

# Effect of initial health status of the udder on inflammatory response to once-daily milking in dairy cows

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RUMINFLAME Project  
INRA GISA metaprogram



- **Once-daily-milking (ODM)**
  - involves a 24h milking interval
  - is of interest in bovine dairy farms:
    - routine work
    - shortage of forages due to extended drought period
    - animal BCS
- **However it is poorly used because:**
  - milk yield decreases by 20 to 30 % on average (Rémond et al, 2005)
  - is seen as risky for the health of the udder

## Once daily-milking: a risky practice?

- extended milk stasis into the udder  
→ growth of pathogens
- increased milk leakage between milkings  
→ penetration of pathogens into the teat canal

- udder inflammation  
Increases in SCC (Stelwagen et Lacy-Hulbert, 1996 ; Rémond et al, 2004)  
not always associated with an increase in the number of infections and clinical mastitis (Holmes et al, 1992 ; Clark et al, 2006 ; Lacy-Hulbert et al, 2005)

→ Only few studies combining microbial and inflammation analysis

- **Aim of the study:**

To describe the inflammatory response to once-daily milking according to the initial health status of the udder

- **Questions:**

- Is there an inflammatory response in dairy cows with no udder inflammation and infection?
- How does this response vary when there is an initial inflammation or infection?

The initial health status of udders were defined *a posteriori* on the basis of:

- the presence or not of an inflammation
- the presence or not of an infection by a **minor** or **major** pathogen

Coagulase negative S.

...

