DairyCoPilot - Automated Data Compilation and Analysis Tools for DairyComp Data Assets

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Dairy Farm Management

- Data-driven decisions
- Successful farms record and analyze data
  - Financial
  - Input
  - Production/health
- Animal health
  - Need data and tools

DairyComp

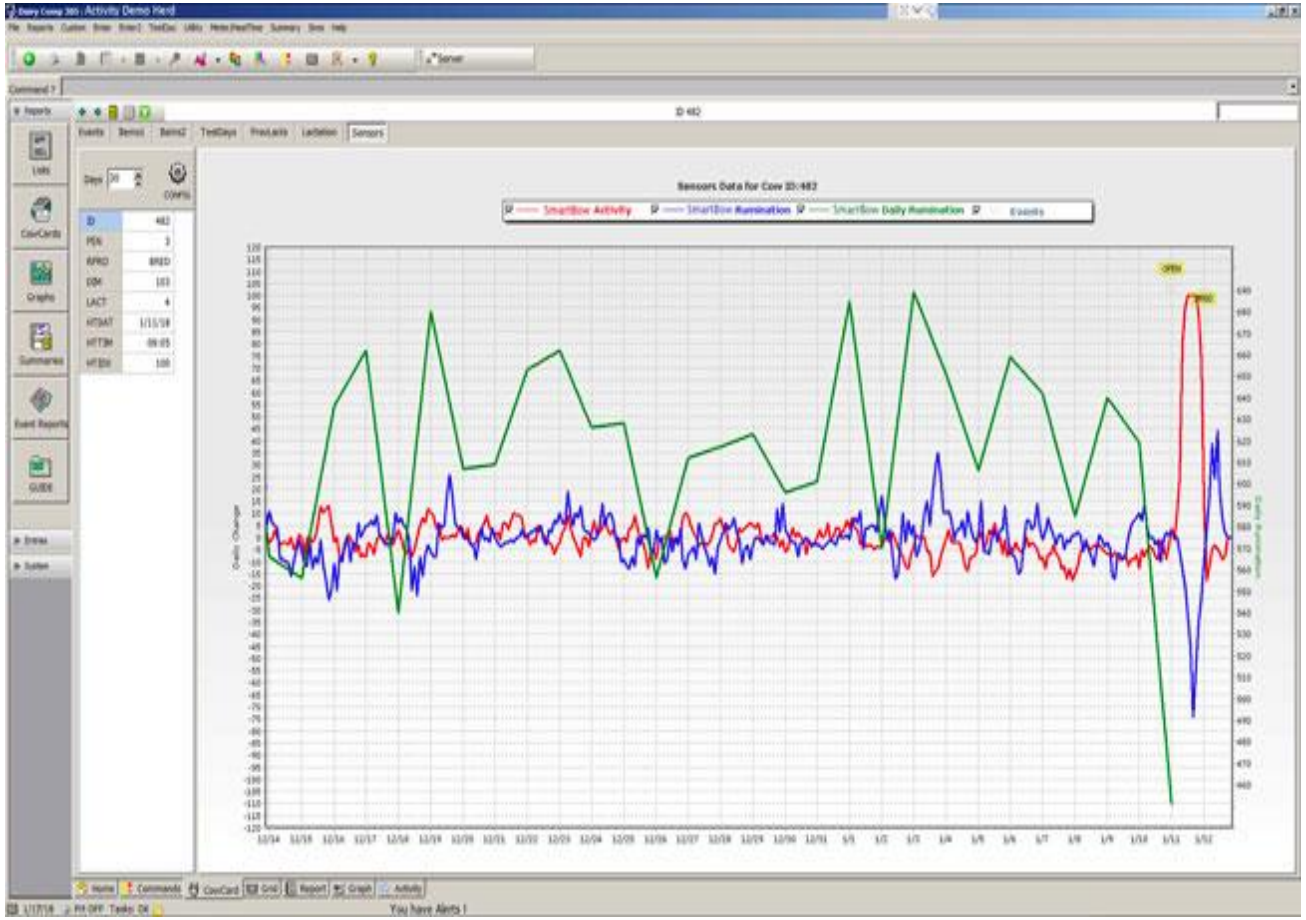
- Dairy management software
- Interconnected apps
- Most popular software

