



Global Methane Genetics initiative

Led by



WAGENINGEN
UNIVERSITY & RESEARCH

In Partnership with



BEZOS
EARTH
FUND



Global
Methane
Hub

Global Methane Genetics initiative - GMG
Database workshops 29 June/3 July 2026



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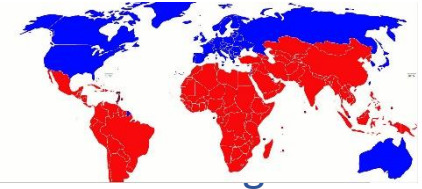
Agenda

- Welcome and aim (Birgit/Roel)
- Demonstration database
- Interactive meeting allowing you to test access and uploading in order to solve:
 - Issues regarding access
 - Issues with data upload/download/sharing
 - Answer questions

- Aim of workshop:
 - Your organisation should have access to the database
 - Being able how to upload, download, and share data with others.

- Pre-requisite: data sharing agreement signed!

Why? How? What? GMG



- Genetic progress can make a **permanent** and **impressive contribution** to reducing methane output from livestock systems **globally**, we aim to accelerate genetic progress and to implement breeding strategies for reduced methane emissions in Ruminants in the **global North and South**
- To **support sharing of protocols and data, to expand phenotyping, breeding program design and genetic evaluations**, underpinning the development of Global Livestock Genetics and Genomics Programs

Global **M**ethane **G**enetics initiative

Investment of 27M US\$

25 countries, 50 partners, 25 breeds

Methane pheno- & genotypes ~110k cattle & sheep, ~20k microbiome

GMG data sharing & database



- Two data sharing agreements GMG organised:
 - GMG paid data should be in database available for fair sharing
 - exchange for external sharing (all organizations)
- But also
 - Bilateral sharing between partners/organisations
 - Sharing general datasets after approval GMG committee
- This sharing is facilitated via the GMG database

GMG data sharing & database

■ Database process

- Sept 2024: Business requirements report April 2025
- August 2025: contracted DataGene as builder
- Weekly meetings and lot of hard work 
- Consultation meeting GMG partners in October 2025
- First delivery March/April 2026
- Extensive testing some partners → updates system 

Database workshop

- Two workshop in different time zones
 - Data uploading and sharing critical for success GMG
 - Used to measure success of phenotyping by organisations
 -
- Database questions: gmg.database@wur.nl

Thanks for your attention & contributions!

gmg@wur.nl

Newsletter:

https://www.wur.nl/en/project/global-methane-genetics-initiative.htm?wmstepid=thank_you

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Global Methane Genetics initiative - GMG

Ina Hulsegge, Birgit Gredler-Grand, Loc Ong and Roel Veerkamp

GMG data sharing & data base



Two data sharing agreements:

- GMG-paid data should be stored in the **database** for fair **data sharing**.
- Fair **data exchange** based on **records contributed** (any organizations: public commercial,...).

A centralized database and organization are needed to support this process.

Technology stacks

Database



PostgreSQL

- Core data store
- Open-source
- Proven in scientific data systems



ETL Orchestration



Apache Airflow

- Automate data transformations
- Robust scheduling & logging
- Modular DAG structure