S. Aureus  
E. Coli  
S. uberis...

Introduction

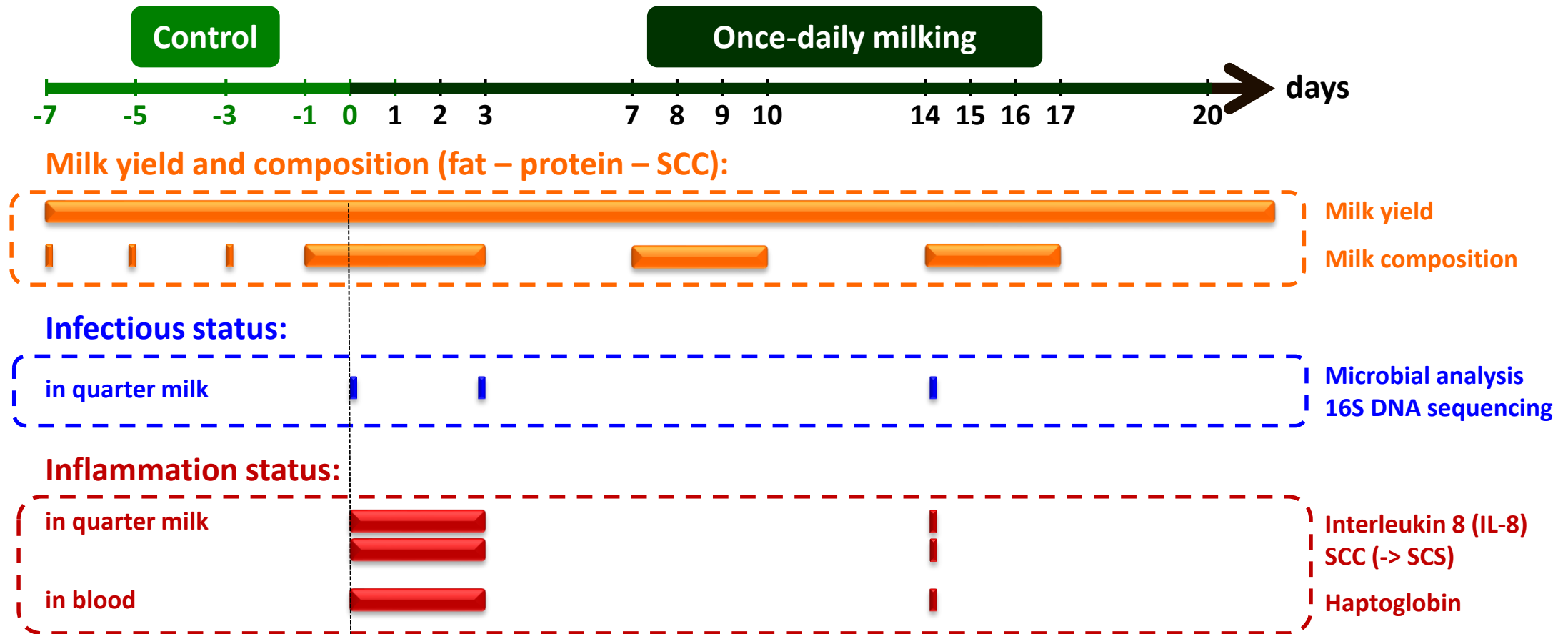
Objectives

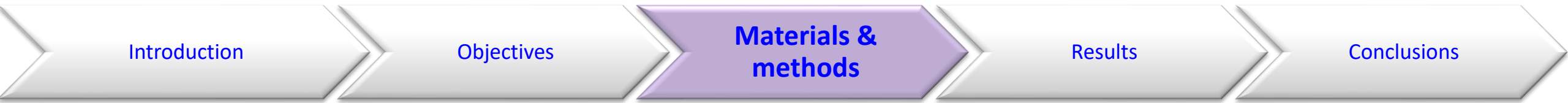
Materials & methods

Results

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-> 55 crossbred Holstein x Normande dairy cows





**Microbial status**



Not infected      Infected major pathogen      Infected minor pathogen

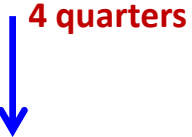
**Quarter level**

**Inflammation status**

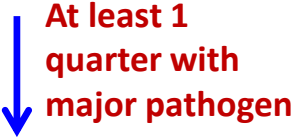
- IL-8 detected in milk
- or
- SCC >100 000 cells/mL



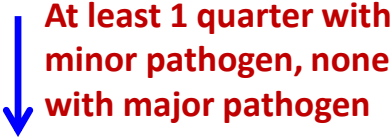
Not inflamed      Inflamed



Not infected



Infected major pathogen

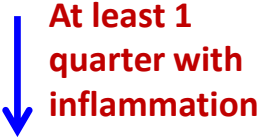


Infected minor pathogen

**Udder level**



Not inflamed



Inflamed

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- **4 initial udder health status:**

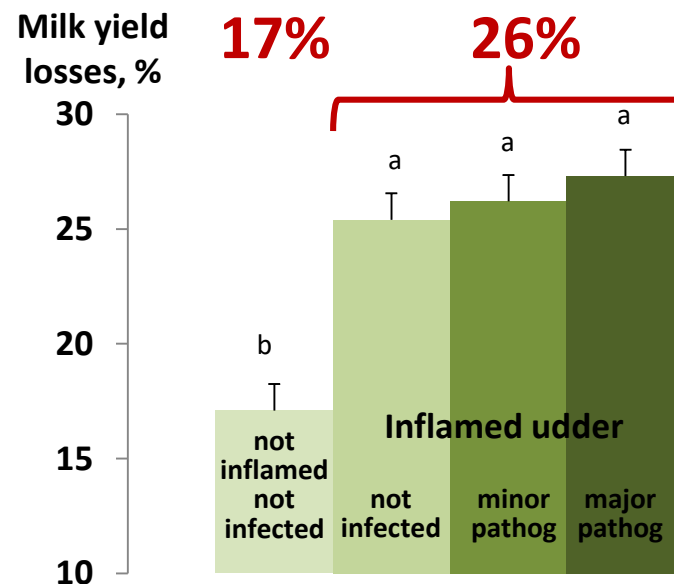
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	<b>Cows (n)</b>
<b>No inflammation and no infection</b>	<b>13</b>
<b>Inflammation and no infection</b>	<b>15</b>
<b>Inflammation and infection by a minor pathogen</b>	<b>13</b>
<b>Inflammation and infection by a major pathogen</b>	<b>14</b>

- Consistently with previous results,

	Twice-daily milking	Once-daily milking	Variations
Milk yield, kg/d	24.7	18.7	- 6.0 (-24%)
Milk fat content, g/kg	42.6	46.7	+ 4.2
Milk protein content, g/kg	30.9	31.6	+ 0.7

