Associations between cow factors, intra-mammary infections and inflammatory indicators

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Where do we start?

- What do we want to achieve?
  - Prevent spread of infectious subclinical mastitis
- How?
  - We have to find the cows that have infectious subclinical mastitis
- How do we find them?
  - By bacteriological culturing/ PCR assay
    - EXPENSIVE!
  - By measuring inflammatory indicators to help us select cows for sampling
Inflammatory indicators

• Somatic cell count (SCC)
  – At IMI the proportion of neutrophils can increase ≥ 90%

• Enzymes
  – Lactate dehydrogenase (LDH)
  – N-acetyl-β-D-glucosaminidase (NAGase)
  – Alkaline phosphatase (AP)
Inflammatory indicators

• Can increase/decrease due to other factors than infection, e.g. parity, stage of lactation, stress etc.
• How does this affect the ability to find cows with an infection?
Inflammatory indicators

• In Sweden we have used a adjusted SCC
  – Parity
  – Stage of lactation
  – Milk yield
  – Breed

• The adjusted SCC has been used to predict the probability that a cow has infectious subclinical mastitis in one or more udder quarters – “the udder health classes”
The project

**Aim**
- To investigate associations between the inflammatory indicators and
  - cow factors
  - Intra-mammary infections (IMI)
- To investigate the ability of the inflammatory indicators to predict IMI

**M&M**
- Approximately 1000 cows from 25 herds
- 3 consecutive samplings
- Bacteriological culturing of all quarters on all occasions
- One whole udder milk sample – SCC, LDH, NAGase, AP
How does cow factors affect SCC, LDH, NAGase and AP in healthy cows?

- Parity and urea in milk was associated with all inflammatory indicators.
How does cow factors affect SCC, LDH, NAGase and AP in healthy cows?

- Breed was associated with SCC and AP
- Days in milk (DIM) was associated with LDH, NAGase and AP
How does cow factors affect SCC, LDH, NAGase and AP in healthy cows?

- Season was associated with LDH and NAGase
  - Lowest in October-November compared to January-April
- Milk yield was associated with SCC and NAGase
- Percentage of fat in milk was associated with SCC and AP
  - Increasing SCC and AP with increasing percentage of fat
- Percentage of protein was associated with LDH
  - Increasing LDH with increasing percentage of protein
Associations between IMI and SCC, LDH, NAGase and AP
Amount explained

**SCC models**

- IMI negative cows
- All cows

**NAGase models**

- IMI negative cows
- All cows

**LDH models**

- IMI negative cows
- All cows

**AP models**

- IMI negative cows
- All cows
## Predictability

<table>
<thead>
<tr>
<th></th>
<th>Sensitivity</th>
<th>Specificity</th>
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<tbody>
<tr>
<td>Incell</td>
<td>56%</td>
<td>90%</td>
</tr>
<tr>
<td>InIdh</td>
<td>22%</td>
<td>94%</td>
</tr>
<tr>
<td>Innagase</td>
<td>9%</td>
<td>96%</td>
</tr>
<tr>
<td>Inap</td>
<td>0%</td>
<td>100%</td>
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Conclusions

- All investigated inflammatory indicators are significantly associated with cow factors.
- It does not seem necessary to adjust the SCC for cow factors.
- SCC seems the best indicator to use to find cows with subclinical mastitis.
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