A tool to identify cows eligible for Selective Dry Cow Therapy (SDCT)

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Mastitis in Italy

- Timespan: last 2023 TD, 365 days back
  - Mean of SCC annual weighted averages: 324 K cells /ml
  - Mean of annual percentage of recorded cows with cells > 200 K /ml: 28.7%

![Monthly trend of weighted SCC Averages, 2023](image-url)
Dry period is a crucial phase for mastitis

During dry period:

- immune defenses decrease (Schukken et al., 2011)
- at the beginning, absence of physical barriers, such as keratin plugs at the level of the nipple sphincter, preventing the entry of mastitogenic agents (Schukken et al., 2011)

50% of cases of environmental mastitis in the first 100 days of lactation originate from infections contracted during the dry period (Green et al, 2002)
Prophylaxis approach: BDCT

(Blanket Dry Cow Therapy, BDCT)

• Treats all quarters with antibiotics to:
  • Eradicate existing infections at the time of dry-off.
  • Prevent new infections during the dry period.

• Use an external or internal sealant to prevent the entry of pathogens.

**PROS:** 😊
All cows are treated

**CONS:** 😞
High costs for antibiotics
High vet expenses

New EU legislation to avoid antibiotic resistance

Regulation 2019/6 on veterinary medicines:
• Article 107(1): “Antimicrobial drugs are not used systematically nor employed to compensate for poor hygiene, inadequate zootechnical practices, lack of care, or even poor management of farms.”

• Article 107(3): “Antimicrobial drugs are not used for prophylaxis, except in exceptional cases, for administration to a single animal or a limited number of animals.”
Selective Dry Cow Therapy (SDCT)

**Criterion:** *Treat with antibiotics only cows showing infections symptoms at dry off.*

<table>
<thead>
<tr>
<th><strong>PROS:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Decrease dramatically the use of antibiotics (and related costs)</td>
</tr>
</tbody>
</table>

*with BDCT:*

- 70% of antibiotics in dairy farms are used for mastitis (van Werven, 2014)
- Of them, 40% at dry-off (Kuipers et al., 2016)

*with SDCT:*

- The use of antibiotic is reduced in a range 21-60% without compromising health status in next lactation (Zecconi et al 2020; Cameron et al., 2014; Kabera et al., 2019; Rowe et al., 2020a, Rowe et al., 2020b)

<table>
<thead>
<tr>
<th><strong>CONS:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Need robust criteria to identify cows requiring treatments</td>
</tr>
</tbody>
</table>

SDCT ➔ TOOL
The tool rationale

a) DHI data to *list the candidate lactating cows to be dried-off* (pregnant / low production)

b) protocols (criteria on SCC and other info) to select cow *to be treated based on SCC history*

• The tool is free available for 14.000 dairy recorded farms and 1.4M cows through the proprietary software Si@lleva.
A two steps approach

Step 1: IDENTIFY COWS ELIGIBLE TO BE DRIED-OFF IN A SPECIFIC DATE by
  • PREGNANCY STATUS
  • MILK YIELD

Step 2: USE PROTOCOLS BASED ON DHI SCC DATA TO ELICIT SDCT COWS

  • OFFICIAL PROTOCOLS: Complying with Regional Veterinary Official protocols
  • CUSTOMIZED PROTOCOLS: Created by the user with farm-tailored criteria
Step 1: Identify dry-off eligible cow at report date:

Parameters: 1) Average Gestation Length = 283 days (fixed) 2) Average farm dry-off period (customizable by farmer) 3) Report date

1) In milk
2) Pregnant (positive diagnosis)

From conception date
1) Calculate expected calving date
2) Calculate expected dry-off date

Average farm dry-off period

\[ n^\circ \text{ of days between report date and expected dry-off date} \]

\[ \leq \]

\[ > \]

ELIGIBL E

NOT ELIGIBLE
Step 1. Identify dry-off eligible cow at report date:

Parameters: 1) Threshold milk production \( m \) (def: 14 Kg) 2) At which \( n \) test day on start to search for low production (def. 4)

Variable: Milk yield at test day (MY)

1) Lactating cows
2) Test days \( \geq n \) (def. 4)

\[ m \] (def. 14 kg) \(<\) last test day milk yield MY \(\geq m \) (def. 14 kg)

\( NOT \) ELIGIBLE

ELIGIBLE
Step 2: Protocol setting

<table>
<thead>
<tr>
<th>Protocol Code</th>
<th>Protocol Description</th>
<th># TD to use</th>
<th>SCC limit</th>
<th># TD to use</th>
<th>SCC limit</th>
<th>Average SCC</th>
<th>Mastitis Presence</th>
<th>Positive CMT</th>
<th>Positive Bacterial ex.</th>
</tr>
</thead>
<tbody>
<tr>
<td>prova</td>
<td>SCC &gt; 100,000 Primiparous, SCC &gt; 200 pluriparous on at least on TD on last 3 TDs</td>
<td>3</td>
<td>100</td>
<td>3</td>
<td>200</td>
<td>YES</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The number of the latest test days included

The threshold value of somatic cells for primiparous and multiparous

Screening methods

Yes= Treat if the Average number of SCC is over the threshold

No= Treat if SCC is over the threshold in at least one TD among those included
Examples

