HoliCow – a new transnational approach to get the best out of DHI data collection and FT-MIR spectral data

Julie Leblois, awé groupe, project coordinator
ICAR conference, 23/05/2024, Bled
Evolution of the number of farms (Eurostat)

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>Livestock</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Mixed</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>
• Unfair income
• Agri-bashing
• Farms are more and more connected
  ➢ Huge amount of data
  ➢ Management becomes very complex, especially for small ones with low manpower

Renewal of generations is very complicated
**HoliCow** - Enable small/med dairy farmers to benefit from big data for holistic decision-making

- 23/03/2023 → 30/06/2026
- 4,758,339.06€, 60% ERDF funding (2,855,003.42€)
- 12 partners, 7 countries

**Partnership:**
- 7 milk recording organizations
- 1 IT center
- 3 research centers/universities
- 1 association defending breeding companies

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HoliCow - Enable small/med dairy farmers to benefit from big data for holistic decision-making

Several topics – 3 work packages

WP1: Data for farm tools

WP2: Tools for farmers

WP3: People for farmers

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Data for farm tools

WP1

Transnational database

Community solution database
WP1 Data for farm tools

- Animal sensors
- Milking robots
- Milk recording data

Source: Nedap

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WP1 Data for farm tools

Past projects → development of predictive models for biomarkers

Milk recording data

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Energy balance
Nitrogen efficiency
Dry matter intake
Body weight
Specific molecules
Methane
Fatty acids
Mastitis
Milk transformation
Minerals
Your logo

Sensors data

Energy balance

Dry matter intake

Methane

Body weight

Nitrogen efficiency

Specific molecules

Mastitis

Fatty acids

Milk transformation

Summarized indicator – easy tool for farmers

Clustering

Pilot farms involvement

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Transnational database
- 5 countries
- 63 millions of spectral data
- 5.6 millions of dairy cows
- 33,300 dairy farms

Harmonization of data formats
(Grelet et al. 2015)
Transnational database - 5 countries - 63 millions of spectral data - 5.6 millions of dairy cows - 33,300 dairy farms

Harmonization of data formats (Grelet et al. 2015)

63 millions of spectral data!

Data for farm tools

WP1

Oh No!!! The Server is down

OK

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1. Data reduction

Method developed within ExtraMIR (Soyeurt) : World Representative Spectral Database

63 millions of spectral data!
2. Inventory of the FT-MIR prediction equations
   - >500 prediction equations identified
   - After cleaning: 200

3. API construction to calculate all predictions

Final file: 200 predictions for each spectra selected by the WRSD method
Ongoing work

- Modelling for clustering based on
  - Spectral data
  - Predictions

- Types of considered models – unsupervised learning methods (tools: Auto-ML, autoencoder, incremental clustering)
**Summary data treatment**

- Data in the transnational DB
- Data reduction (spectra)
- Calculation of predictions
- Unsupervised learning for clustering

6 clusters

**WP1** Data for farm tools

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Community solution database

- Advice about solutions to the problems addressed
- Possibility to provide feedback on the tool
Heat stress problem identified

Solutions proposed:
- Allow animals inside
- Increase water points
- Use ventilation fans
- Trees on pasture
- Other solution: note it

WP1 Data for farm tools

Alert
WP1 Data for farm tools

Heat stress problem identified
Solutions proposed:
- Allow animals inside
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- Use ventilation fans
- Trees on pasture
- Other solution: note it

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Heat stress problem identified
Solutions proposed:
- Allow animals inside

Was this solution effective?/Please rate this solution

★ ★ ★ ★ ★
Heat stress problem identified
Solutions proposed:
- Allow animals inside

Was this solution effective?/Please rate this solution

Feedback to be stored

Probably possibility to write detailed feedback too (farmers, advisors)
Heat stress problem identified
Solutions proposed:
- Allow animals inside
- Increase water points
- Use ventilation fans
- Trees on pasture
- Other solution: write here

New solution to be stored and proposed

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WP2 Tools for farmers
Development of the data flow structure and requirements at the different levels
- HoliCow
- MROs
- EMR
WP2: Tools for farmers

- IT implementation of the developed clustering methods (development of APIs and Dockers)
- Documentation for the implementation in the different MROs’ platforms
- Training of IT staff from the MRO partners (webinars)
WP2 Tools for farmers

Technical production of the community database

Quality Assurance for spectral data & modelling
WP3 People for farmers
1. Training of farmers and advisors to the developed tools (report, community database)

- Organisation of training sessions
- Production of explanatory documents
- Training on farms
- Webinars, MOOCs
2. Sensibilisation of rural communities to the importance of farming livestock → support from community to farmers

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• Functional database containing 63 millions spectra (more to come)
• Data processing is challenging
  • Volume of data
  • Data sources
• Creation of a « solutions » oriented database
• Involvement of pilot farms throughout the entire project
• Communication to general public about farming is key
Thank you!

Julie Leblois,
Project coordinator
jleblois@awegroupe.be

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