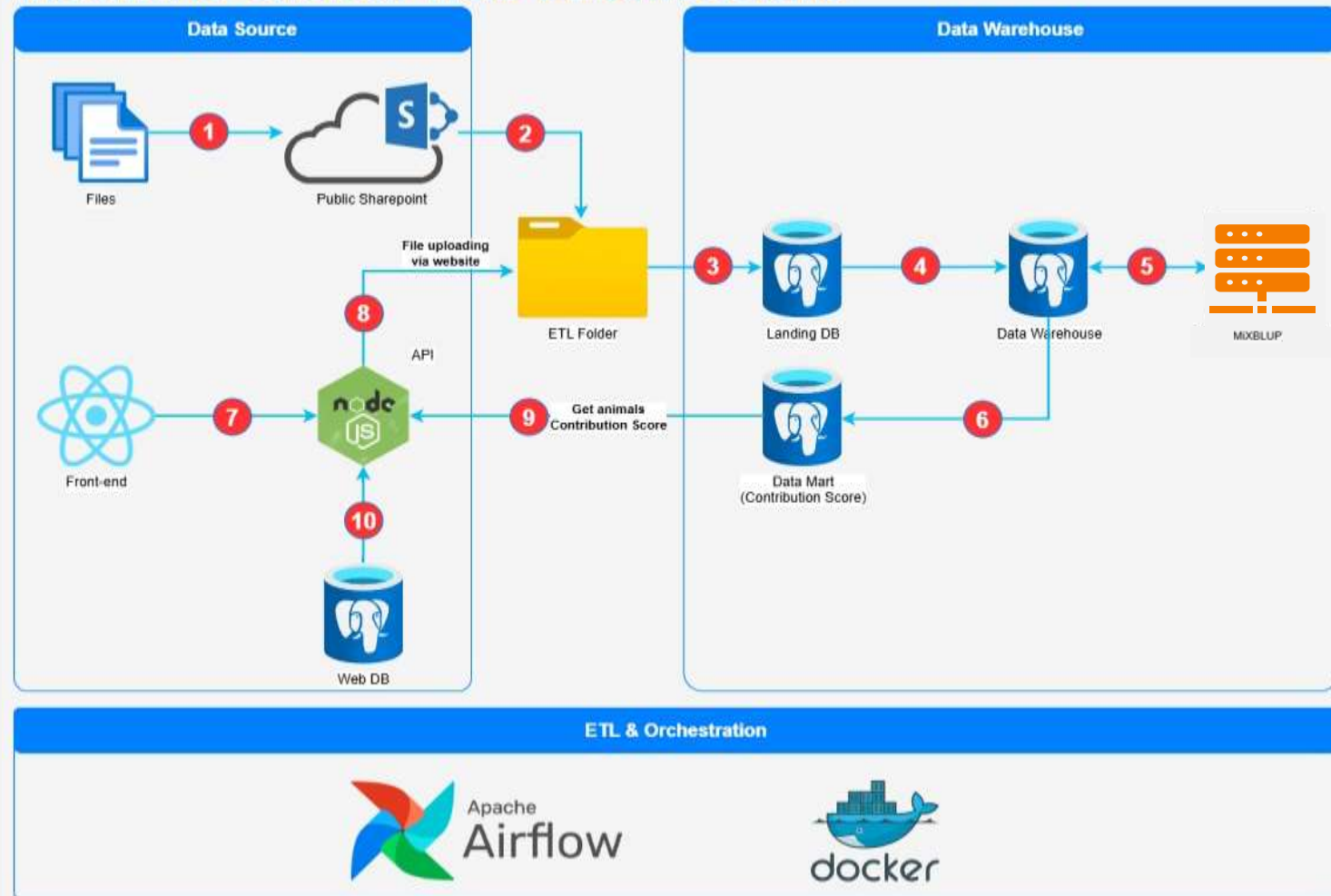
Web App



- Node.js: handles API endpoints
 - Lightweight, event-driven
- React: user interface
 - Modern, modular, responsive

Architecture & data flow

Methane Global Hub Architecture



Landing DB

- Storing a copy of imported files
- Validate & cleanse data



Data Warehouse

- Centralized methane data store
- Keeping historical version of data records
- MiXBLUP integration
- Contribution score



