Recording grazing time of dairy cows

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Context

An increase in the farm size and productivity, a change in the farming systems (AMS doubled since 2010)…
… a decrease in the grazing

Average dairy herd size in France

40
52.6

Cow is... an herbivore

And

Economic advantages
Animal health and welfare (lameness, ...)
Milk quality
Consumers and society vision of livestock farming
Valorisation of unusable surfaces for other productions (crops)
...

Grazing positive effects
AutoGrassMilk Project

WP1: Optimum feeding strategies
WP2: Optimize the integration using new technologies
WP3: Increase the sustainability
WP4: Economic assessment

Innovative and sustainable systems combining automatic milking and precision grazing
Validation of the Lifecorder + sensor
Lifecorder + sensors

- Lifecorder + = Uniaxial accelerometer
- Combination with in/out antennas

- Algorithm (R. Delagarde, INRA): Signal → binary information (eating yes/no): eating time, nb of meals
Tested in 2 experimental farms
- 25 cows equipped in Derval Farm
- 14 cows equipped in Trévarez Farm

Observations as reference
- Scanning every 10 min
- Registered activities: eating, ruminating, standing/lying, walking
Lifecorder + vs. observations
Reliable tool to measure grazing time

- Relative Prediction Error : 17%
- Delagarde and Lamberton (2015): $R^2=0.98$ and RPE = 7%
- Possible tool to monitor eating behaviour and to manage grazing
- Other marketed tools available
Use of the grazing time to assess grazing behaviour in an AMS farm
Derval experimental farm

Herd management
- Delaval VMS, 2008
- Saturated AMS, 2,000 kg/day
- 72 Holstein, 9,500 kg/cow/year

Feeding strategy
- Simplified rotational grazing system
- Supplementation: maize silage
23 cows equipped from March to June 2015

A PCA + HAC were achieved to make groups of individuals with common features

Daily grazing behaviour in Derval
### Daily grazing behaviour in Derval Farm

<table>
<thead>
<tr>
<th></th>
<th>Derval farm (n=1,323)</th>
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<tbody>
<tr>
<td><strong>Groups</strong></td>
<td><strong>Herd ave. (SD)</strong></td>
</tr>
<tr>
<td><strong>Nb of animals</strong></td>
<td>23</td>
</tr>
<tr>
<td><strong>Grazing Time (min)</strong></td>
<td><strong>320 (102)</strong></td>
</tr>
<tr>
<td><strong>Nb of meals</strong></td>
<td>5.3 (1.8)</td>
</tr>
<tr>
<td><strong>Meals Duration (min)</strong></td>
<td>64 (23)</td>
</tr>
<tr>
<td><strong>Access Time (min)</strong></td>
<td>775 (237)</td>
</tr>
<tr>
<td><strong>Grazing Time/Access Time (%)</strong></td>
<td>43 (14)</td>
</tr>
<tr>
<td><strong>Exit time</strong></td>
<td>1h20</td>
</tr>
<tr>
<td><strong>Yield (kg/cow/day)</strong></td>
<td>27.1</td>
</tr>
<tr>
<td><strong>Milking Frequency (milk./day/cow)</strong></td>
<td>1.92</td>
</tr>
</tbody>
</table>

- Huge impact of the herd hierarchy on GT
- Different grazing behaviours and efficiencies
Effects on grazing time

- Animal effect (breed, parity, yield, etc.)
- Farm system effect (complementation vs. full grass, robot)
- Pasture characteristics (species, grass height and composition)
- Grazing management (strip grazing, rotational, simplified)

→ Difficult to use as an absolute value
Potential use of grazing time

Grazing/herd management
- Improve existing tools (plate meters, grazing software, GPS)?
- Cow circulation with robots \( \rightarrow \) use the herd hierarchy and grazing efficiency
- Health issues detection

Certification / welfare assessments
- For the legislator, the consumer and the farmer

Estimation of grass intake in regulated grazing systems (Van Reenen et al. 2016)
- Phenotyping feed intake for selection or herd management
- Phenotyping grazing efficiency?

\[ R^2 = 0.82 \]

Figure 1. Relationship between grass intake determined with the n-alkane method and grass intake estimated with the use of regression Model 1.
Accurate grazing time measurement is possible with accelerometer sensors

Hundred thousands of animals are equipped worldwide

Huge variability of grazing behaviours between animal

Parameter to be used to
  - Improve grazing management (in addition of existing tools)
  - Reinsure the consumer...and better pay the farmer (ex. in NL)
  - Phenotyping new traits (grass intake, grazing efficiency,...)?
Questions ?