VET TECH
Empowering Livestock Health

Empowering Livestock Economies
Through Health Innovation and Technology

Harnessing Data for Animal Health

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Université de Montréal

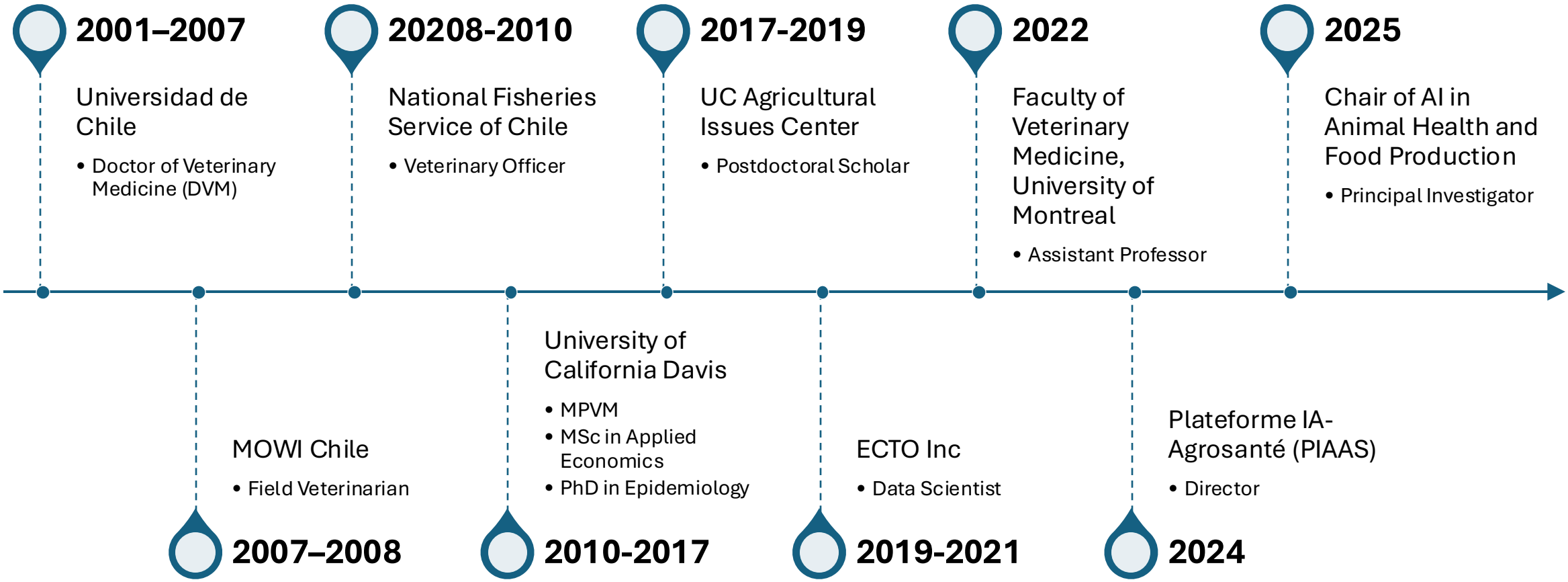
PIAAS
Plateforme IA-Agrosanté

2-3 of December 2025, Riyadh

وزارة البيئة والمياه والزراعة
Ministry of Environment Water & Agriculture
Kingdom of Saudi Arabia المملكة العربية السعودية

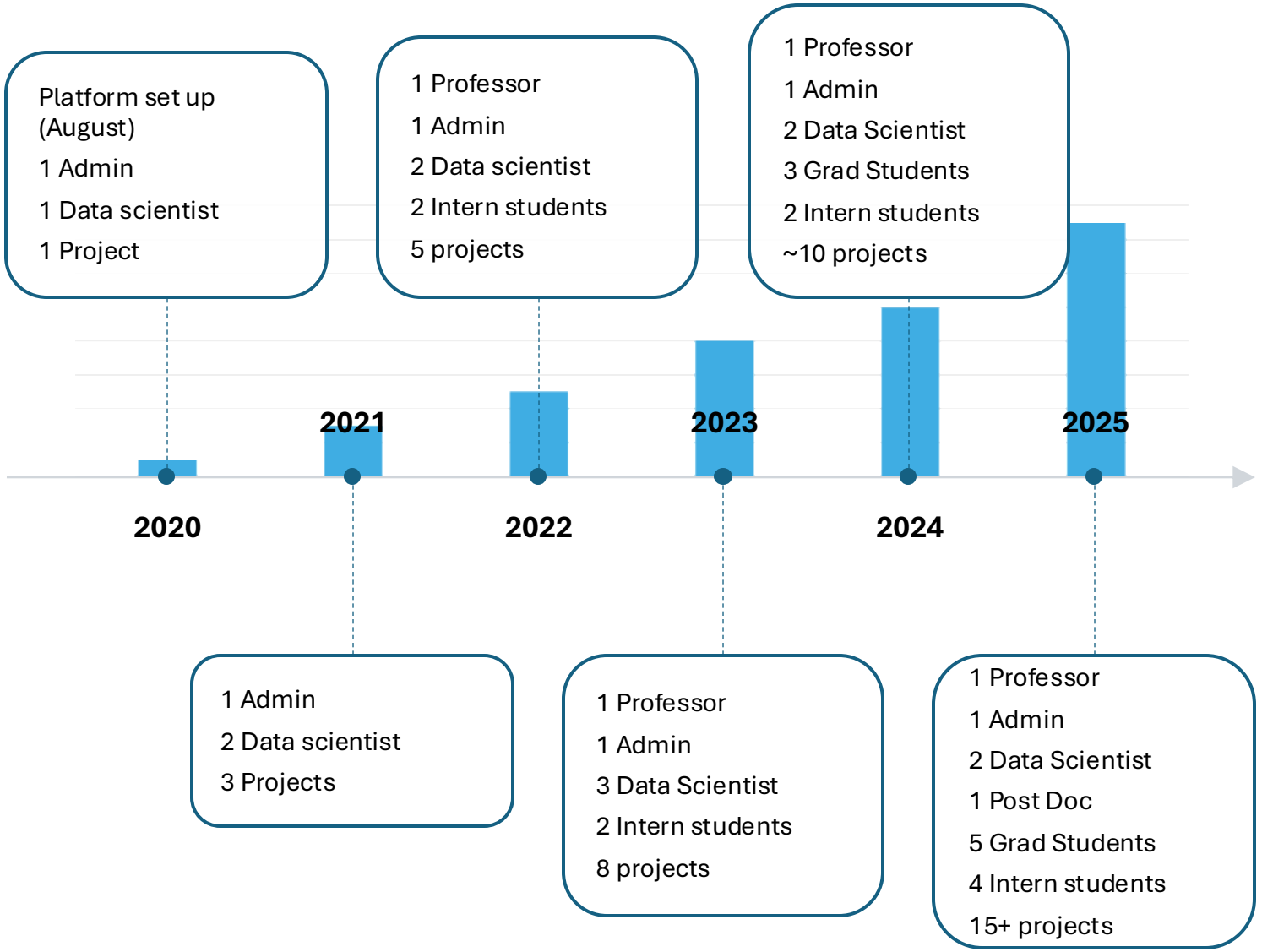
TAFS forum

البرنامج الوطني لتطوير قطاع الثروة الحيوانية والسمكية
NATIONAL LIVESTOCK & FISHERIES D. P.