Strengths

- Large user base
- Multiple integrations
- User customizability

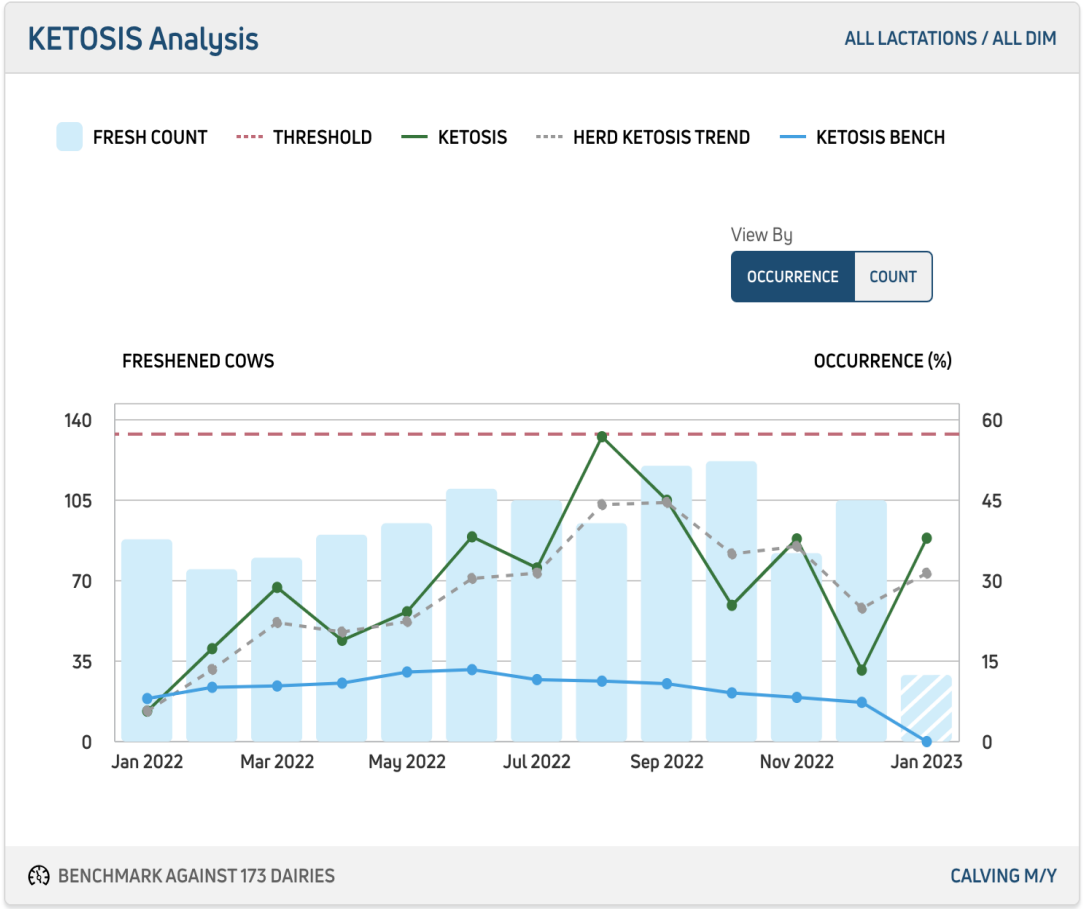
Weaknesses

- User customizability
- Aged desktop software
- Poor analysis options
- Proprietary software



Motivation

- Health data is locked in DC
- Limited integrated analysis
  - Trend lines
  - Benchmarking
- Extensive preprocessing