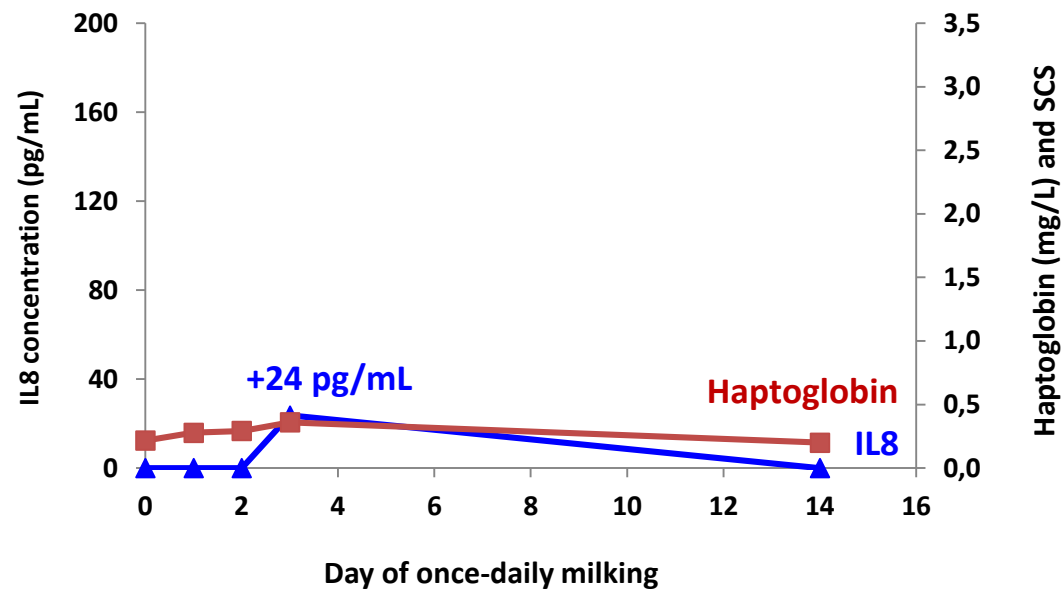
- Milk yield losses were higher for cows with udder inflammation whatever their infection status



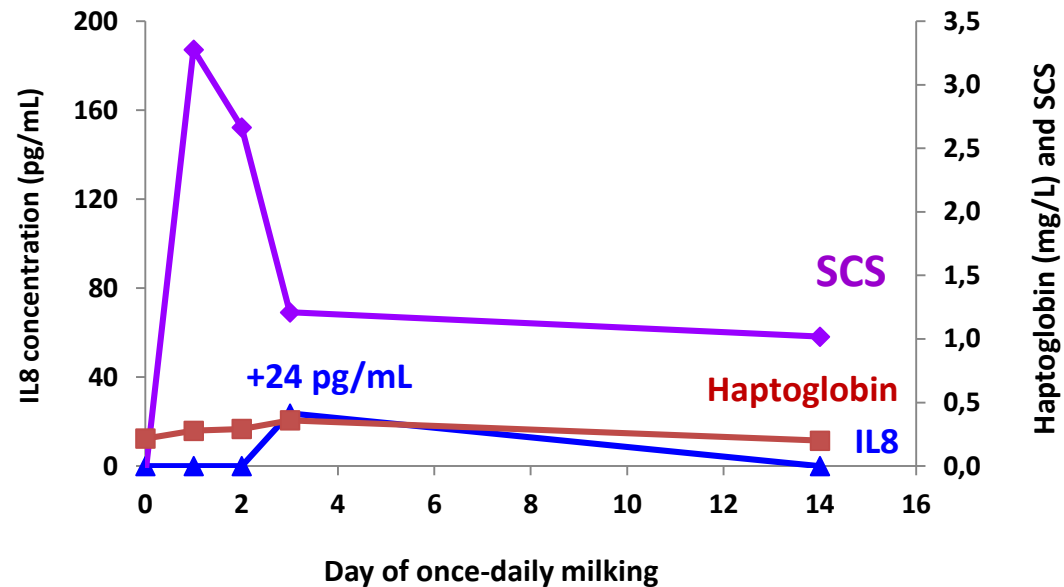
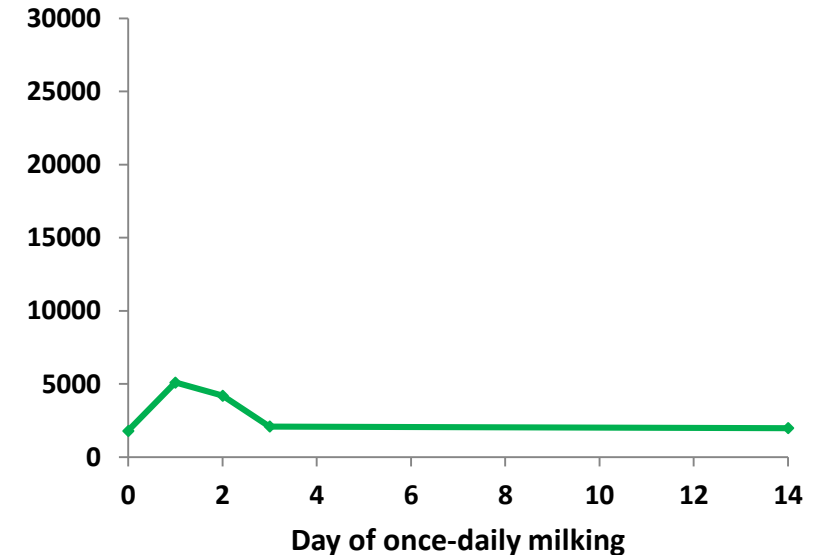
a, b :  $P < 0.05$



