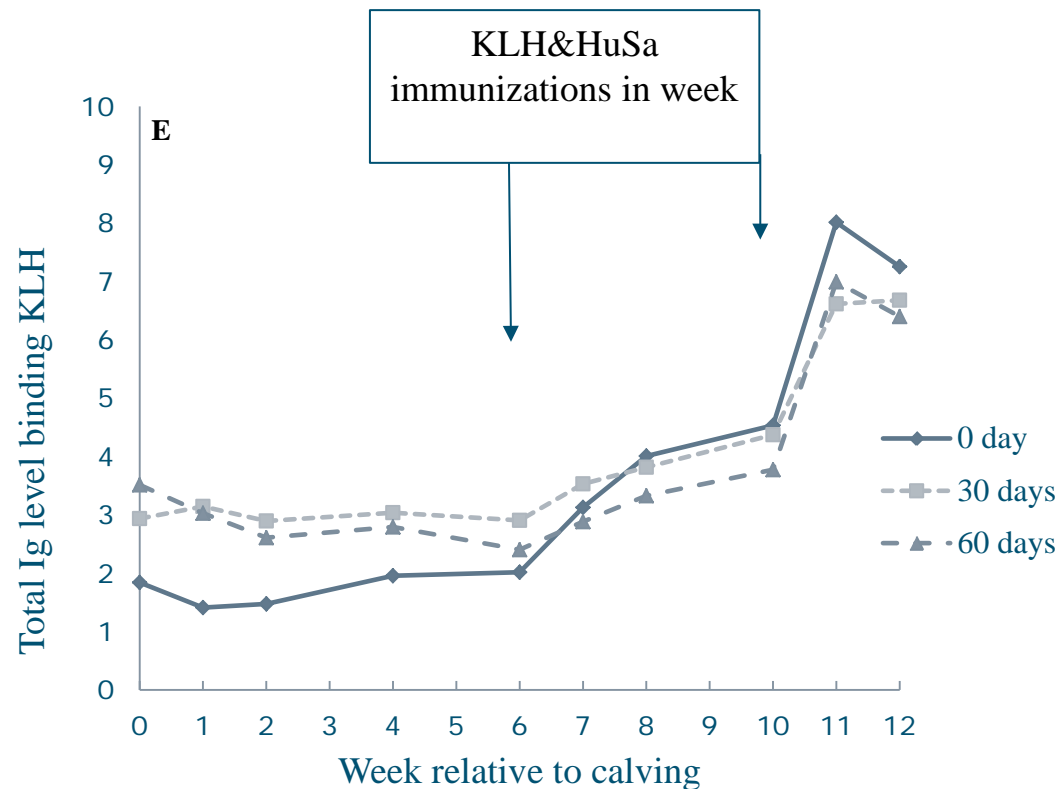
# Timing of colostrum secretion makes the difference

- Total colostral IgG is not different between 0 and 60 days dry
- Timing of secretion is different!



# Lower plasma antibodies in first weeks, later no effect

- Calves received colostrum of their own mother (2 x 2 ltr in first 24 hrs);
- Calves were immunized with model antigens (KLH and HuSa) in week 6 and 10
- No effect on calf growth first 12 weeks



KLH : Keyhole Limpet Hemocyanin  
HuSA: Human Serum Albumin  
DPL: Dry Period Length

(Mayasari et al., 2015)



# Conclusions WHYDRY

## Short dry period

- Limited reduction in milk yield
- Improvement of the energy balance
- No effect on: SCC, colostrum, calves, persistency
- Shortening the DP for 2 subsequent lactations is possible!

## No dry period

- Strong reduction in milk yield, no effect on persistency
- Large improvement of the energy balance and metabolic health
- Greater SCC, lower colostrum quality
- Risk that cows are not persistent enough
- Option for selected group of cows.