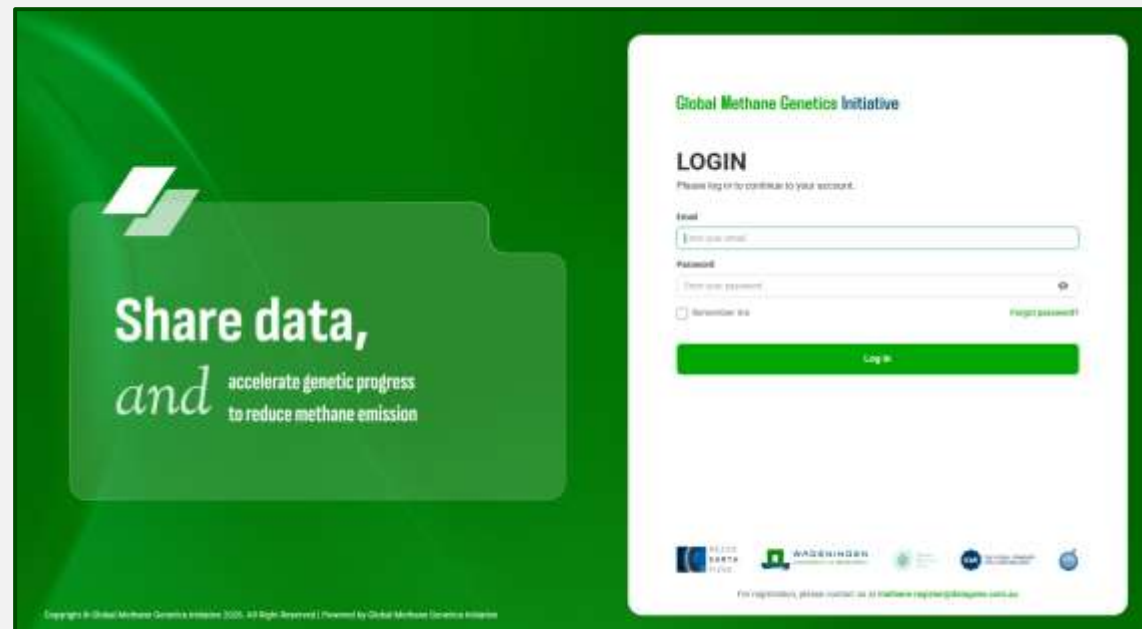
Data Mart (Contribution Score)

- Dedicated database for viewing info

Website

The website supports:

- Upload and management of methane data from organizations
- Data sharing for research and genetic evaluation
- User and organization management
- Operation in compliance with security and data privacy requirements



Registration



Organisation

- Registration process is **NOT** public
- GMG committee creates organization and its administrator
- Each organization has 1 administrator
- Maximum of 5 users per organization

Users

- Registration process is **NOT** public
- Non-administrator users are created/managed by organization administrator

Login

Share data,
and accelerate genetic progress
to reduce methane emission

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LOGIN

Please log in to continue to your account.

Email

Password

☐ Remember me

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and accelerate genetic progress
to reduce methane emission

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CONFIRM YOUR EMAIL

Enter the OTP we sent to your email ira.hulsegge@wur.nl

Share data,
and accelerate genetic progress
to reduce methane emission

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Contribution Score Weekly Monthly Yearly Jun 2025