- **Cows with no initial inflammation and infection exhibited a moderate and transitory inflammation in response to ODM**



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Quantity of somatic cells in milk ( $10^6/\text{day}$ )



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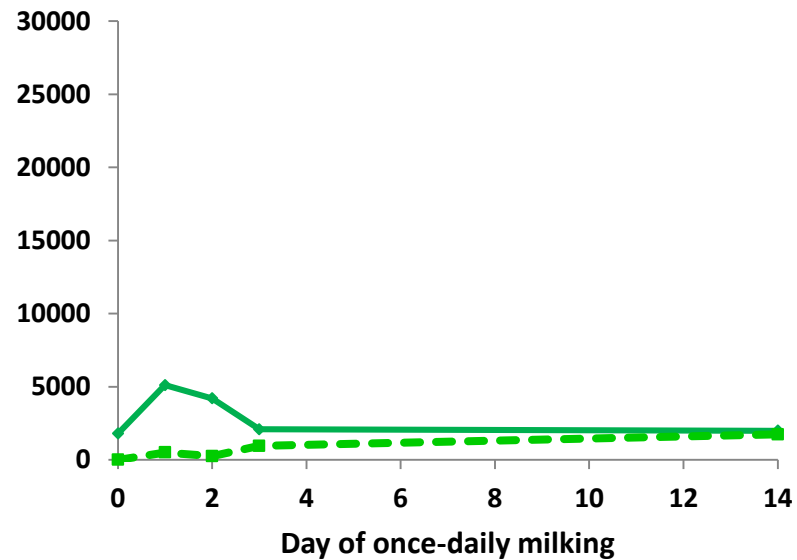
**Results**

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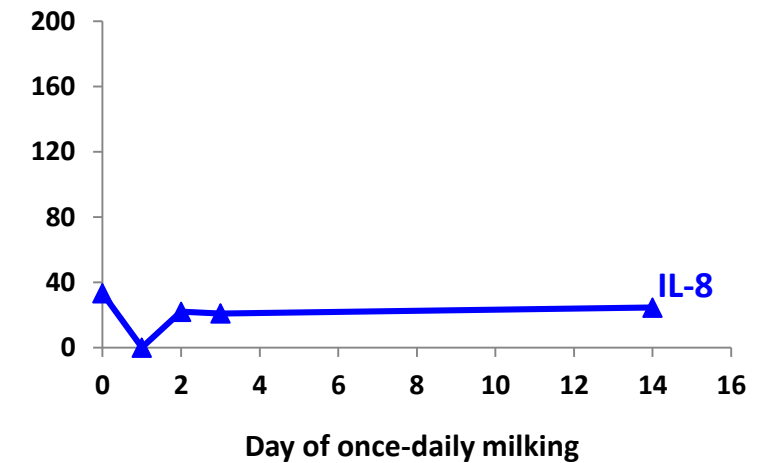
- **How does this inflammatory response vary for the other initial health status?**
  - Haptoglobin concentrations varied similarly, with a slight increase at d3
  - What about the concentrations of IL8 and somatic cells in milk?