2001–2007
Universidad de Chile
• Doctor of Veterinary Medicine (DVM)
2007–2008
MOWI Chile
• Field Veterinarian
20208-2010
National Fisheries Service of Chile
• Veterinary Officer
2010-2017
University of California Davis
• MPVM
• MSc in Applied Economics
• PhD in Epidemiology
2017-2019
UC Agricultural Issues Center
• Postdoctoral Scholar
2019-2021
ECTO Inc
• Data Scientist
2022
Faculty of Veterinary Medicine, University of Montreal
• Assistant Professor
2024
Plateforme IA-Agrosanté (PIAAS)
• Director
2025
Chair of AI in Animal Health and Food Production
• Principal Investigator

PIAAS

Plateforme IA-Agrosanté

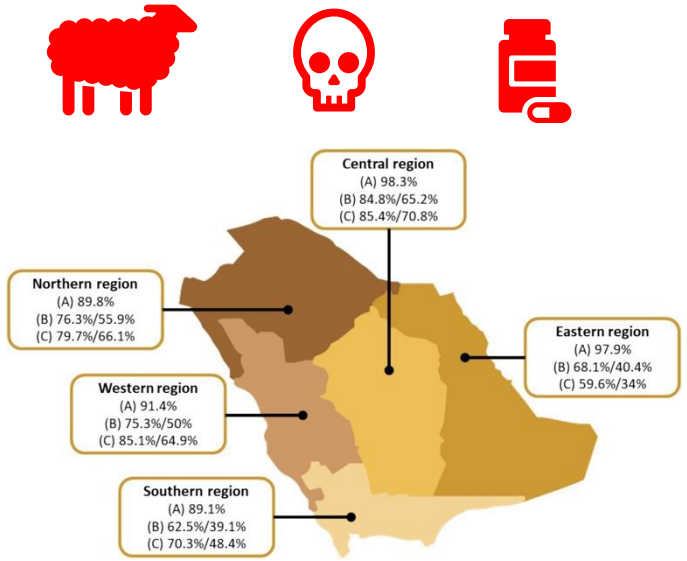


Why animal health matters

1. Animal Welfare
   - **Longevity**: Healthier animals live longer.
   - **Productivity**: Optimal health drives increased productivity and output.

2. Economics
   - **Indirect losses**: Sick animals reduce productivity.
   - **Direct losses**: Dead animals fail to produce output.
   - **Increase in production costs**: Due to treatments, veterinary services, etc.
   - **Product prices:** Market price disruptions

3. Public Health
   - **Zoonotic diseases**: Direct impact on human health.
   - **Antimicrobial resistance**: Increase in the use of treatments.



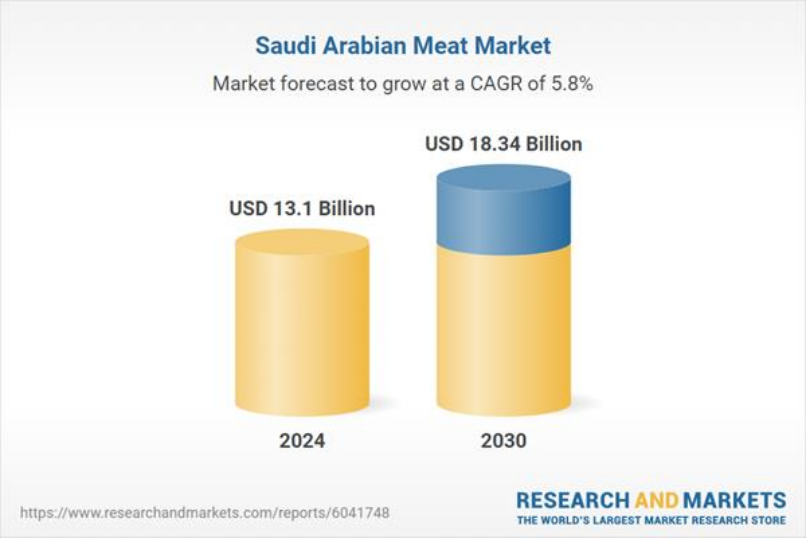
Level of knowledge of brucellosis in Saudi Arabia

Source: Assessment of knowledge, attitude, and practice related to brucellosis among livestock farmers and meat handlers in Saudi Arabia. Alghafeer, M. H., et al. 2024

Why animal health matters

4. Food Security and Nutrition

- Animals are key sources of protein, vitamins, and minerals.
- Disease in animals can reduce supply of animal products.



5. Environment

- Livestock management affects land use, waste management, and biodiversity.
- Compared to healthy animals, sick animals require more resources to produce.

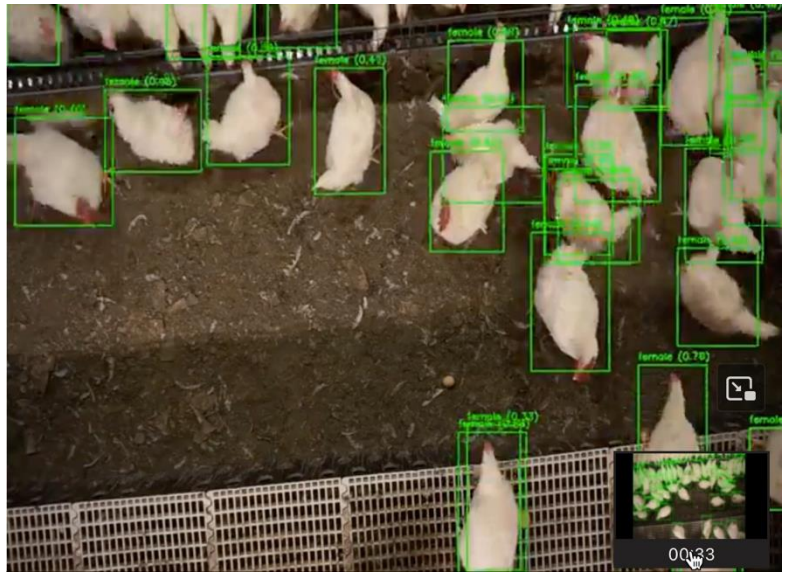
The role of animal data

Animal Welfare

Wearables (collars, ear tags, pedometers)

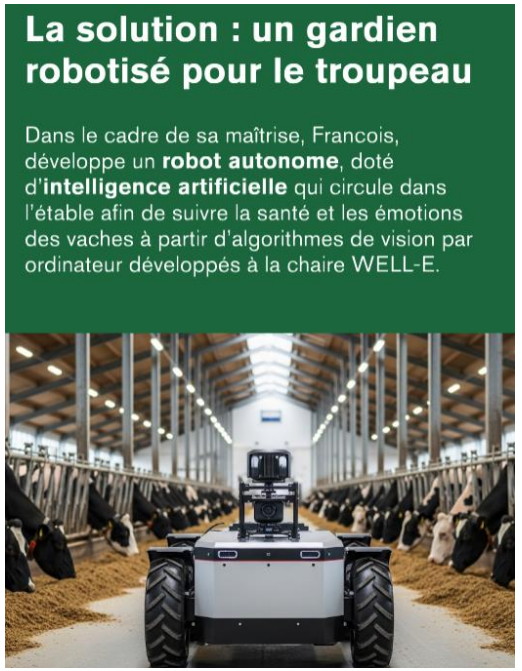
New Sensor Technology to Estimate Feed Intake in Lactating Dairy Cows
https://extension.sdstate.edu/new-sensor-technology-estimate-feed-intake-lactating-dairy-cows

Surveillance cameras



Applying computer vision to identify desirable and undesirable behaviors in broiler breeder flocks – PIAAS, under development

Drones



Design and Development of an Autonomous Robotic System for Welfare Monitoring in Dairy Cows
– Prospective PIAAS PhD student

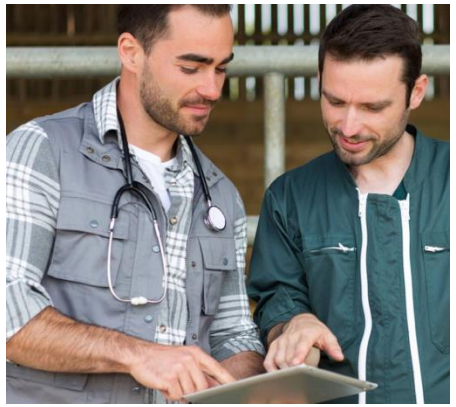
The role of animal data

Animal Welfare

Internet of Tings (IoT)

Enterprise Resource Planning (ERP) systems

Economics



DSAHR production software
https://www.dsahr.com/en/about/

SaFIRE (Small Animal Feed Intake Recording Equipment)
https://youtu.be/TKoU-ge8MOk?si=BH869WVg5evUuTgZ

The role of animal data

Animal Welfare

Economics

Environment

Environmental sensors

Poultry climate control: New sensor is a milestone for poultry production
https://www.bigdutchman.com/en/news-stories/article/poultry-climate-control-new-sensor-is-a-milestone-for-poultry-production/

The role of animal data

Animal Welfare

Economics

Environment

Food Security and Nutrition

Robots

Farm robotics: Lots of progress but far from the finish line
https://share.google/images/blTcDzsKustli8fRb