Contribution Score

0 0.5 1 1.5 2

Week 1 Week 2 Week 3 Week 4 Week 5

Total Contribution Score

27 2% than last year

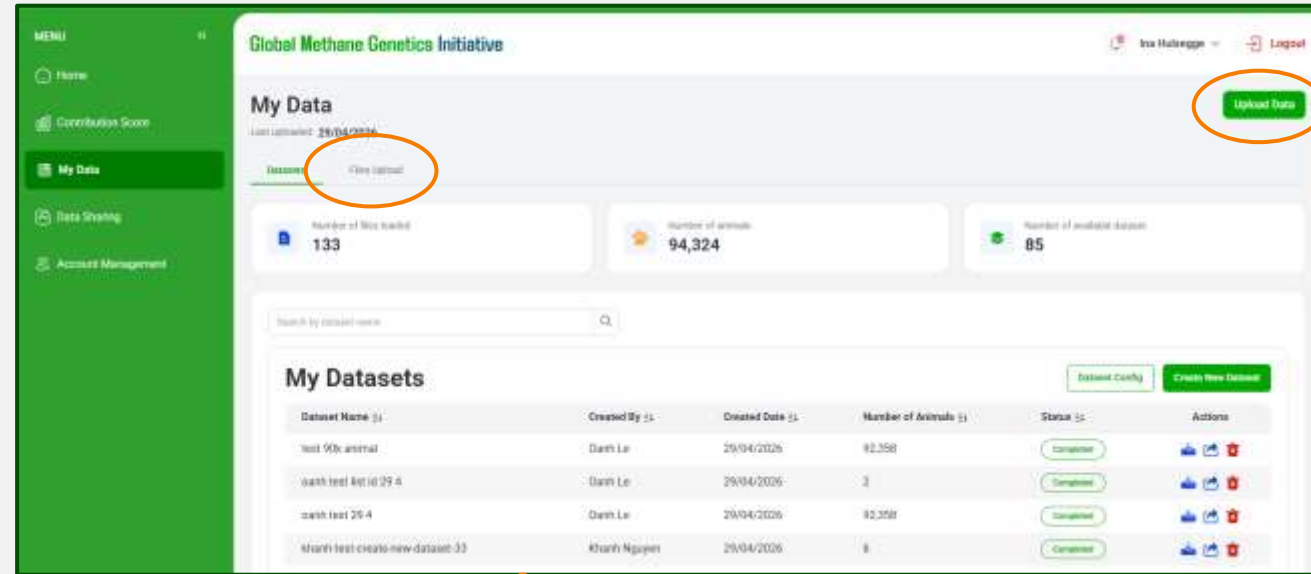
Activity Log This month

Name	Change	Time update
ira.hulsegge	Templates file downloaded	Jun 18, 2025, 03:29 PM
ira.hulsegge	Templates file downloaded	Jun 1, 2025, 09:59 AM

10 Items per page

Breeds of Species

Data upload



Global Methane Genetics Initiative

My Data
Last updated: 29/04/2026

[New Upload](#)

