Improve mastitis detection through better decisions

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• **Whittlestone (AU) said:**

  At this stage in the growth of the Dairy Industry, two things are important:
  
  A. The improvement in the efficiency of the dairy farm so that the cost of production can be lowered
  
  B. An increase in quality of the milk produced

*Good quality dairy products cannot be made from poor quality milk, and in a competitive world, the highest quality at the lowest price must be the aim.*
• Many issues:
  o Cow welfare
  o Sustainability
  o Prudent use of antibiotics
  o Emerging pathogens
  o Food safety

• One answer: **Prevention**
• Application of pre- and post dipping
• Application of management practices decreasing risk of infections
  o Milking hygiene
  o Bedding hygiene
  o Proper nutrition
  o …
• Monitoring
To monitor:
Watch and check a process carefully for a period of time in order to discover something about it

- Benchmarking
- (Early) Diagnosis

Monitoring
Early diagnosis
• **Early diagnosis aims**
  - To identify diseased cows
  - To identify cows at risk

• **Classical methods**
  - CMT
  - SCC

• **New methods**
  - Sensors
  - Pattern identification (quality control curves)
There are pros, but also cons

Oldest and most applied procedures
- Selection of cows to sample
- Selection of cows to treat
- Identification of problem cows

Sensitivity vs CMT > 0

- ANY INFECTION
  - first: 47
  - second: 52
  - third: 57

- MAJOR PATH
  - first: 58
  - second: 61
  - third: 67

- MINOR PATH
  - first: 38
  - second: 45
  - third: 49

E.D. example: CMT
Sensivity vs SCC>500,000/ml

E.D.example: SCC contagious

Zecconi & Piccinini 2002, Recent developments and perspectives in bovine medicine, 346-359
Take home message 1

• Diagnostic tests are an essential component of monitoring.
• Sensitivity and specificity of each test should be known.
• How to select parameter to be monitored:
  o Cow side / on line
  o High Se (Sp)
  o Cheap to perform
  o Easy to record
  o Easy to interpret
Benchmarking
• Benchmark: a level of «quality» which can be used as a standard to compare performances.

• The terms «objective», «threshold», «target», «level» are also often used.

• A benchmark can be:
  o Legal (i.e. SCC 400,000 cell/ml EU)
  o Local (i.e. SCC levels to determine milk price)
  o Practical (i.e. acceptable levels for the frequency of a disease)
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Benchmark/Target</th>
</tr>
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<tbody>
<tr>
<td>Lactational new IMI rate</td>
<td>&lt;5-7%</td>
</tr>
<tr>
<td>% herd &gt; 200,000 cells/ml</td>
<td>&lt;15%</td>
</tr>
<tr>
<td>Fresh calver IMI rate</td>
<td>&lt;10%</td>
</tr>
<tr>
<td>Dry period new IMI rate</td>
<td>&lt;10%</td>
</tr>
<tr>
<td>Dry period cure rate</td>
<td>&gt;85%</td>
</tr>
<tr>
<td>Incidence rate clinical mastitis (100 cow/year)</td>
<td>&lt;25</td>
</tr>
</tbody>
</table>

Bradley et al, 2012 *Dairy Herd Health*
Frequency of clinical mastitis in 125 Italian dairy herds

Zecconi, 2016, Summa veterinaria, 11, 12-16
Benchmark/target: subclinical mastitis

Frequency of subclinical mastitis ($\approx 160,000$ QMS)

Zecconi, 2016, Summa veterinaria, 11, 12-16
Blood NAGase pattern during the periparturient period in the three dairy herds

Albonico et al, 2016
Take home message 2

A benchmark/target should be:
1. Measurable
2. Fitted to herd characteristics
3. Credible
4. Achievable
5. Rewarding (economically or psychologically)
6. Flexible (when required)
From benchmarking to action
Continuous improvement process

Plan: say what you do
Do: do what you said
Check: record what you have done
(re)Act: repeat a new cycle based on results
CM frequency: 2%/month

Records

Target achieved

Yes

No

Procedures

- Milk Sampling
- Bact analysis
- Epi data analysis
- Ther.prot. update
SCC post-calving

<100,000 cells/ml

Individual Test

Target achieved

END

Yes

NSAID

No

M.P. Bact. +ve

A.M. Therapy

Yes

Milk sampling Analysis

No

Target achieved

END
Bimodality

<20%

Test

Target achieved

Yes

No

Milking procedure and M.M. assessment
1. Monitoring is essential to assess production process in an effective way.
2. An effective and easy-to-retrieve recording system should be in place.
3. Parameters should be selected among the ones that can be linked to a practical intervention (action).
4. Parameters which are frequently measurable (daily/weekly) should be preferred.
5. Benchmarks (targets) should be defined based on achievable results at herd level.
6. An operational procedure should be implemented any time a significant change (or alarm) is observed.
7. Benchmarks should be changed as long as the targets are achieved and efficiency of the process improves.
CONCLUSIONS

• Milk production is a **continuous process** involving different factors (biological, economical, mechanical, psychological...).

• This process **must be monitored** like any other production process.

• Only when information (data) are collected and evaluated promptly and efficiently, **proper decisions** can be taken and positive results expected.
Thank you!