The role of animal data

Enterprise Resource Planning (ERP) systems

5 Milk Analysis Tests Provided by Dairy One
https://dairyone.com/5-milk-analysis-tests-provided-by-dairy-one/

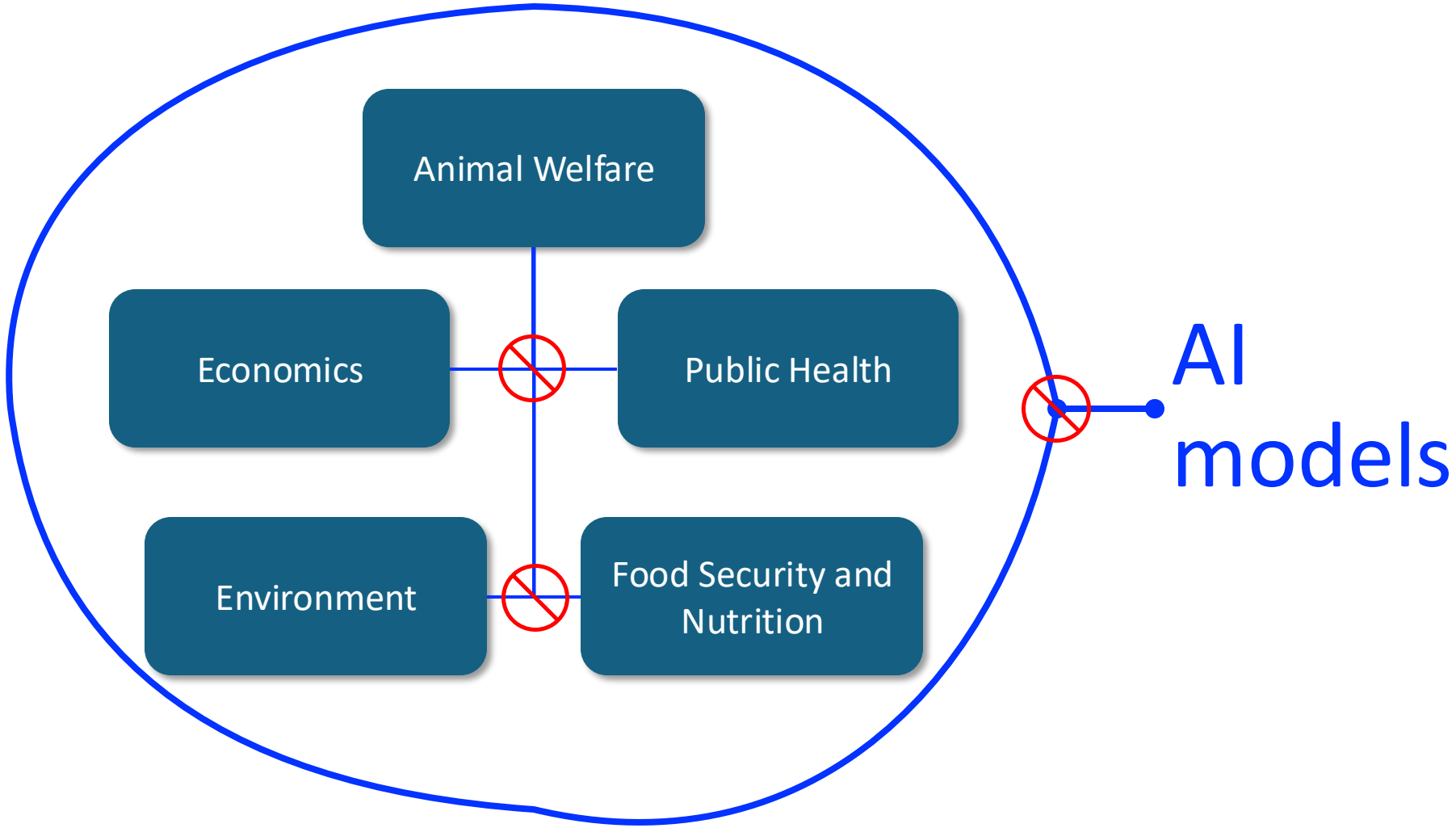
Animal Welfare

Public Health

Environment

Food Security and Nutrition

The role of animal data



The role of animal data

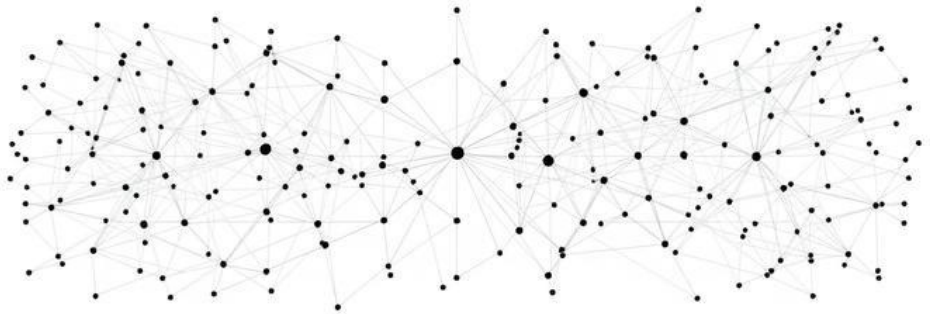
Data integration is essential for the development of **AI** in all fields, including **AI in Animal Health**

The role of animal data

Why is data integration important for the development of AI?

- AI models learn by identifying patterns in large datasets.

In animal health, this involves feeding algorithms real-world data to help them "understand" normal and abnormal patterns (e.g., animal movements, feed consumption, disease symptoms).



- AI needs (animal) big data!

Animal big data

- 5 Vs

Variety

Many *types of data* (or variables) per each single entity.

Animal-level data: Age, sex, breed, genetics, weight, health history.

Environmental data: Weather, pasture quality, water quality, housing conditions, herd density.

Behavioral and physiological data: Activity, feeding patterns, body temperature.

Epidemiological data: Disease outbreaks, vaccination records, antimicrobial use.

Genomic and microbiome data: Genetics for breeding, resistance to diseases, gut microbiome insights.

Animal big data

- 5 Vs

Structured data: Data that has been predefined and formatted before being placed in data storage (schema-on-write)

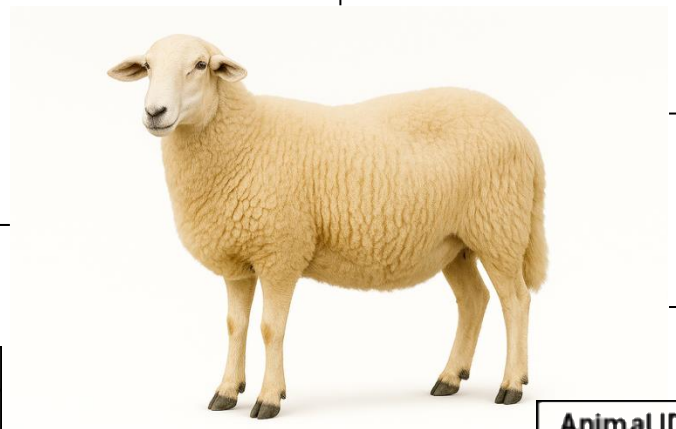
Variety

Many *types of data* (or variables) per each single entity.