Number of files loaded: 133

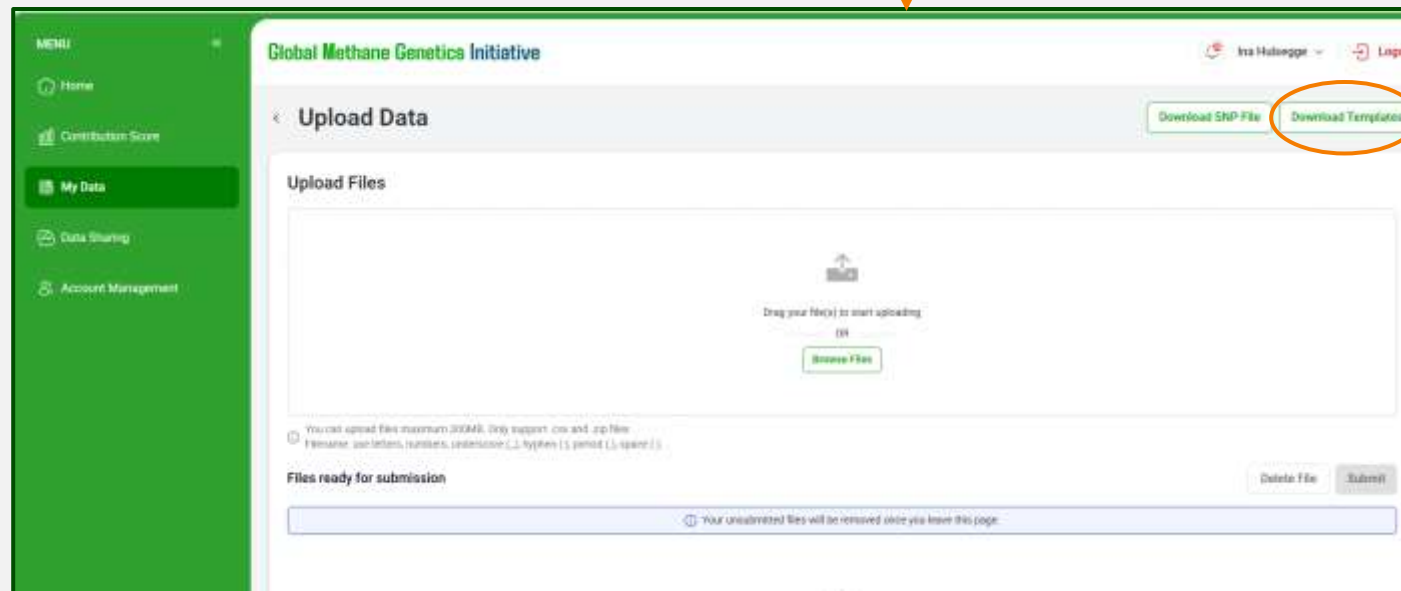
Number of animals: 94,324

Number of available datasets: 85

Search by dataset name

My Datasets

Dataset Name	Created By	Created Date	Number of Animals	Status	Actions
test 90k animal	Danh Le	29/04/2026	82,358	Completed	Download Share Delete
wash test 8pt 10 29.4	Danh Le	29/04/2026	2	Completed	Download Share Delete
wash test 29.4	Danh Le	29/04/2026	82,358	Completed	Download Share Delete
khuanh test create new dataset 33	Khuanh Nguyen	29/04/2026	8	Completed	Download Share Delete



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Upload Data

[Download SNP File](#) [Download Template](#)

Upload Files

Drag your file(s) to start uploading
OR
[Browse Files](#)

You can upload files maximum 200MB. Only support csv and zip file.
(Filename: use letters, numbers, underscore (_), hyphen (-), period (.), space ())

