Challenges and possible solutions for data integration and use on dairy farms

DairyBrain.Wisc.edu

Victor E. Cabrera
Challenges and possible solutions for data integration and use on dairy farms

DairyBrain.Wisc.edu

Victor E. Cabrera
Ecosystem of Exchange of **Dairy Data and Insights**

**Design Documents**

**Coordinated Innovation Network Activities**

**Research Activities**

**Dairy Brain**

- **Analytics Suite**
- **User Dashboard**

**Agricultural Data Hub**

- Data transferred from partner farms for harmonization and aggregation
- Data access by the Dairy Brain

**Other Innovators**

- Other innovators can also offer additional data services

**Research Ideas**

- **Hoard’s series**
- j.dairyj.2021.105069
- j.livsci.2021.104602
- ani12060721
- ani11102981
- ani11072025

**Farms**

- jds.2023-00000
- jds.2022-21882
- jds.2021-21559
- ani11051229
- j.dairyj.2021.105051
- APDV2020.08.000678
- jds.2019-17608
- jds.2019-17145

Results presented back to farms for digestion
# Data Collection

## Challenges

- Diversity of data sources
- Lack of accuracy and consistency (standards)
- Different frequency of data recording and collection
- Data prepared for human consumption

## Overcoming Collection

- Automated data collection systems
- IoT devices
- Invest on APIs and cloud systems
- Develop and apply standardized protocols
Data Integration

Challenges

- Heterogeneous data formats and systems
- Non transferable scripts
- Data silos within and between farms

Streaming Integration

- Unified data platforms
- ICAR data standards
- Interoperable systems
## Data Quality

### Challenges
- Incomplete
- Inconsistent
- Erroneous/Noisy
- Repeated

### Ensuring Quality
- Validation
- Cleaning
- Governance practices
- Quality control
- Promote standardization
## Data Analysis

### Challenges
- Big data issues
- Lack of professionals with combined skill sets

### Unlocking the Potential
- AI, ML
- Capacity building
## Security and Privacy

### Challenges
- Ownership
- Data breaches
- Unauthorized access
- Data loss
- Regulatory considerations
- Ethical considerations
- Extreme IP concerns

### Safeguarding Data
- Clear data transfer agreements
- Robust data security
- Anonymization
- Sharing agreements
- Foster trust with companies
Decision Support

Challenges

- Translating data into actionable insights
- Bridging the gap between data and farm management
- Adoption dilemma and sustained adoption

Enhancing Decision

- Develop relevant DSS
- Predictive and prescriptive analytics
- Decision maker education
Implementation

Challenges

- High upfront cost
- Resistance to change and innovation

Navigating Roadblocks

- Cost-effective solutions
- Phased implementation
- More effective workflow
## Collaboration

### Challenges
- Collaboration among farmers, industry, and academia
- Sharing data, knowledge, and best practices
- Difficult to align interests

### Fostering partnerships
- Industry partnerships
- Cooperative models
- Open data initiatives
- Create value/incentives
Interdisciplinarity

Challenges

- Different/conflicting mindsets
- What is the proposed value

Nurturing interdisciplinarity

- Promote inclusive and communicative environment
- Focus on the target audience and the deliverables
## Sustainability

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Unlocking funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expensive development</td>
<td>Company contracts</td>
</tr>
<tr>
<td>Most work under the hood</td>
<td>Pay per service fee</td>
</tr>
<tr>
<td>Funding uncertainty</td>
<td>Develop a consortium</td>
</tr>
</tbody>
</table>
The Future of Data Integration on Dairy Farming

- Integrated data plays a critical role in sustainable dairy farming
- It is required to embrace new technologies and practices for data-driven decision making
- It is crucial to continue ongoing research and innovation for improved data integration solutions
Food and Agriculture Cyberinformatics and Tools Initiative

The Agriculture and Food Research Initiative's Food and Agriculture Cyberinformatics and Tools (FACT) initiative seeks to catalyze activities that harness big data for synthesizing new knowledge, making predictive decisions, and fostering data-supported innovation in agriculture.

Project supported by Agriculture and Food Research Initiative Competitive Grant No. 2019-68017-29935 (2019-2023) from the USDA National Institute of Food and Agriculture
SAVE THE DATE!