Cow M43 eligible to dry-off for pregnancy status: parity 3, Threshold SCC count: 200K, SCC result for last 3 TDs:

<table>
<thead>
<tr>
<th>Current TD</th>
<th>414K</th>
</tr>
</thead>
<tbody>
<tr>
<td>TD -1</td>
<td>245K</td>
</tr>
<tr>
<td>TD -2</td>
<td>151K</td>
</tr>
</tbody>
</table>

Average SCC = 270 K  
TREAT

Cow M25 eligible to dry-off for pregnancy status: parity 1, Threshold SCC count: 100K, SCC result for last 3 TDs:

<table>
<thead>
<tr>
<th>Current TD</th>
<th>51K</th>
</tr>
</thead>
<tbody>
<tr>
<td>TD -1</td>
<td>49K</td>
</tr>
<tr>
<td>TD -2</td>
<td>22K</td>
</tr>
</tbody>
</table>

Average SCC = 40.7 K  
DON'T TREAT

Cow M11 eligible to dry-off for low production: parity 1, Threshold SCC count: 100K, SCC result for last 3 TDs:

<table>
<thead>
<tr>
<th>Current TD</th>
<th>85K</th>
</tr>
</thead>
<tbody>
<tr>
<td>TD -1</td>
<td>158K</td>
</tr>
<tr>
<td>TD -2</td>
<td>309K</td>
</tr>
</tbody>
</table>

Average SCC = 184 K  
TREAT

ICAR 2024 Annual Conference, Bled
The report

### Eligible to be dried off

<table>
<thead>
<tr>
<th>Farm ID</th>
<th>Official ID</th>
<th>Name</th>
<th>Last lactation</th>
<th>Last TD</th>
<th>SCC prev. TDs</th>
<th>Predictions</th>
<th>SDCT</th>
<th>Treat</th>
<th>Reason Treatment</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>M43</td>
<td>IT0xxxxxxxxx7</td>
<td>GIOVANNA</td>
<td>3</td>
<td>10/06/2023</td>
<td>324</td>
<td>16.2</td>
<td>414</td>
<td>245</td>
<td>151</td>
<td>25/03/2024</td>
</tr>
<tr>
<td>M15</td>
<td>IT0xxxxxxxxx9</td>
<td>MARIA</td>
<td>3</td>
<td>25/03/2023</td>
<td>401</td>
<td>12.2</td>
<td>231</td>
<td>190</td>
<td>177</td>
<td>16/04/2024</td>
</tr>
<tr>
<td>M25</td>
<td>IT0xxxxxxxxx8</td>
<td></td>
<td>1</td>
<td>12/06/2023</td>
<td>322</td>
<td>26.0</td>
<td>51</td>
<td>49</td>
<td>22</td>
<td>29/04/2024</td>
</tr>
</tbody>
</table>

### Eligible for low milk production after n (3) TDs

<table>
<thead>
<tr>
<th>Farm ID</th>
<th>Official ID</th>
<th>Name</th>
<th>Last lactation</th>
<th>Last TD</th>
<th>SCC prev. TDs</th>
<th>Predictions</th>
<th>SDCT</th>
<th>Treat</th>
<th>Reason Treatment</th>
<th>NOTES</th>
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</thead>
<tbody>
<tr>
<td>M11</td>
<td>IT0xxxxxxxxx0</td>
<td>CATERINA</td>
<td>1</td>
<td>05/10/2023</td>
<td>207</td>
<td>12.0</td>
<td>85</td>
<td>158</td>
<td>109</td>
<td></td>
</tr>
</tbody>
</table>

### Protocol Details

<table>
<thead>
<tr>
<th></th>
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<td>3</td>
<td>100</td>
<td>3</td>
<td>YES</td>
<td></td>
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</tr>
</tbody>
</table>
## Mastitis risk class from DSCC

<table>
<thead>
<tr>
<th>DIM stage</th>
<th>SCC</th>
<th>DSCC (%)</th>
<th>Mastitis Risk Class</th>
<th>COLOUR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DIM &lt;= 100</strong></td>
<td>&lt;= 200.000 u/ml</td>
<td>&lt;= 66,3</td>
<td>Healthy/Normal</td>
<td>Green</td>
</tr>
<tr>
<td></td>
<td>&gt; 200.000 u/ml</td>
<td>&gt; 66,3</td>
<td>Suspicious/ mastitis onset</td>
<td>Yellow</td>
</tr>
<tr>
<td>100 &lt; DIM &lt;= 200</td>
<td>&lt;= 200.000 u/ml</td>
<td>&lt;= 69,2</td>
<td>Healthy/Normal</td>
<td>Green</td>
</tr>
<tr>
<td></td>
<td>&gt; 200.000 u/ml</td>
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Tool diffusion among DHI Farm in Italy

- **533** dairy farms (3.8%)
- **100K** milking cows (7%)
Conclusions

Aim of the tool:
- foster the adoption of SDCT
- help farmers/veterinarian to comply with EU indications about antimicrobial responsible use
- exploit DHI data

Cautions
- results are heavily protocols and parameters setting dependent
- information provided are based on risk analysis and not on direct diagnosis
- the tool do not replace the veterinary service