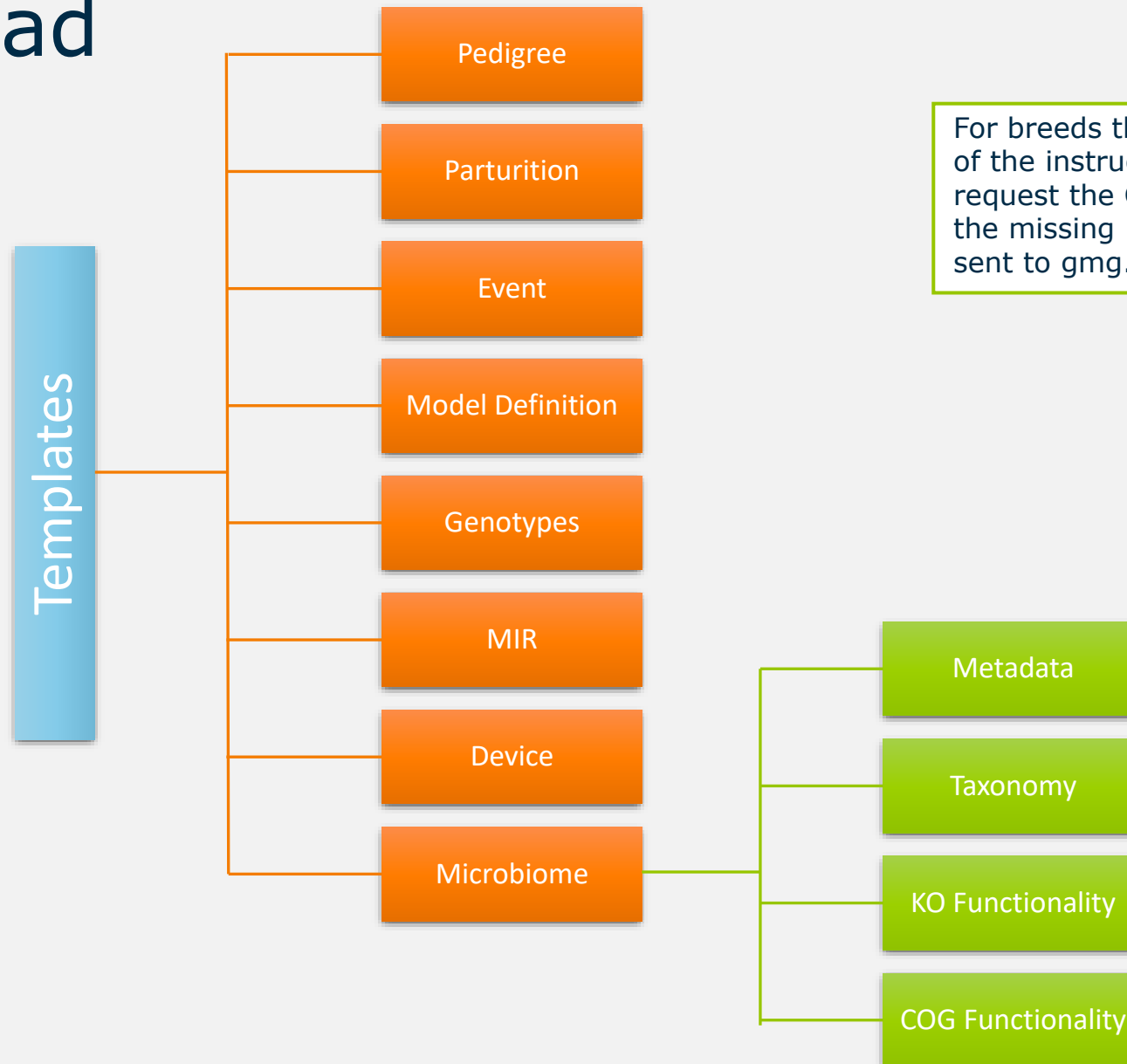
Files ready for submission

[Delete File](#) [Submit](#)

Your unsaved files will be removed once you leave this page.