- How does this inflammatory response vary for the other initial health status?

Quantity of somatic cells in milk ( $10^6$ /day)



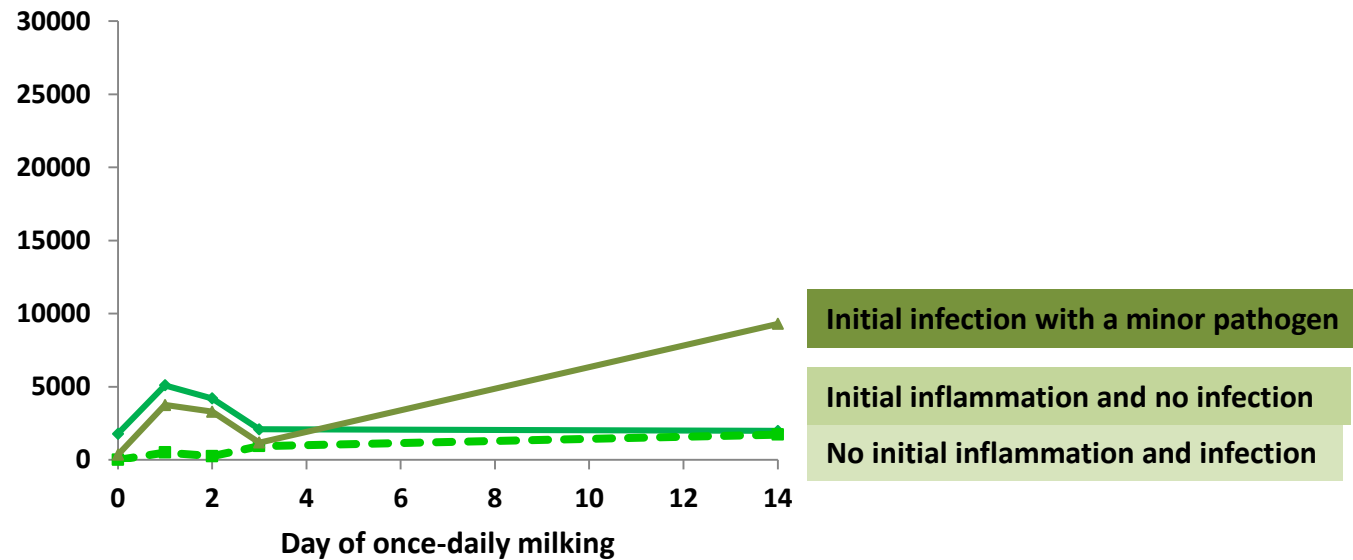
Concentration in milk ( $\mu\text{g/mL}$ )



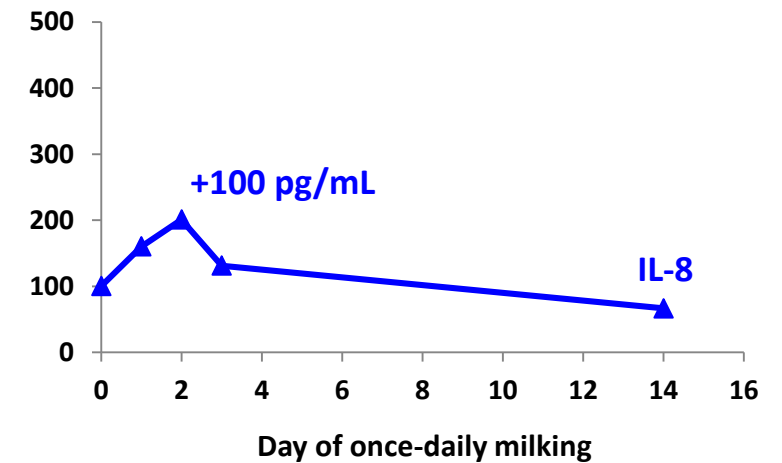
**No local inflammatory response**

- How does this inflammatory response vary for the other initial health status?