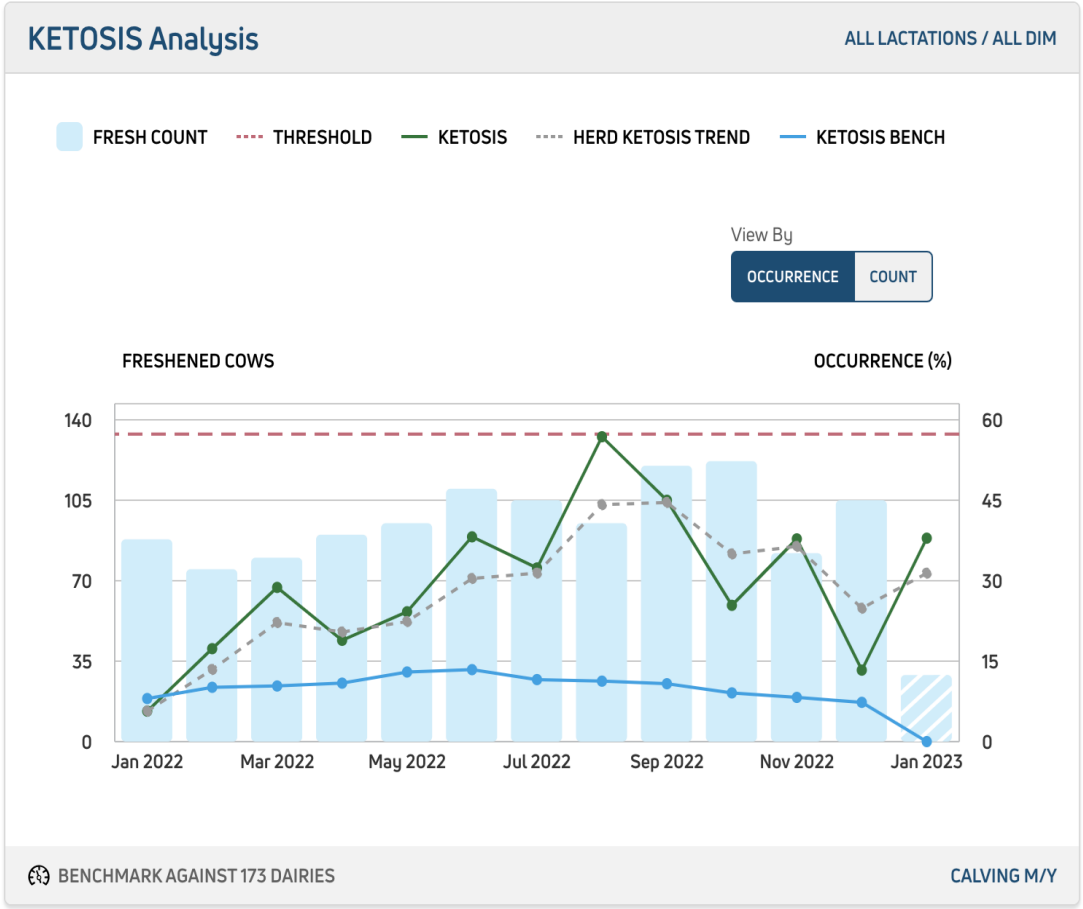
Automate DairyComp

Aim

- Automate DairyComp write out
- Apply tools to support data-driven decisions
- Customize reports and graphs for a better management experience

Audience

- DairyComp users
- Dairy Skills I instructors & students

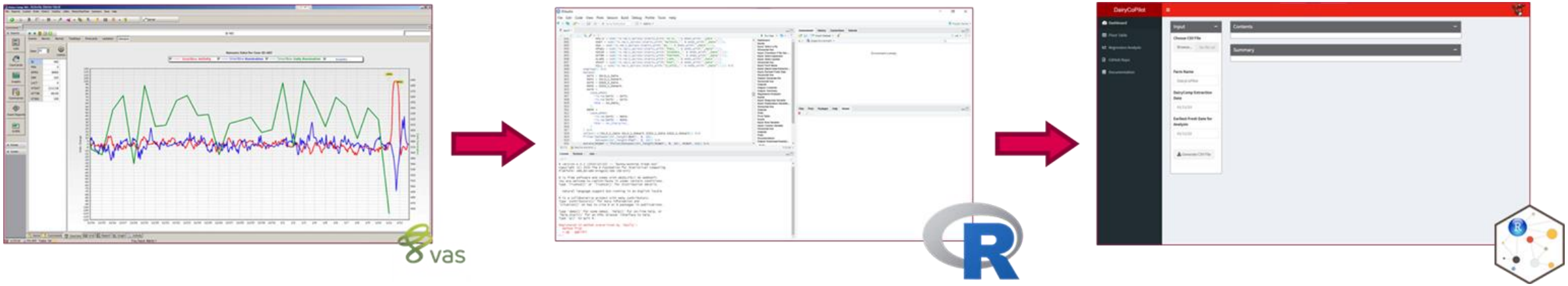


DairyCoPilot

- Simplify data wrangling in DairyComp
  - Time spent creating events < 20 mins
  - Repeatability
- Reduce time for data cleaning
  - Download → Insight < 10 mins
- Simplify analysis
  - GUI
  - Interactive
  - Reportability
- Enhanced analysis
  - Multiple odds ratios → Multiple linear regression