Animal ID	DoB	Sex	Weight at birth	Breed	Diseases
2025_890	2025-06-05	1	7	Najdi	None

Animal ID	Date	Activity
2025_890	2025-06-01	9
2025_890	2025-06-02	7
2025_890	2025-06-03	7
2025_890	2025-06-04	3
2025_890	2025-06-05	8
2025_890	2025-06-06	5
2025_890	2025-06-07	8
2025_890	2025-06-08	1

Animal ID	Date	Temp	House	Feed
2025_890	2025-06-01	37	Corral 1	Premix567
2025_890	2025-07-01	43	Corral 1	Premix568
2025_890	2025-08-01	49	Corral 1	Premix569
2025_890	2025-09-01	45	Open pasture	Premix569+grass
2025_890	2025-10-01	37	Open pasture	Premix569+grass
2025_890	2025-11-01	38	Open pasture	Premix569+grass
2025_890	2025-12-01	42	Corral 5	PremixUltra5678



Animal ID	Date	Vaccine	ATB
2025_890	2025-06-01	OO-Vac3	
2025_890	2025-07-01		FFC
2025_890	2025-08-01		FFC

Animal ID	Genetic strain	Ewe ID	Ram ID
2025_890	GEN50-1	2023_6789	2020_789

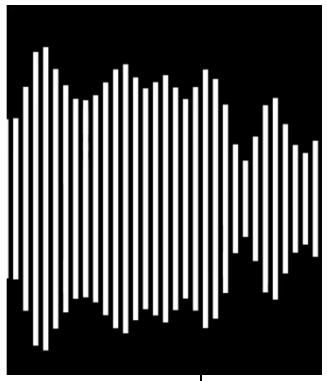
Animal big data

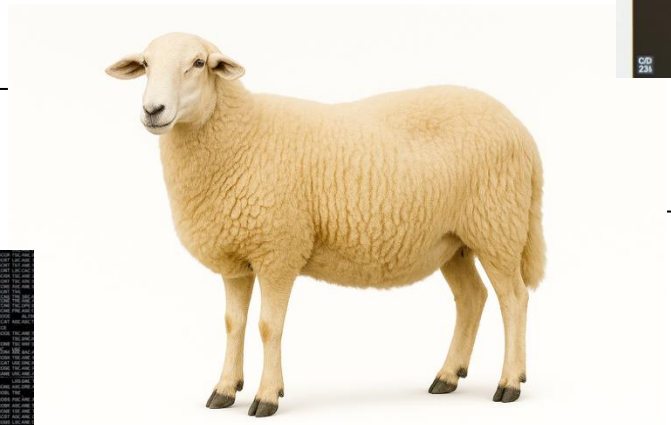
- 5 Vs

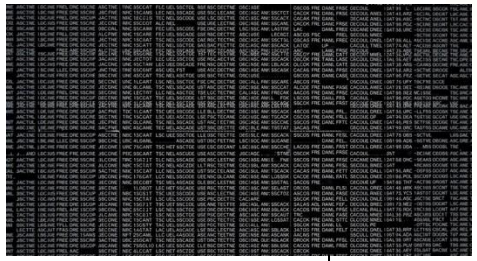
Unstructured data: Data stored in its native format (i.e., unprocessed) until it is used (schema-on-read)

Variety

Many *types of data* (or variables) per each single entity.







Animal big data

- 5 Vs

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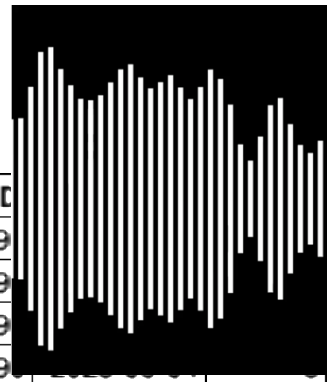
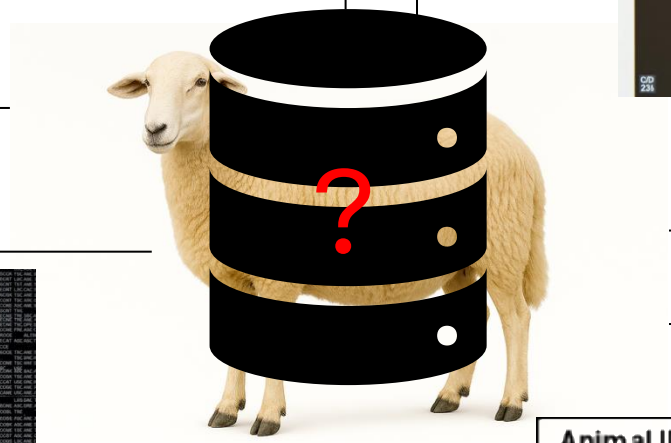
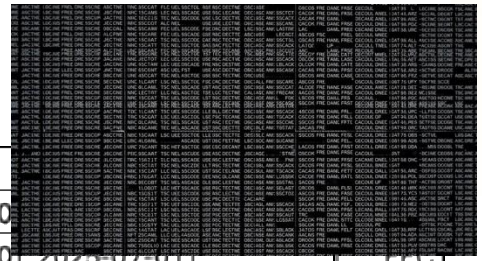


Animal ID		
2025_89		
2025_89		
2025_89		
2025_89		
2025_890	2025-06-05	8
2025_890	2025-06-06	5
2025_890	2025-06-07	8
2025_890	2025-06-08	1





Animal ID			
2025_890			
2025_890	2025-07-01		FFC
2025_890	2025-08-01		FFC

Animal ID	Genetic strain	Ewe ID	Ram ID
2025_890	GEN50-1	2023_6789	2020_789

Animal big data

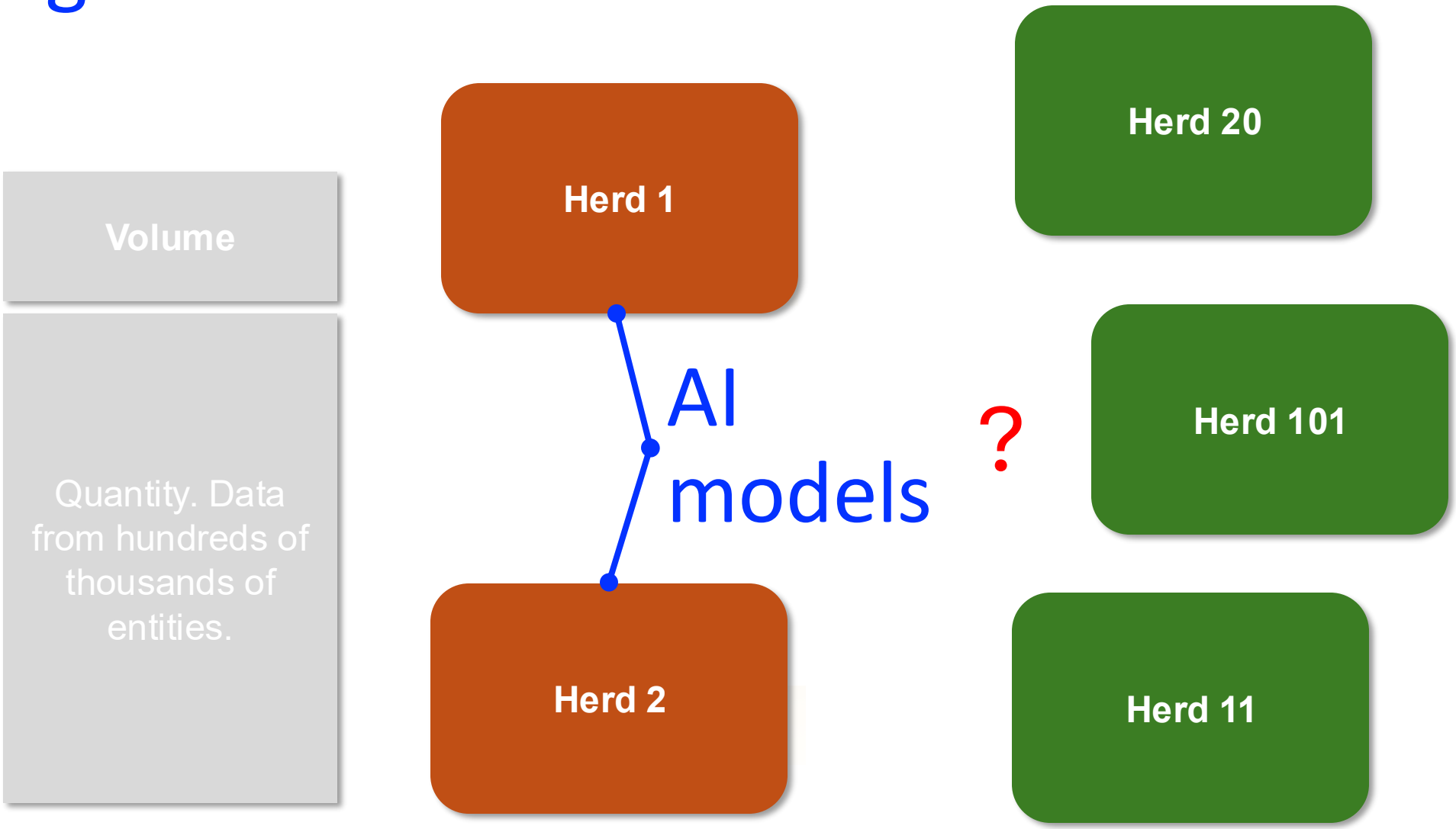
- 5 Vs

Volume

Quantity. Data from hundreds of thousands of entities.