Potential Conference Topics
- Data integration across the entire dairy chain
- Adoption of technology
- Disruptive technologies
- Data governance & cybersecurity
- Mining the value of data

For complete conference information go to: https://www.adsa.org/Meetings/46th-Discover-Conference

Milking the Data – Value Driven Dairy Farming

May 6-9, 2024
Eaglewood Resort & Spa in Itasca, IL
Hosted by the American Dairy Science Association
Program Committee

Co-Chairs:
Miel Hostens, Utrecht University
Joao Dorea, University of Wisconsin

Committee:
Christine Baes, University of Guelph
Jeffrey Bewley, Holstein Association USA
Victor Cabrera, University of Wisconsin
Joao Durr, Council on Dairy Cattle Breeding
Michael Iwersen, University of Veterinary Medicine, Vienna
Hélène Soyeurt, University of Liege
Rene Van der Linde, ICAR, Netherlands

For complete conference information go to: https://www.adsa.org/Meetings/46th-Discover-Conference
Ecosystem of Exchange of Dairy Data and Insights

Coordinated Innovation Network Activities

Research Activities

Dairy Brain
- Analytics Suite
- User Dashboard

Agricultural Data Hub
  - data access by the Dairy Brain
  - data transferred from partner farms for harmonization and aggregation

Design Documents

Research Ideas

Other Innovators

Farms

Other innovators can also offer additional data services

results presented back to farms for digestion

jds.2023-00000
jds.2022-21882
jds.2021-21559
ani11051229
jldairyj.2021.105051
APDV2020.08.000678
jds.2019-17608
jds.2019-17145

ani12060721
ani11102981
ani11072025
jldairyj.2021.105069
Hoard's series
jllwsci.2021.104602
## Data Collection

### Challenges
- Diversity of data sources
- Lack of accuracy and consistency (standards)
- Different frequency of data recording and collection
- Data prepared for human consumption

### Overcoming Collection
- Automated data collection systems
- IoT devices
- Invest on APIs and cloud systems
- Develop and apply standardized protocols
Data Integration

Challenges

- Heterogeneous data formats and systems
- Non transferable scripts
- Data silos within and between farms

Streaming Integration

- Unified data platforms
- ICAR data standards
- Interoperable systems
Data Quality

Challenges

- Incomplete
- Inconsistent
- Erroneous/Noisy
- Repeated

Ensuring Quality

- Validation
- Cleaning
- Governance practices
- Quality control
- Promote standardization

Challenges

Ensuring Quality
## Data Analysis

### Challenges
- Big data issues
- Lack of professionals with combined skill sets

### Unlocking the Potential
- AI, ML
- Capacity building
# Security and Privacy

## Challenges
- Ownership
- Data breaches
- Unauthorized access
- Data loss
- Regulatory considerations
- Ethical considerations
- Extreme IP concerns

## Safeguarding Data
- Clear data transfer agreements
- Robust data security
- Anonymization
- Sharing agreements
- Foster trust with companies
Decision Support

Challenges

- Translating data into actionable insights
- Bridging the gap between data and farm management
- Adoption dilemma and sustained adoption

Enhancing Decision

- Develop relevant DSS
- Predictive and prescriptive analytics
- Decision maker education
Implementation

Challenges

- High upfront cost
- Resistance to change and innovation

Navigating Roadblocks

- Cost-effective solutions
- Phased implementation
- More effective workflow
## Collaboration

### Challenges
- Collaboration among farmers, industry, and academia
- Sharing data, knowledge, and best practices
- Difficult to align interests

### Fostering partnerships
- Industry partnerships
- Cooperative models
- Open data initiatives
- Create value/incentives
Interdisciplinarity

Challenges

● Different/conflicting mindsets
● What is the proposed value

Nurturing interdisciplinarity

● Promote inclusive and communicative environment
● Focus on the target audience and the deliverables
Sustainability

Challenges
- Expensive development
- Most work under the hood
- Funding uncertainty

Unlocking funding
- Company contracts
- Pay per service fee
- Develop a consortium
The Future of Data Integration on Dairy Farming

- Integrated data plays a critical role in sustainable dairy farming
- It is required to embrace new technologies and practices for data-driven decision making
- It is crucial to continue ongoing research and innovation for improved data integration solutions
Food and Agriculture Cyberinformatics and Tools Initiative

The Agriculture and Food Research Initiative's Food and Agriculture Cyberinformatics and Tools (FACT) initiative seeks to catalyze activities that harness big data for synthesizing new knowledge, making predictive decisions, and fostering data-supported innovation in agriculture.

Project supported by Agriculture and Food Research Initiative Competitive Grant No. 2019-68017-29935 (2019-2023) from the USDA National Institute of Food and Agriculture
SAVE THE DATE!

Potential Conference Topics
- Data integration across the entire dairy chain
- Adoption of technology
- Disruptive technologies
- Data governance & cybersecurity
- Mining the value of data

For complete conference information go to:
https://www.adsa.org/Meetings/46th-Discover-Conference
Program Committee

Co-Chairs:
Miel Hostens, Utrecht University
Joao Dorea, University of Wisconsin

Committee:
Christine Baes, University of Guelph
Jeffrey Bewley, Holstein Association USA
Victor Cabrera, University of Wisconsin
Joao Durr, Council on Dairy Cattle Breeding
Michael Iwersen, University of Veterinary Medicine, Vienna
Hélène Soyeurt, University of Liege
Rene Van der Linde, ICAR, Netherlands

For complete conference information go to:
https://www.adsa.org/Meetings/46th-Discover-Conference