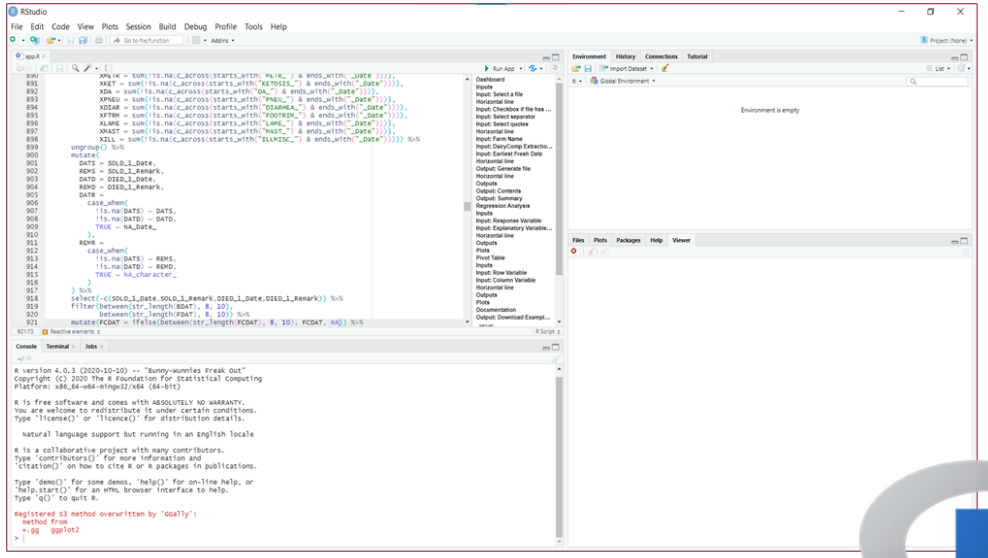
Methods

1. DairyComp Data Extraction
2. DairyCoPilot Data Cleaning
3. Rstudio Connect Deployment



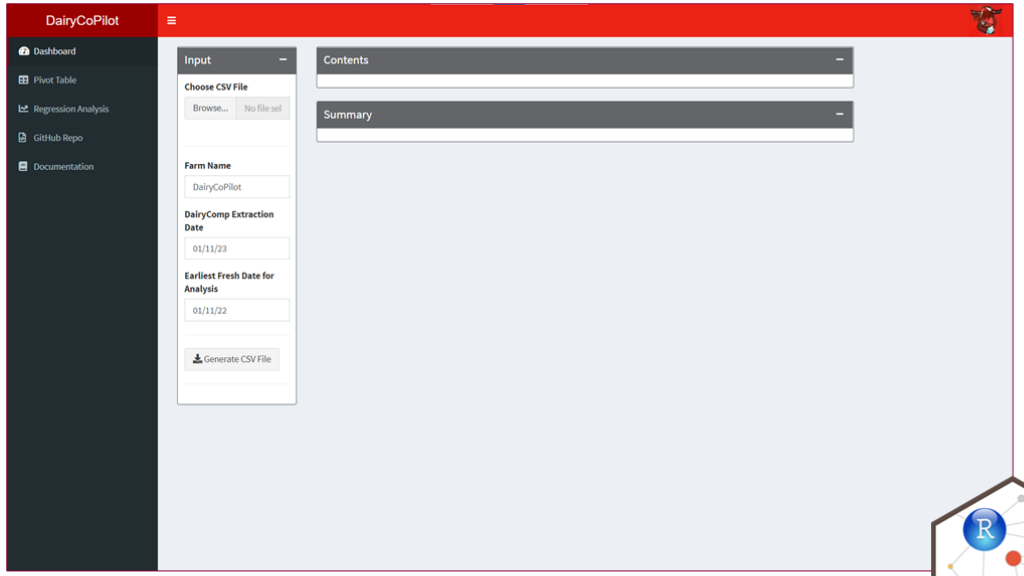
DairyCoPilot Data Cleaning

- Read CSV file
  - Rename events
  - Filter out missing events
  - Create missing columns
- Delete duplicate event records
- Create predefined variables
  - Number of occurrences of an event
  - Date and Remark of first event
  - Cutoff days post calving
- Convert to appropriate variable type