Animal big data

- 5 Vs



Animal big data

- 5 Vs

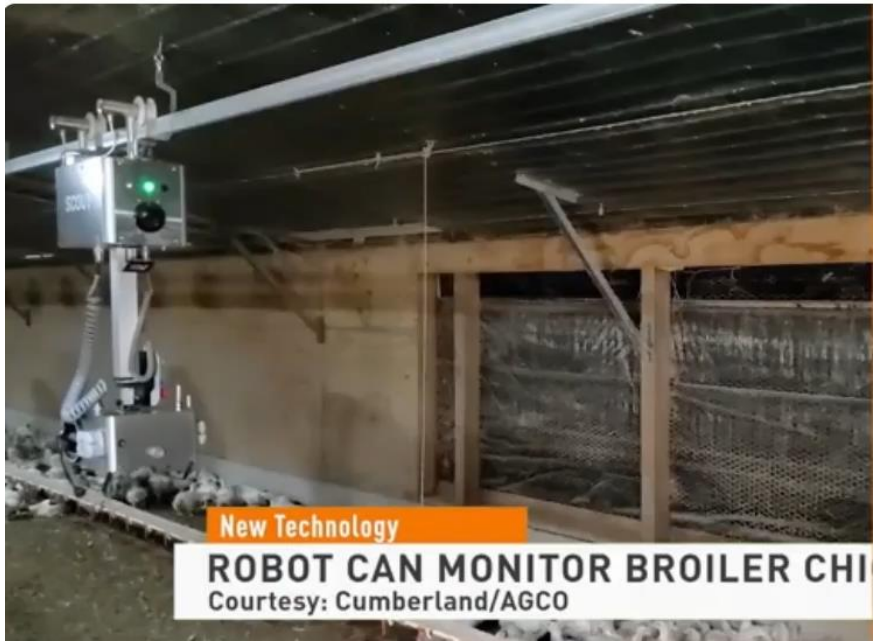
Wearables (Collars, ear tags, pedometers).

https://www.nytimes.com/2025/10/05/technology/cows-ai-collars.html

Velocity

Speed of data generation and data collection.

Drones or robots



https://www.youtube.com/watch?v=JNd0mXLFbKA

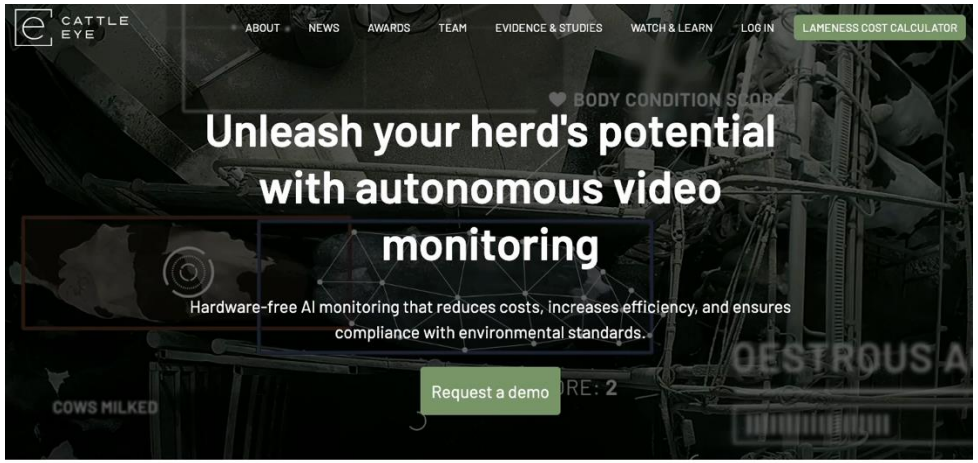
Animal big data

- 5 Vs

Velocity

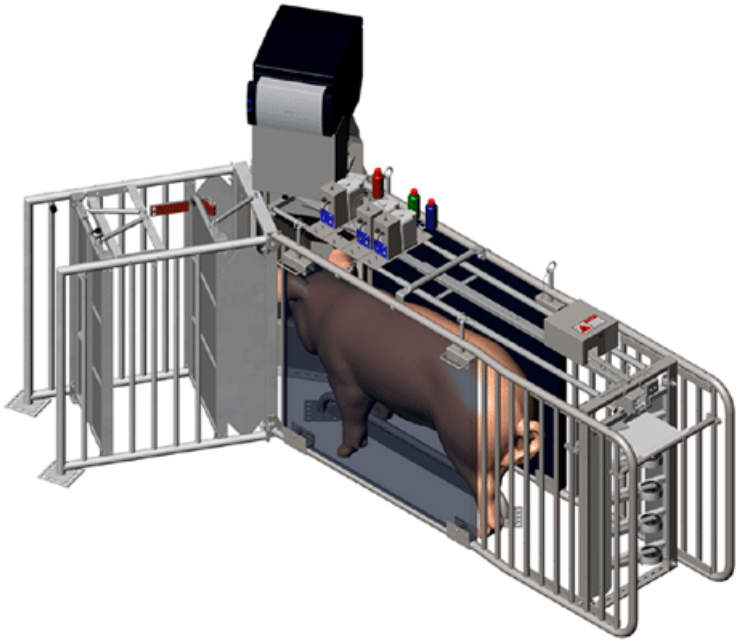
Speed of data generation and data collection.

Surveillance cameras



Evaluation of commercially available AI tools for detecting lameness in dairy cows – UdeM ongoing project
https://cattleeye.com/

IoT sensors



An example of an automatic feeding station with controlled access for pigs
https://share.google/images/u4kdTXnhysjkW82mC

Animal big data

- 5 Vs

Health and production records

AI-based digitization of hand-filled records from veal production farms in Quebec, Canada

Ongoing PIAAS project. To be submitted

Velocity

Speed of data generation and data collection.

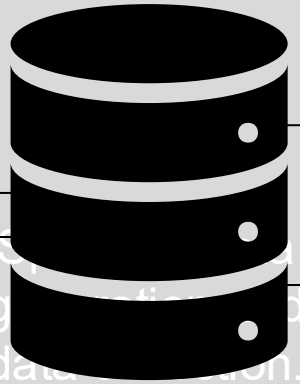
Mobile apps

Mobile Cattle Monitoring App | MilkingCloud
https://share.google/images/0DdyBScwRa4Grh7Ih

Animal big data

- 5 Vs

Velocity



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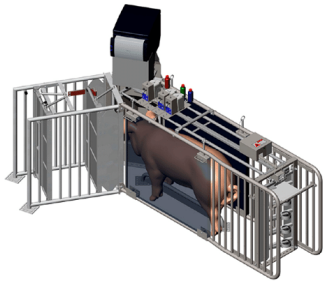

Animal big data

- 5 Vs

“Data practitioners spend 80% of their time finding, cleaning, and organizing the data. This leaves only 20% of their time to perform analysis on it”

Overcoming the 80/20 Rule in Data Science

Veracity

Data quality and accuracy.

Animal big data

- 5 Vs

Veracity

Data quality and accuracy.

Animal big data

- 5 Vs

Variety	Volume	Velocity	Veracity	Value
Many data points (or variables) are available.	Quantity of data.	Speed of data generation and collection.	Data quality and accuracy.	Actions from data analysis.

AI in animal health

Predictive models

Forecast disease outbreaks or health issues.

Disentangling complex relationships

Detect anomalies in behavior and their relationships to early disease and effects in production.

AI models for Animal Health

Decision support systems

Helping veterinarians or farmers make timely interventions.

Animal selection

Select the best animals for disease resistance or lifespan of production.

Examples

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Predictive models

Forecast disease outbreaks or health issues.

Context-based and transfer learning using LLMs for predicting broiler chicken livability using multi-species farm data

Objectives:

1. Compare datasets from different salmonid and chicken to generate reliable forecasts
2. Use LLMs to learn multi-species contextual patterns before predicting livability on new broiler data.
3. Use transfer learning from a pre-trained salmonid-model to a broiler-model to predict broiler livability.

