AMS in Germany – dataprocessing in milkrecording

Dr. Kai Kuwan, ICAR 2016, Puerto Varas, Chile
vit – Who we are!

- non profit organisation, owned by DHI, AI and Herdbook organisations
- vit provide services for
  - Herdbook and AI-organisation (all Germany and Luxemburg)
  - Genetic evaluation (all Germany, Austria and Luxemburg)
  - Identification and registration (regional)
  - Milkrecording organisation (DHI)
- our service for milkrecording organisation
  - data collecting software for electronic devices
  - laboratory software to connect farm data and milksample data
  - data processing and verification
  - data supply for all kind of herd management
    - paper
    - software
    - web based
- ....
- 8 of 12 milkrecording organisation in Germany (and Luxembourg) use our services
vit – member organisation in milkrecording

- 14,600 farms
- 1,760,000 Cows
- mostly Holstein
- these are 75% of milk recorded Holstein cows in Germany
Introduction of AMS in Germany

- similar to other european countries
- structural differences in the mid 90’s in Germany
  - family driven farms in the west part
    - herd size around 40 cows
    - often breeders
  - cooperations in the east part
    - herd size around 200 cows (with a high percentage of bigger farms)

- first AMS on production farms are installed in the mid 90’s
  - mostly on family farms
    - more flexibility
    - open for innovation
  - upcoming interest since the last 10 years of bigger farms
    - problems to require good staff for milking
    - rationalization
Development of AMS in vit milkrecording organisation

% AMS

year

Farms %
cows %
Milkrecording in AMS

- in 1997 the first farmers required for milkrecording with AMS
  - their requirement to data processing:
    - comparable results for daily milk yield and contents to conventional herds
    - calculation of a “true lactation yield”
  - requirement of data processing center’s:
    - one interface for all supplier’s
    - raw data for all further calculation

- national DLQ guideline 1.8 “Milkrecording in AMS”
  - definition of interface
  - definition of 24h milk yield and test day result for ingredients
  - definition to calculate lactation yield
Calculation of contents at testday

- at testday from every milking during a period of 24h should a sample be taken
- accuracy versus costs
- example:

<table>
<thead>
<tr>
<th>Date</th>
<th>time</th>
<th>TBM</th>
<th>MYkg</th>
<th>F%</th>
<th>P%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 20160913</td>
<td>1:35</td>
<td>351</td>
<td>9.9</td>
<td>5.92</td>
<td>3.07</td>
</tr>
<tr>
<td>2 20160912</td>
<td>19:44</td>
<td>533</td>
<td>14.1</td>
<td>4.92</td>
<td>3.18</td>
</tr>
<tr>
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<td>10:51</td>
<td>684</td>
<td>17.4</td>
<td>4.53</td>
<td>3.17</td>
</tr>
<tr>
<td>4 20160911</td>
<td>23:27</td>
<td>557</td>
<td>14.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 20160911</td>
<td>14:10</td>
<td>899</td>
<td>18.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

48 h

- calculation of fat % at testday:

\[
F\% = \frac{(9.9 \text{ MYkg} \times 5.92 \text{ F\%} + 14.1 \text{ MYkg} \times 4.92 \text{ F\%} + 17.4 \text{ MYkg} \times 4.53 \text{ F\%})}{(9.9 \text{ MYkg} + 14.1 \text{ MYkg} + 17.4 \text{ MYkg})} 
\]

= 5.00 % fat at testday
Calculation of daily milk yield

- use of all milking's during 48 h backwards from last sample of each animal
- corrected on 24 h
- example:

<table>
<thead>
<tr>
<th>Date</th>
<th>time</th>
<th>TBM</th>
<th>MYkg</th>
<th>ΣTBM</th>
<th>Σ MYkg</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 20160913</td>
<td>1:35</td>
<td>351</td>
<td>9.9</td>
<td>351</td>
<td>9.9</td>
</tr>
<tr>
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<td>19:44</td>
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<td>884</td>
<td>24.0</td>
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<tr>
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<td>17.4</td>
<td>1568</td>
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<tr>
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<td>23:27</td>
<td>557</td>
<td>14.6</td>
<td>2125</td>
<td>56.0</td>
</tr>
<tr>
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<td>14:10</td>
<td>899</td>
<td>18.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

48 h

- calculation of testday milk yield:
  - milking No 1 is last sample at testday for the cow
  - milking No 1 to 4 are full integrated in the interval of 48 h (=2880 min)
  - milking No 5 is only partly integrated in the interval of 48 h (2880 – 2125) = 755 min
  - 18.3 MYkg / 899 Min. TBM x 755 Min. = 15.4 Mykg

⇒ (56.0 kg + 15.4 kg) / 48 h * 24 h = 35.7 Mykg at testday
Calculation of lactation

- Germany use TIM to calculate lactation

- requirement of farmer
  - lactation yield near to the truth
  - use of all milking between two testdays to calculate lactation yield

- very easy in theory
  - sum up all single milkings!

- Very hard in praxis
  - missing data
    - too short period exported by the farmer
    - cows out of system
      - treatment
      - show
    - data loss
AMS - Challenge of data processing

- mass of data - up to more than the 90-fold per cow/testday
  - 35 day testday interval X 2.6 milking per day

- storage of an average milk yield for both of the two parts of testday interval is the solution

\[
\sum \text{milk} / \sum \text{time} = \bar{\text{milk}} \text{ per 24h for first part of testday interval}
\]

\[
\sum \text{milk} / \sum \text{time} = \bar{\text{milk}} \text{ per 24h for second part of testday interval}
\]
Calculation of lactation

Use of testday interval

<table>
<thead>
<tr>
<th>event</th>
<th>date</th>
<th>days</th>
<th>Σ MYkg*</th>
<th>Ø Mykg**</th>
<th>calculation</th>
<th>Σ MYkg</th>
</tr>
</thead>
<tbody>
<tr>
<td>calving</td>
<td>01.09.15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. td</td>
<td>11.09.15</td>
<td>10</td>
<td>271.0</td>
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<td>10 x 27.1</td>
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</tr>
<tr>
<td>2. td</td>
<td>15.10.15</td>
<td>34</td>
<td>481.1</td>
<td>28.3</td>
<td>17 x 28.3</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>552.5</td>
<td>32.5</td>
<td>17 x 32.5</td>
<td>552.5</td>
</tr>
<tr>
<td>3. td</td>
<td>20.11.15</td>
<td>36</td>
<td>621.0</td>
<td>34.5</td>
<td>18 x 34.5</td>
<td>621.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>774.0</td>
<td>43.0</td>
<td>18 x 43.0</td>
<td>774.0</td>
</tr>
<tr>
<td>lactationyield at 20.11.15:</td>
<td></td>
<td></td>
<td>2669.6</td>
<td></td>
<td></td>
<td>2699.6</td>
</tr>
</tbody>
</table>

* Sum from all single milking in the period

** This milk yield has to be stored additional to the testday result, to calculate lactation.
Special quality check during data processing

- data format
  - animal ID

- milk per minute for every single milking

- identification of data loss

- number of sample per testday

- average number of sample per cow

- average milk per milking

- ...

Arguments for milkrecording in AMS

- check farm data against information in other (official) database
  - Identification and registration

- approved combination of milkyield data with herdbook and AI data

- approved calculation methods which allow to compare
  - animals
  - farms
  - group of farms
    - same production trades
    - same size
    - same breed
Thanks for your attention!

IT-Solutions for Animal Production