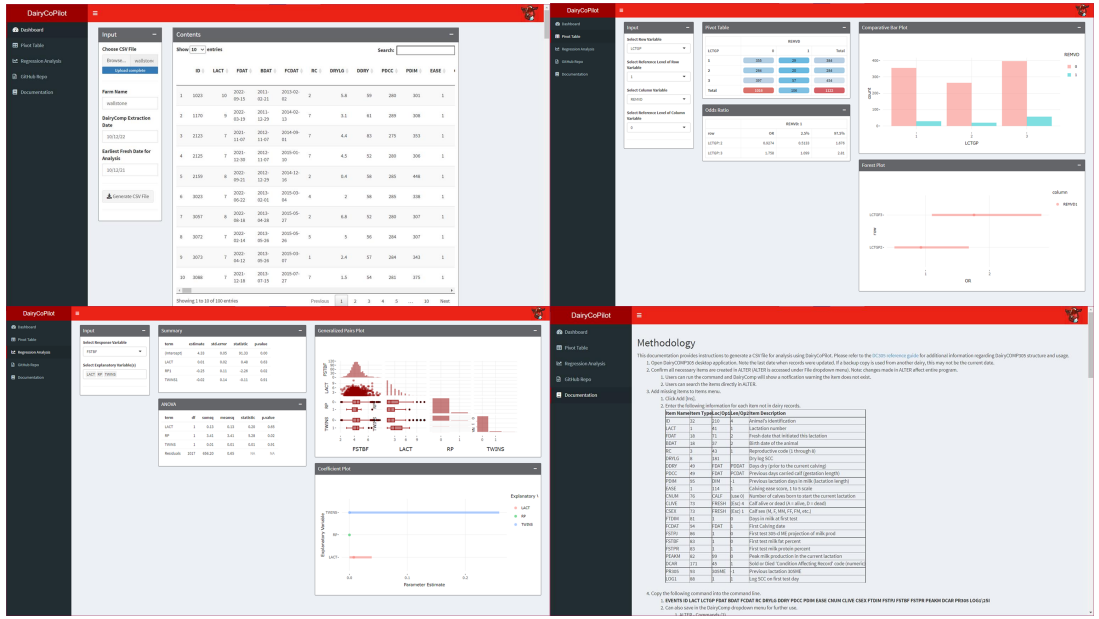
RStudio Connect Deployment

- Standalone publishing platform
  - Dashboards
  - On-demand and scheduled reports
  - Interactive applications
- User-friendly web application
  - Access controls
  - Performance settings
  - View logs



