

GLOBAL: a 10-year experiment to phenotype, understand and predict lifetime health in dairy cows

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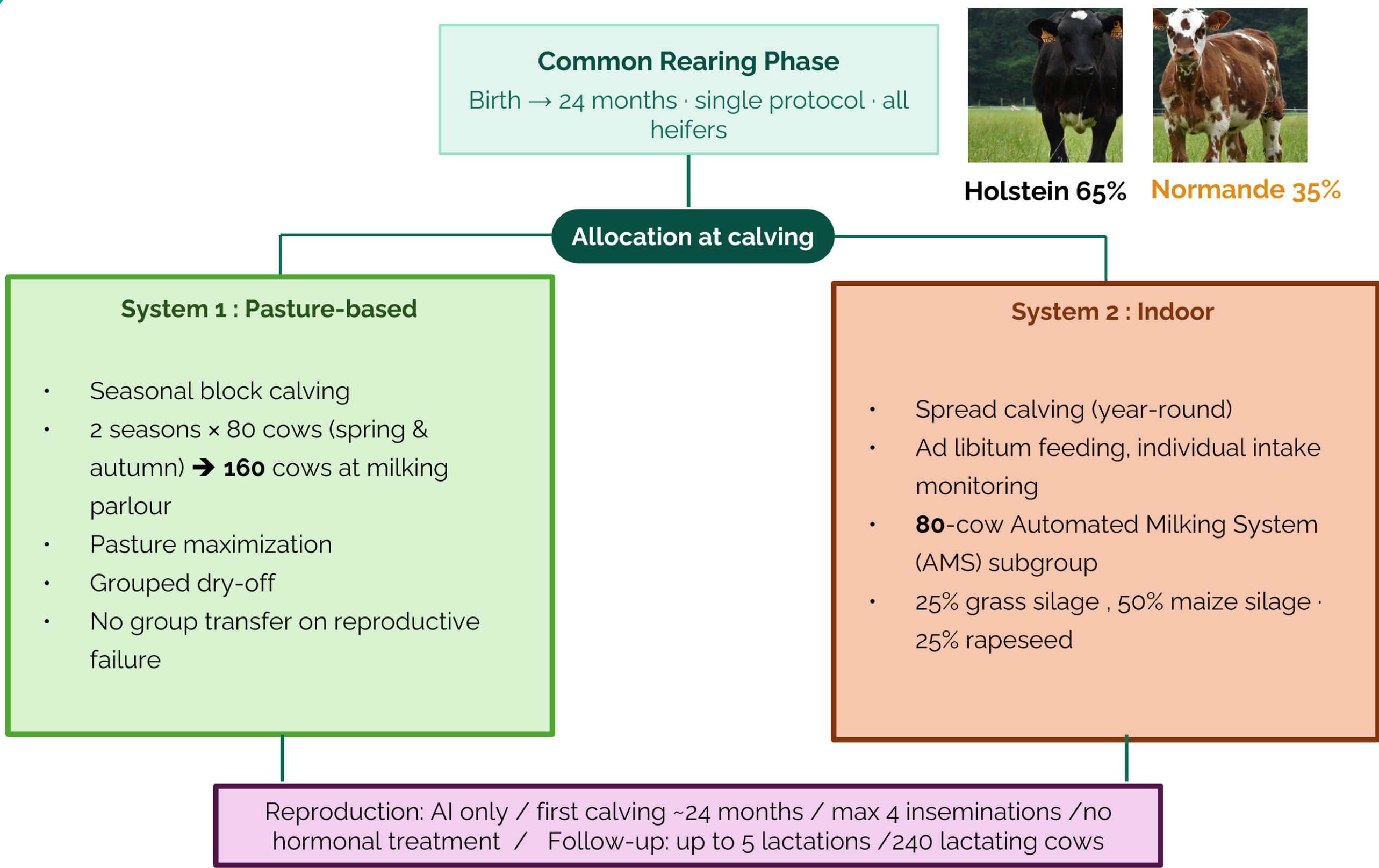
1. Context and challenge

- Animal health is usually captured through isolated events, not whole-life trajectories. Disconnected sensor, biological and clinical data limit our ability **to model how early life shapes lifelong health and longevity.**
- GLOBAL** builds a traceable, reusable longitudinal data infrastructure at INRAE Le Pin experimental facility linking **continuous phenotyping, detailed biological sampling and clinical health events** to predict “overall health” across the productive life of dairy cows.

2. Research objectives

- Phenotype overall health** : Develop a dynamic, life-course phenotype of health from multi-source data.
- Uncover mechanisms & genetics** : Link health with reproduction, longevity, resilience, production & welfare; explore genetic determinism.
- Predict from early life** : Predict lifelong health from genetics and young-age measurements.
- Compare production systems** : Test whether health trajectories depend on the management system.