Agriculture, Pêcheries et Alimentation
Québec

Examples

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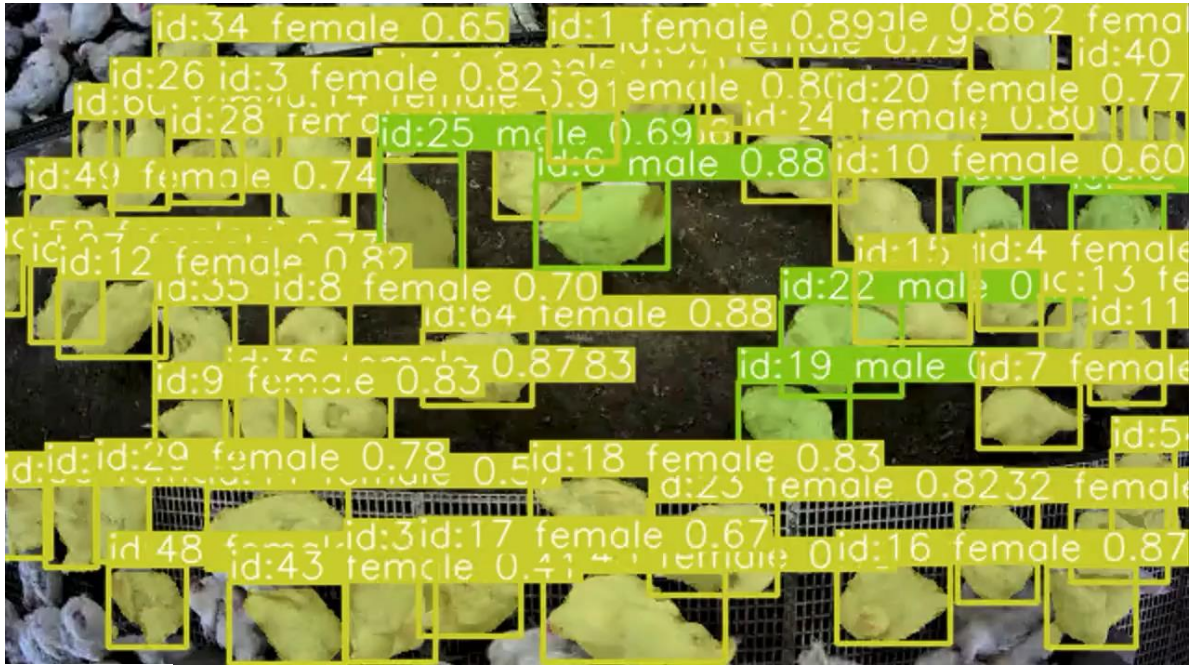
AI-powered multimodal analyses to reveal health risks and hidden behaviors in animal production



Poulet Québec

Disentangling complex relationships

Detect anomalies in behavior and their relationships to early disease and effects in production.

Objectives:

1. Develop and test multimodal models to detect and monitor good or problematic behaviors in experimental poultry farming.
2. Use unsupervised learning to reveal animal behaviors that professionals may overlook.
3. Evaluate the relationships of these behaviors with early disease manifestation and production.

Examples

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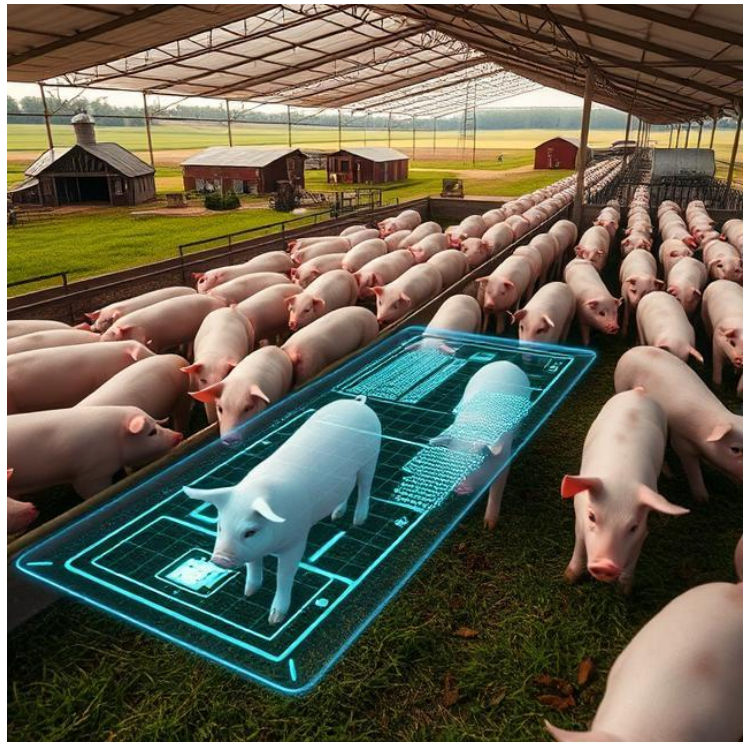
Developing digital twins for enhanced livestock production management



Objectives:

1. Integrate data from sensors, IoT devices, and monitoring systems into a unified database.
2. Build a high-fidelity virtual replica of a swine farm that accurately reflects health, behavior, and production dynamics.
3. Enable simulation, analysis, and predictive modeling within the digital twin to assess outcomes under different management and environmental scenarios.

Decision support systems

Helping veterinarians or farmers make timely interventions.

IRTA CReSA

OIE · Centre de Referència de l'OIE per Pesta Porcina Clàssica.
· Centre Col·laborador de l'OIE per a la Recerca i control de malalties porcines emergents i re-emergents a Europa.

Examples

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Using AI combined with historical maternal data for heifer selection

Objectives:

1. Integrate a multi-farm dataset that links each dam with the complete historical records of her heifer.
2. Identify early indicators of longevity and performance in heifers.
3. Develop AI models that combine production, reproduction, and health data to predict the probability of a heifer's long production lifespan.

dsahr
SOLUTIONS DE GESTION EN SANTE ANIMALE

Animal selection

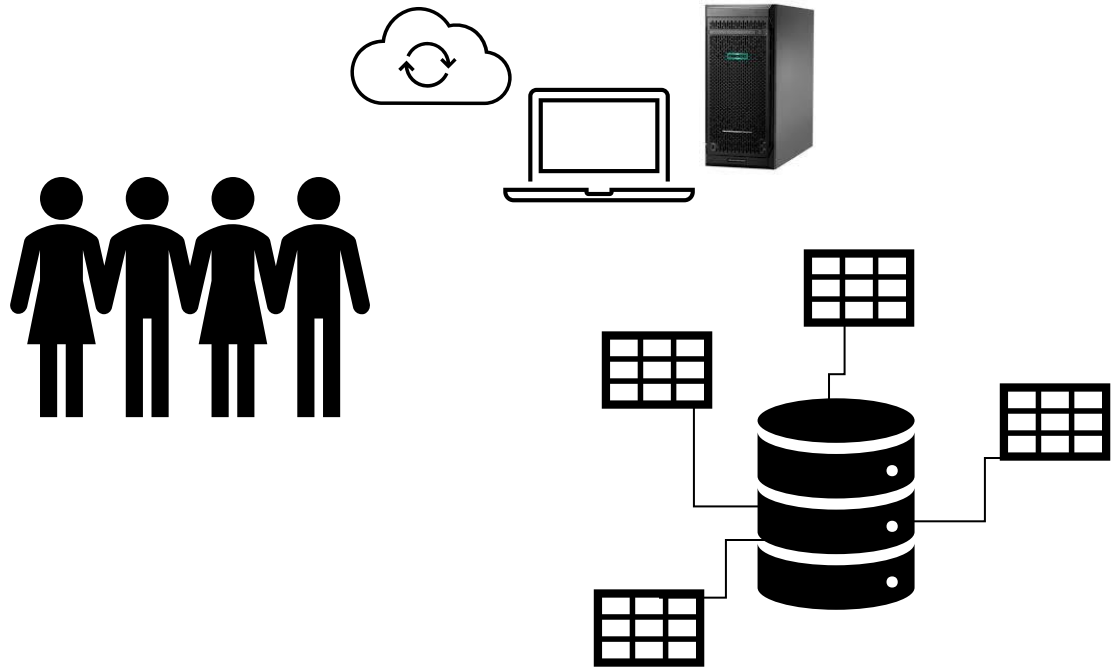
Select the best animals for disease resistance or lifespan of production.

Challenges

Talking about AI is easy, but implementing AI is hard and expensive.