Data upload

➤ File format: **.csv**



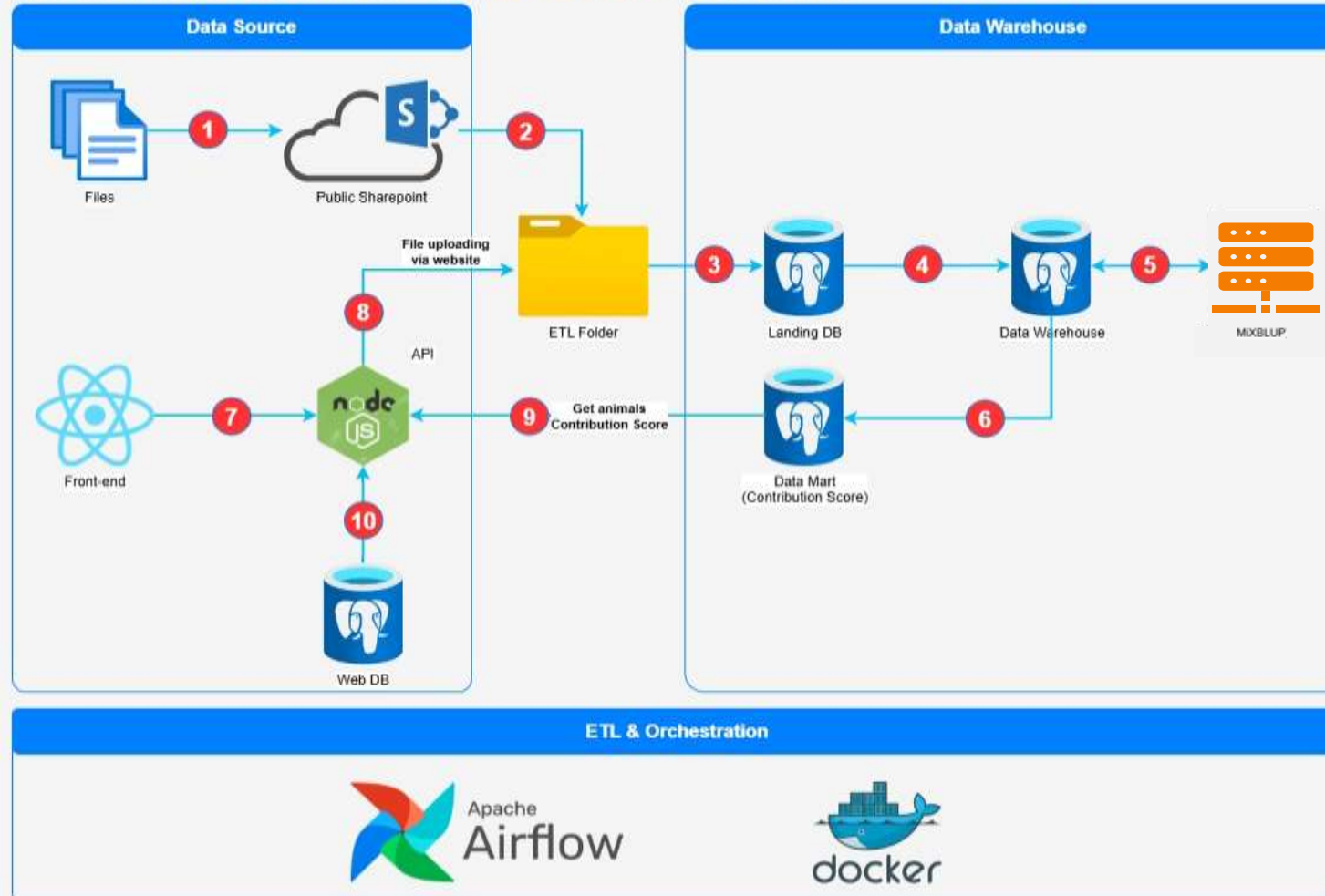
For breeds that are not in the lists of the instruction file, users can request the GMG committee to add the missing breeds. An email can be sent to gmg.database@wur.nl.

Data upload

- When uploading a file, it is first stored on the server while it waits to be processed by the database.
- The database checks for new files every five minutes, so there may be a short delay before processing begins. During this time, the website may not display the most up-to-date status.
- Use refresh to check

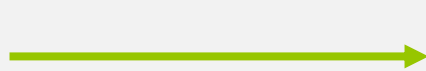
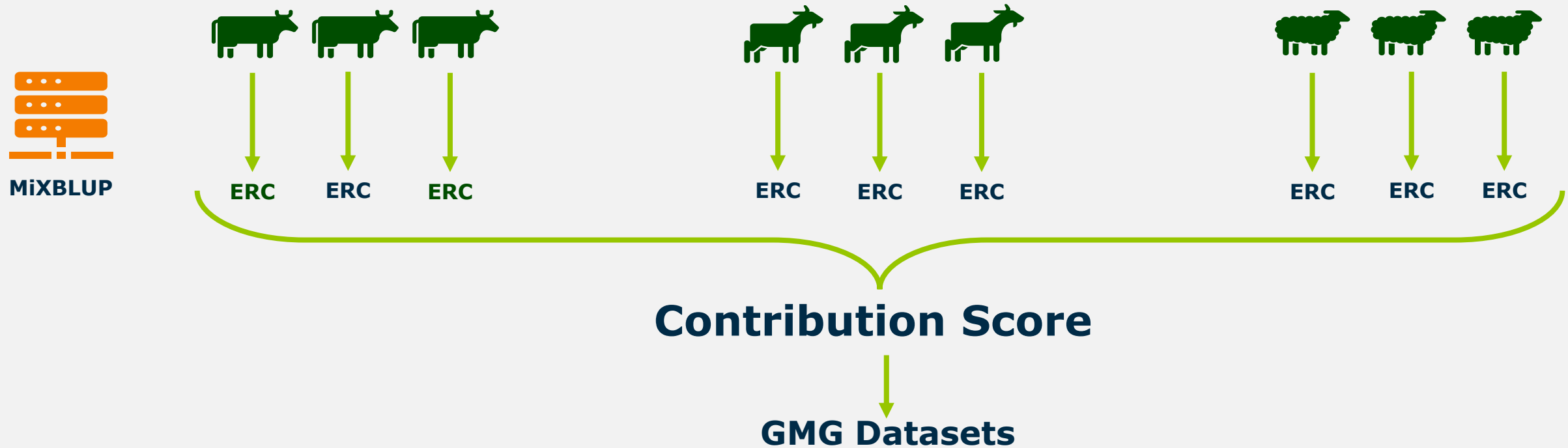
GMG datasets creation and sharing