Quantity of somatic cells in milk ( $10^6$ /day)



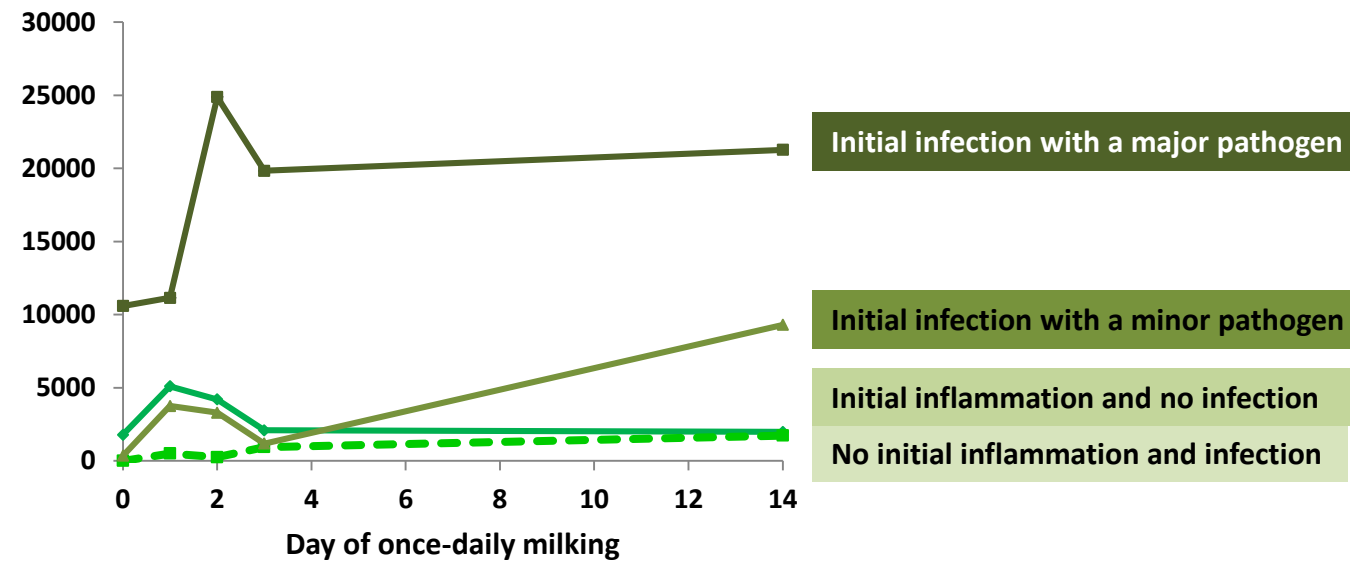
Concentration in milk (pg/mL)



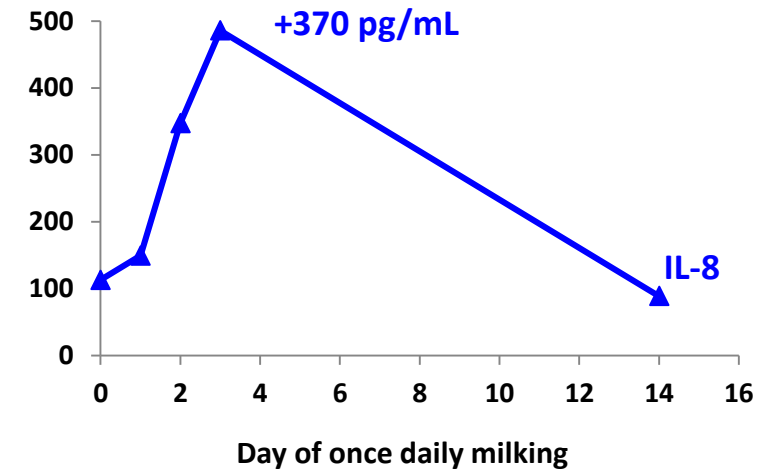
**Local inflammatory response**

- How does this inflammatory response vary for the other initial health status?

Quantity of somatic cells in milk ( $10^6/\text{day}$ )



Concentration in milk (pg/mL)



**A higher local inflammatory response**

- **Haptoglobin: once-daily milking induces a slight systemic inflammation whatever the initial health status of the udder**
- **IL8 and SCC: it induces different local inflammatory responses**

Udder	Response
No inflammation and no infection	moderate & transitory
Inflammation and no infection	no response
Inflammation and infection	+ (minor pathogen) / ++ (major pathogen)

- **Once-daily milking should be avoided in case of initial infection of the udder**

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**thank for your attention**