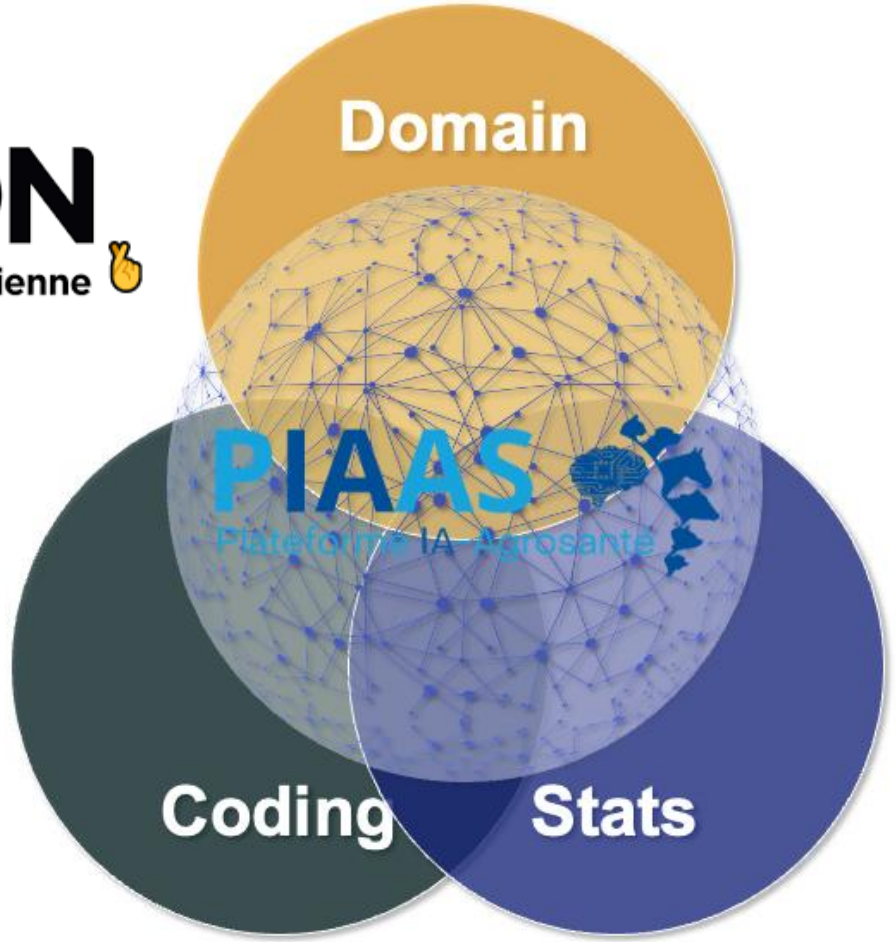
Research and implementation of AI requires significant investment in:

1) **Robust infrastructure**
2) **Specialized talent**
3) **Large and quality data**



1) Robust infrastructure

INNOVATION
Canada Foundation for Innovation
Fondation canadienne pour l'innovation



Faculté de médecine vétérinaire
Université de Montréal

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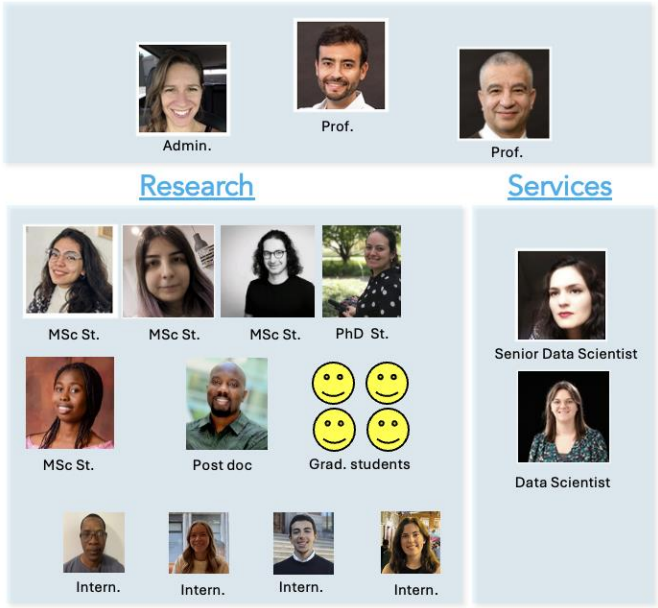
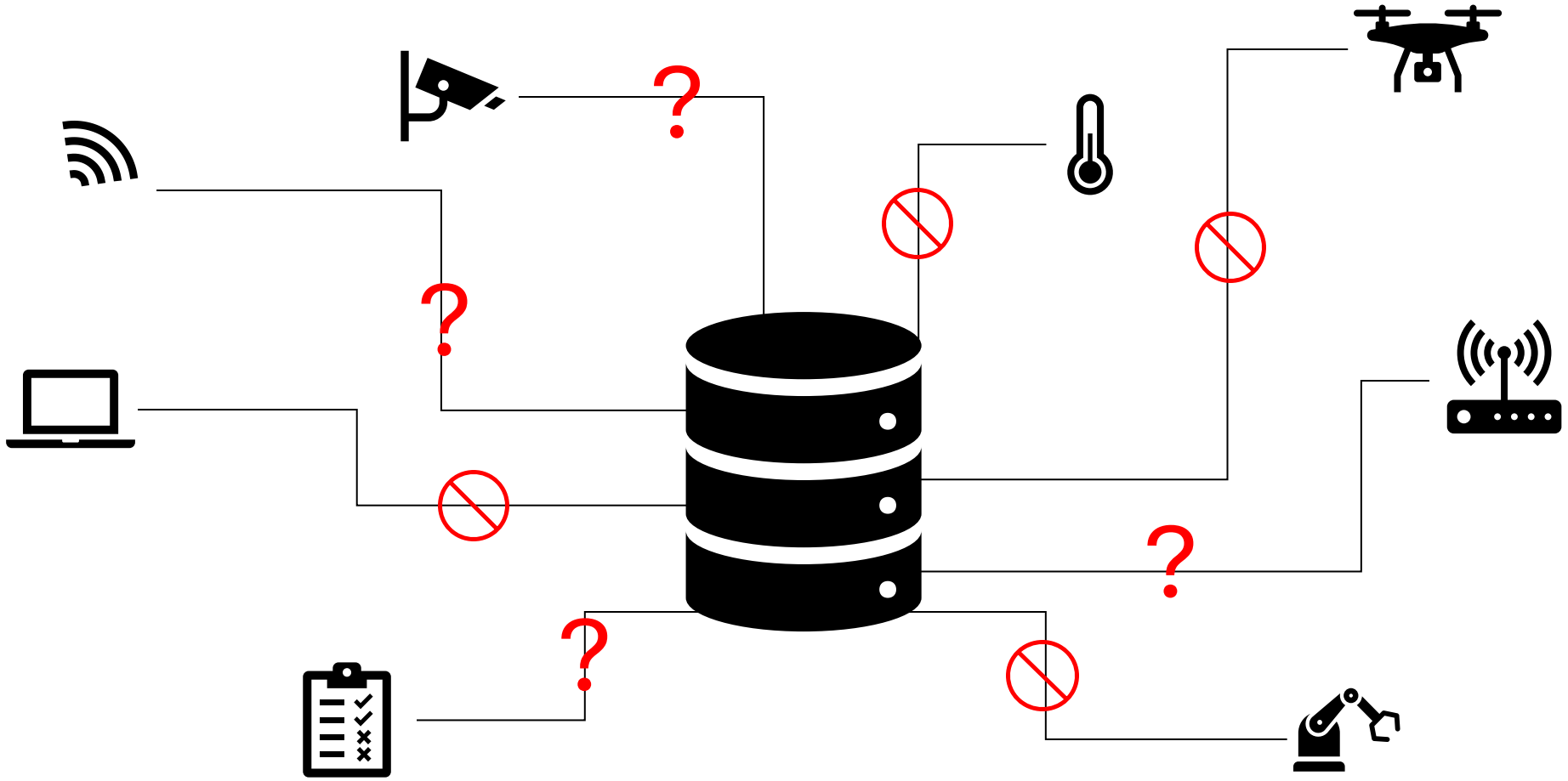


2) Specialized talent

3) Large and quality data



3) Large and quality data

What can we do when we do not have big data?