Methane Global Hub Architecture



Contribution Score

ERC = Effective Record Contribution



- Runs nightly with new data detected
- Manual execution is controlled by GMG committee

GMG datasets (system datasets) creation



Cattle-Breed-250



Goat-Breed-250



Sheep-Breed-250



Cattle-Breed-250



Goat-Breed-250



Sheep-Breed-250



Cattle-Breed-250



Goat-Breed-250



Sheep-Breed-250

...

...

...

- Random animals are selected from across all organisations
- Animals paid by GMG are prioritized
- Once create, datasets stay fixed
- Larger datasets progression: 250 → 500 → 1000 → 2000 → 4000 → 8000 → ...
- Animal ID anonymized
- An organization's contribution score is used by GMG to provide access to GMG datasets

GMG datasets

MENU

Home

Contribution Score

My Data

Data Sharing

Account Management

Global Methane Genetics Initiative

Ina Hulsegge Logout

My Shared Datasets

System Dataset Sharing

System Dataset Sharing

Search by organization name

Q

Organization Name	Organization Contribution Score	Number of Shared Dataset	Last Shared Date	Action
AGBU	0.00	0	-	
ANAFIBJ	0.00	0	-	
ARC	0.00	0	-	
Aarhus University	0.00	0	-	
AbacusBio	0.00	0	-	

Organization datasets creation and sharing

- The organization administrator can create their own dataset and share this with other organization administrators
- The organization administrator can request sharing data to another organization administrator

The screenshot shows the 'Create New Dataset' form. The 'Create New Dataset' button is circled in orange. The form includes fields for 'Dataset ID', 'Species', 'Particular Data', 'Dataset', and 'Hard Cattle'. There is also a section for 'Upload a file that includes a list of Animal ID's'.

The screenshot shows the 'Data Sharing' page. The 'My Shared Datasets' link is circled in orange. Below the link is a table titled 'Dataset sharing' with columns: Dataset Name, Shared To, Shared Date, and Action.

Dataset Name	Shared To	Shared Date	Action
System combined dataset_Dairy Cattle_HQ_1000	Omnia	05/05/2028	
System dataset_Dairy Cattle_HQ_18	Adams 000026	26/04/2028	
System dataset_Dairy Cattle_HQ_12	Org6	26/04/2028	
System dataset_Dairy Cattle_HQ_8	Org6	26/04/2028	
System combined dataset_Dairy Cattle_HQ_300	Org6	26/04/2028	
System combined dataset_Dairy Cattle_HQ_4000	Org6	26/04/2028	
System combined dataset_Dairy Cattle_HQ_2000	Org6	26/04/2028	
System combined dataset_Dairy Cattle_HQ_1000	Org6	26/04/2028	
System dataset_Dairy Cattle_HQ_1	Adams 000026	09/04/2028	
System dataset_Dairy Cattle_HQ_18	Volant	09/04/2028	

Main points

- Data upload
- Dataset creation and sharing by GMG (anonymized data)
- Data creation by organizations and sharing with other organizations

Questions ?

Global Methane Genetics (GMG) initiative



GMG initiative project partners – associated organizations