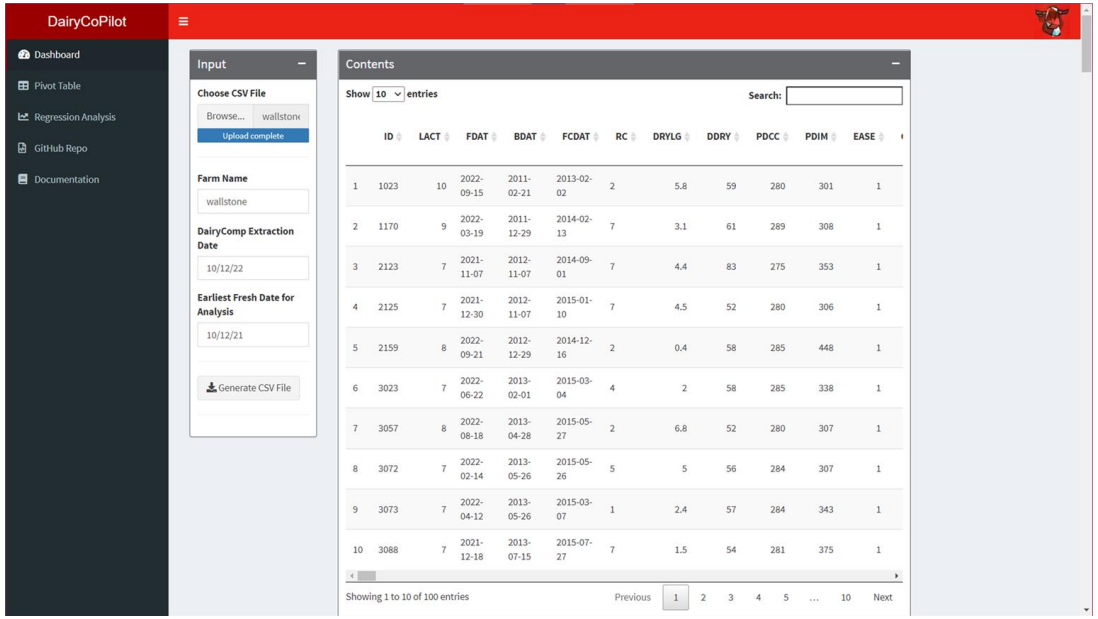
Results

1. Input Tab
2. Pivot Table Tab
3. Regression Analysis Tab
4. Documentation Tab



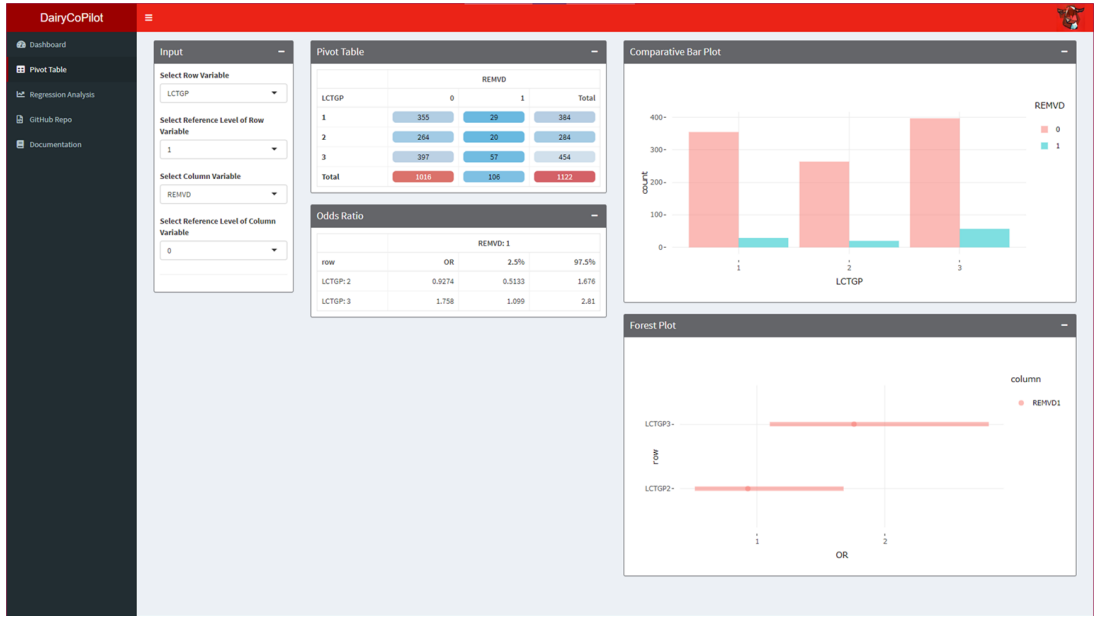
Input Tab

- Upload CSV file from DairyComp
- Download cleaned dataset to local drive
- Descriptive statistics
  - Show top entries
  - Data summary by variable type