3. Study design



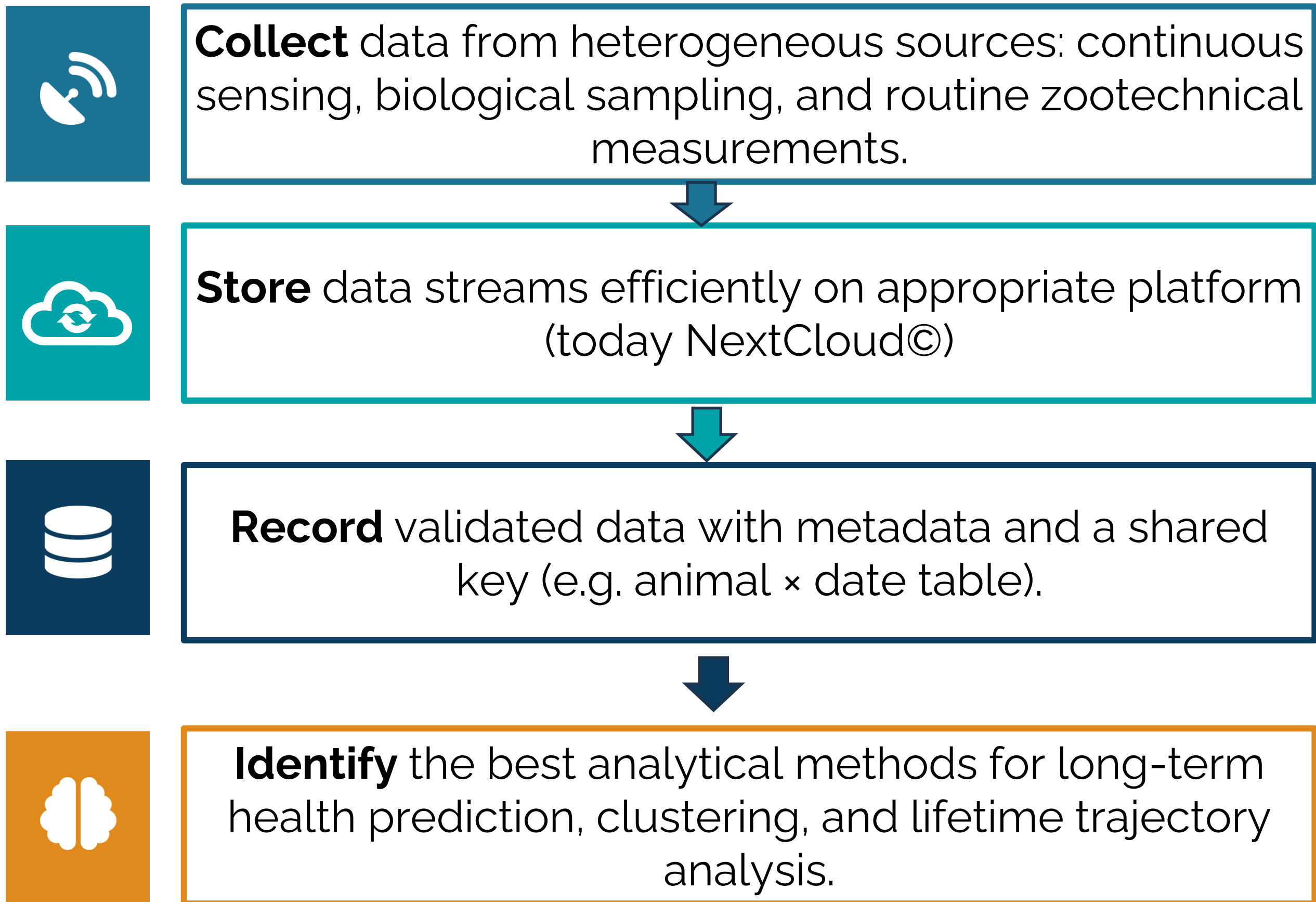
7. Acknowledgements

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6. Expected outputs

- Longitudinal multi-source datasets** (sensor + biological + management) enabling fair comparison of **health-prediction models, clustering algorithms, and feature-selection methods** under realistic on-farm conditions.
- Dynamic characterization of “overall health” from birth to end of life**, linking early-life phenotypes (immunity, microbiome, epigenome, etc.) to adult health, longevity, and performance across two contrasted production systems.
- Identification of genetic variants, genomic regions, and biological pathways underlying resistance vs. susceptibility to infectious disease** (mastitis, lameness, metritis) through divergent line comparison.

5. Integrate heterogeneous data



4. Longitudinal monitoring protocol — from calf to lactating cow