Foundation Models

"A very large AI model that has been trained on huge amounts of general-purpose data (like text, images, code, audio, etc.) so that it can perform many different tasks (not just one)."
– *From ChatGTP*

Text generators (ChatGPT)
Trained on lots of text

Image generators (DALL·E, Midjourney)
Trained on lots of images + descriptions

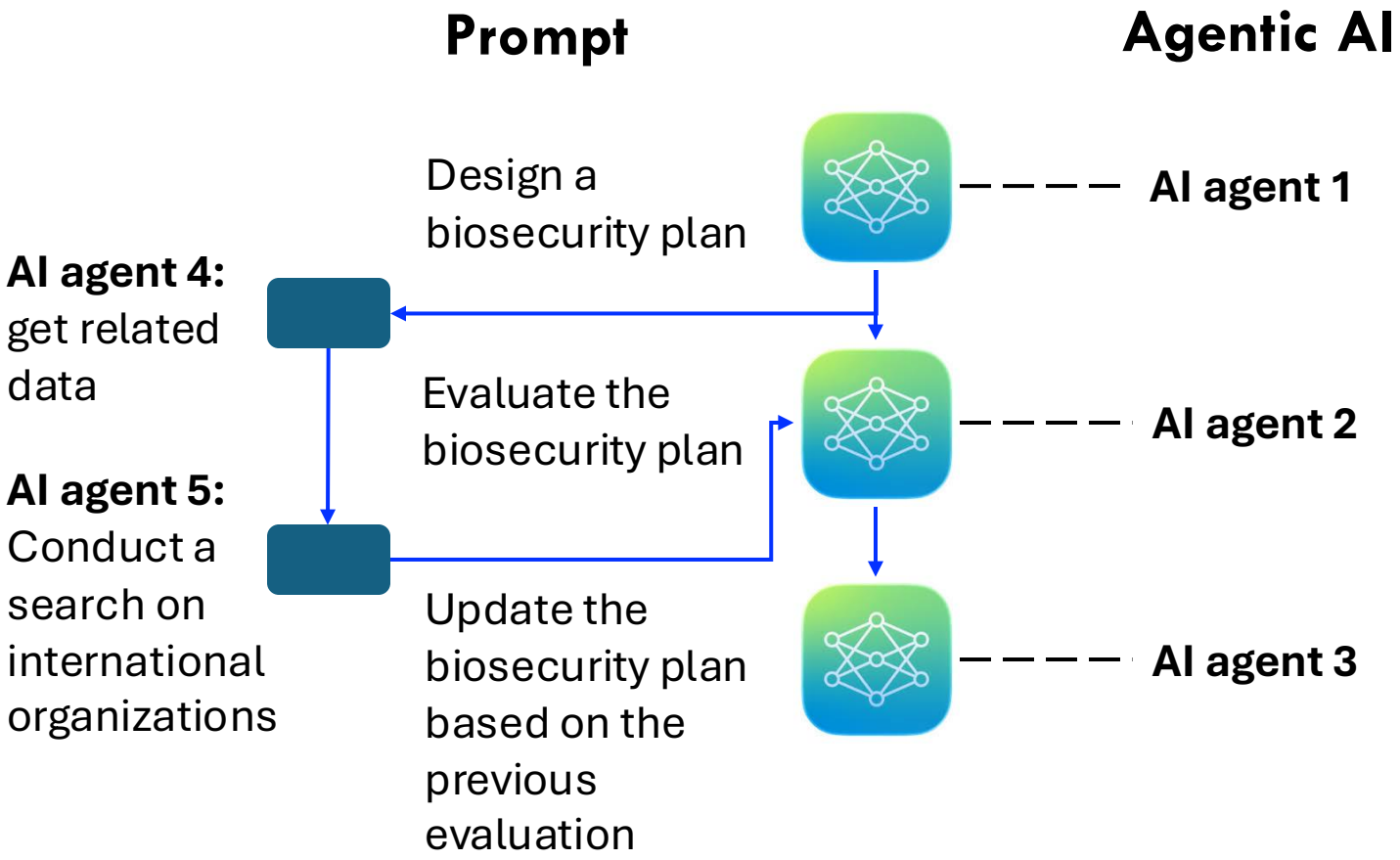
Speech recognition (Whisper)
Trained on lots of audio files

Multimodal models (like GPT-4o, Gemini, Claude 3)
Trained on lots of text + images + audio

Agriculture, Pêcheries et Alimentation Québec

3) Large and quality data

What can we do when we do not have big data?

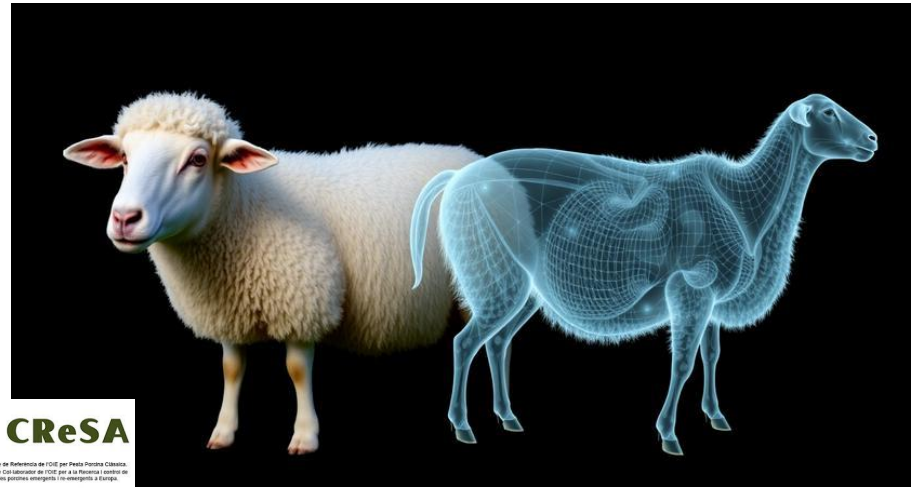


3) Large and quality data

What can we do when we do not have big data?

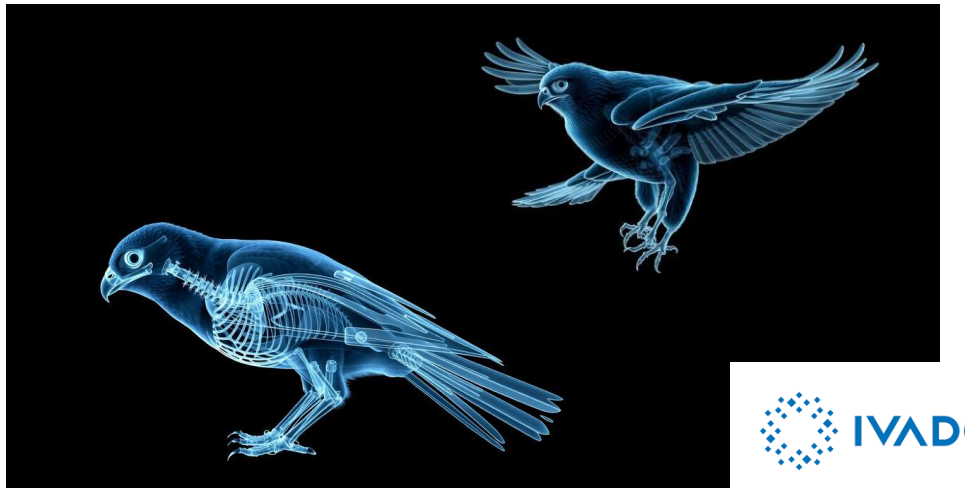
Digital Twins

- Virtual replicas of real-world entities.
- Enable simulations to be used for training models.



Synthetic Data

- Artificial data simulated from real-world data.
- Uses existing data to expand the available data.



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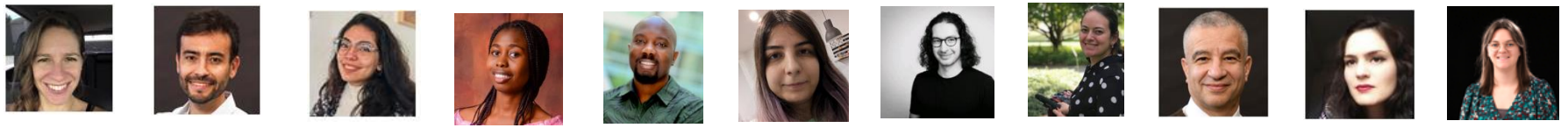
Thank you!

CA CL TN NG HT IR TR CO MA TN FR



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NG MW FR TN CA ES BJ FR FR TR

2022 2023 2024 2025

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Questions?

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