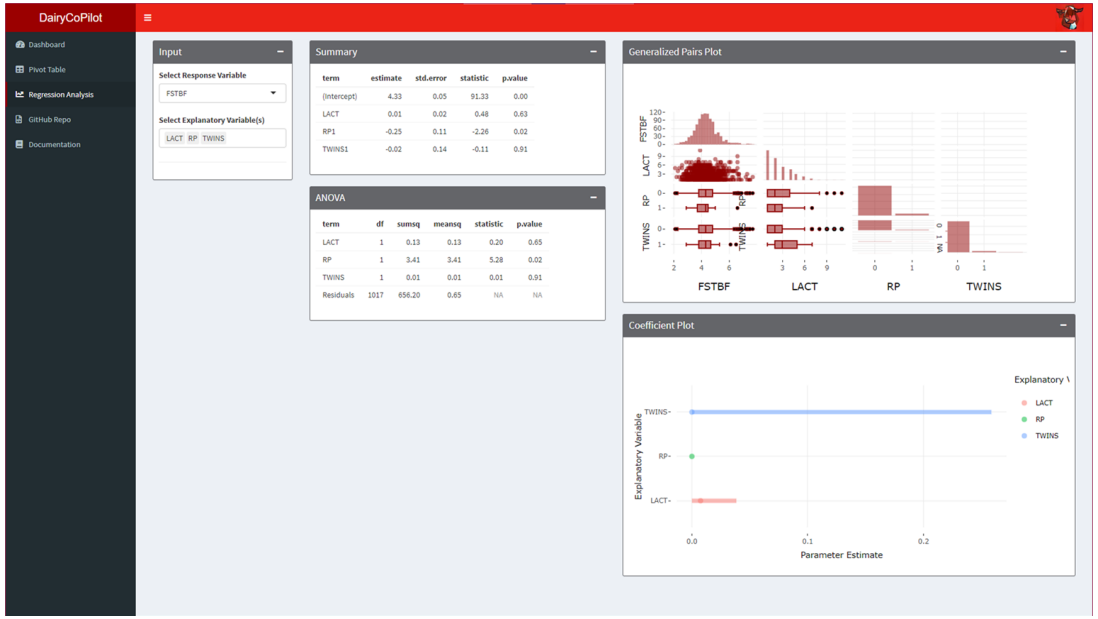
Pivot Table Tab

- Categorical data analysis
  - Select row and column variable
  - Select reference level for each variable
- Statistical analysis
  - Pivot table
  - Odds ratios and 95% confidence intervals
- Data visualization
  - Comparative bar plot
  - Forest plot



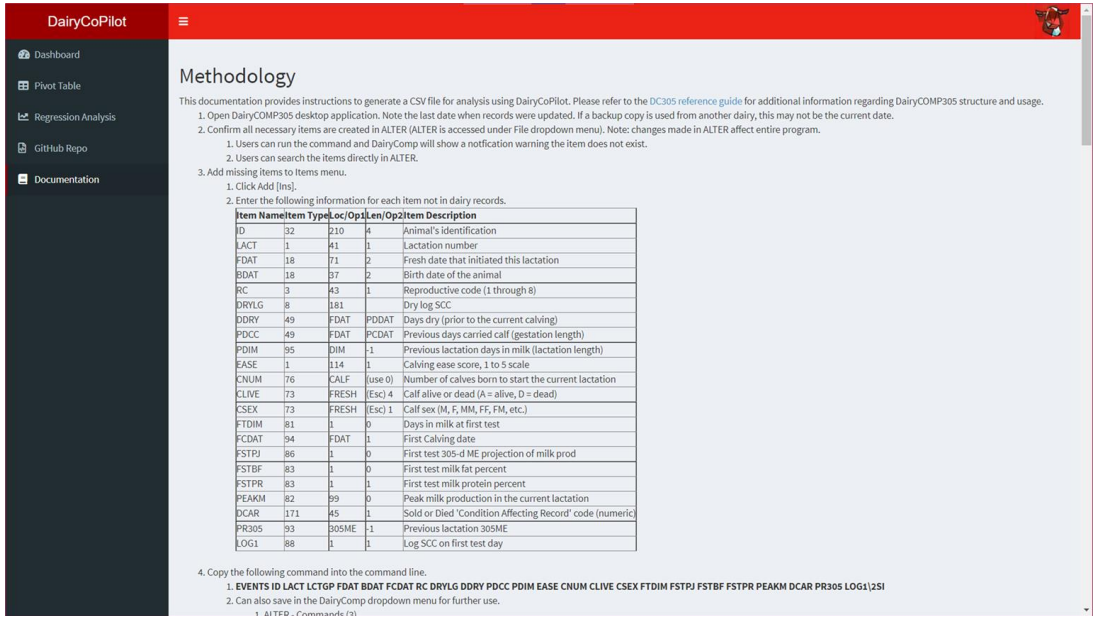
Regression Analysis Tab

- Linear and logistic regression analysis
  - Select a response variable
  - Select multiple explanatory variables
- Statistical analysis
  - Summary table
  - ANOVA table
- Data visualization
  - Generalized pairs plot
  - Coefficient plot



Documentation Tab

- Methodology
  - DairyComp Data Extraction
- Glossary
  - DairyCoPilot Data Cleaning
- Contacts
- Examples
  - Example Datasets
  - Instructional Videos (Upcoming)



Case Study

- Wall-Stone dataset
  - 1000-cow dairy in Wisconsin, USA
  - 43012 events collected in 2022

https://drive.google.com/file/d/11QAM1TTe8YizGLIshxlQsKlFCCOrfjSI/view?usp=sharing

https://data-viz.it.wisc.edu/dairy-copilot/

Summary and Future Directions

- DairyComp is still the backbone of dairy cattle management
- Tools such as DairyCoPilot expand limited analysis options
  - Increase available data
  - Decrease preprocessing time
- Upcoming features
  - Create custom columns
  - Edit factor variables
  - Edit incorrect data directly in application
- Build new features requested by users

SCAN ME

Thank you!