

SmartCow: integrating research infrastructures to foster innovation in the European cattle sector

*R. Baumont¹, R. Dewhurst², B. Kuhla³, C. Martin¹,
L. Munksgaard⁴, C. Reynolds⁵, M. O'Donovan⁶ and A. Rosati⁷*

*¹INRA (France), ²SRUC (Scotland), ³FBN-Leibniz (Germany),
⁴Aarhus University (Denmark), ⁵Univ. Reading (UK), ⁶Teagasc (Ireland), ⁷EAAP (Italy)*

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Coordinator: Dr René Baumont (INRA)



SmartCow

an integrated infrastructure for increased research capability and innovation in the European cattle sector



Aim of infrastructure projects supported by EU

Bring together, integrate on European scale, and open up key RIs to all European researchers, ensuring their optimal use and joint development

Three types of activities:

Networking activities

- *Improvement of the cooperation between research infrastructures, scientific communities, industries and other stakeholders*

Joint Research Activities

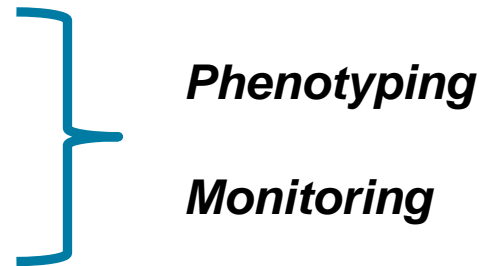
- *Improvement of the services the infrastructures provide to scientific communities*

Transnational Access

- *Harmonisation, optimisation and improvement of access procedures and interfaces*

Background of SmartCow project

- **Research on farm animals needs to address global issues:** sustainability, food security, climate change, consumer acceptance
- Animal production and research is also **challenged by society** in terms of **ethics** (animal welfare)
- At the same time **new opportunities** to help the animal sector:
 - Smart technologies (PLF)
 - Rapid analytical methods
 - Digital “revolution”
- Livestock research infrastructures are **expensive to equip and maintain**



Specific challenges for an infrastructure in agricultural (animal) science

- **In comparison with many fields, challenges due to:**
- Scale and cost of the work – but this is also a driver to use facilities more effectively (improve methods and share resources)
- Regional variation across Europe (agro-climatic zones, feeds, animal breeds, speciality products)
- Lack of common terminology

Concept of SmartCow

Strategic aim: Efficiency and innovation by integrating key research infrastructures

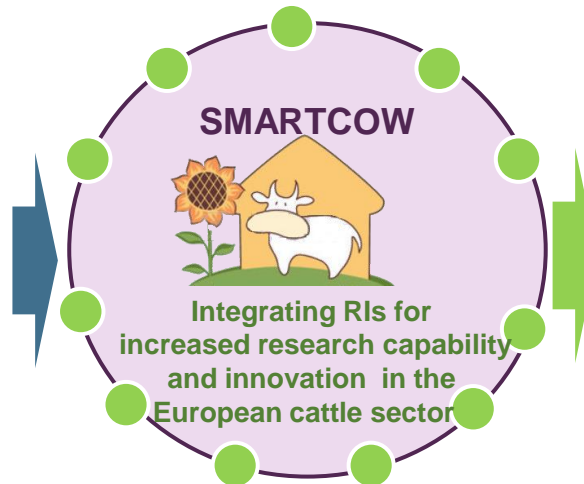
Challenges and cross-cutting issues

Efficient use of biomass – Food security

Sustainable competitiveness of livestock systems

Healthy livestock for healthy diets and people

Improving infrastructure for research and innovation



Solutions

Networking Research Infrastructures to improve research practices

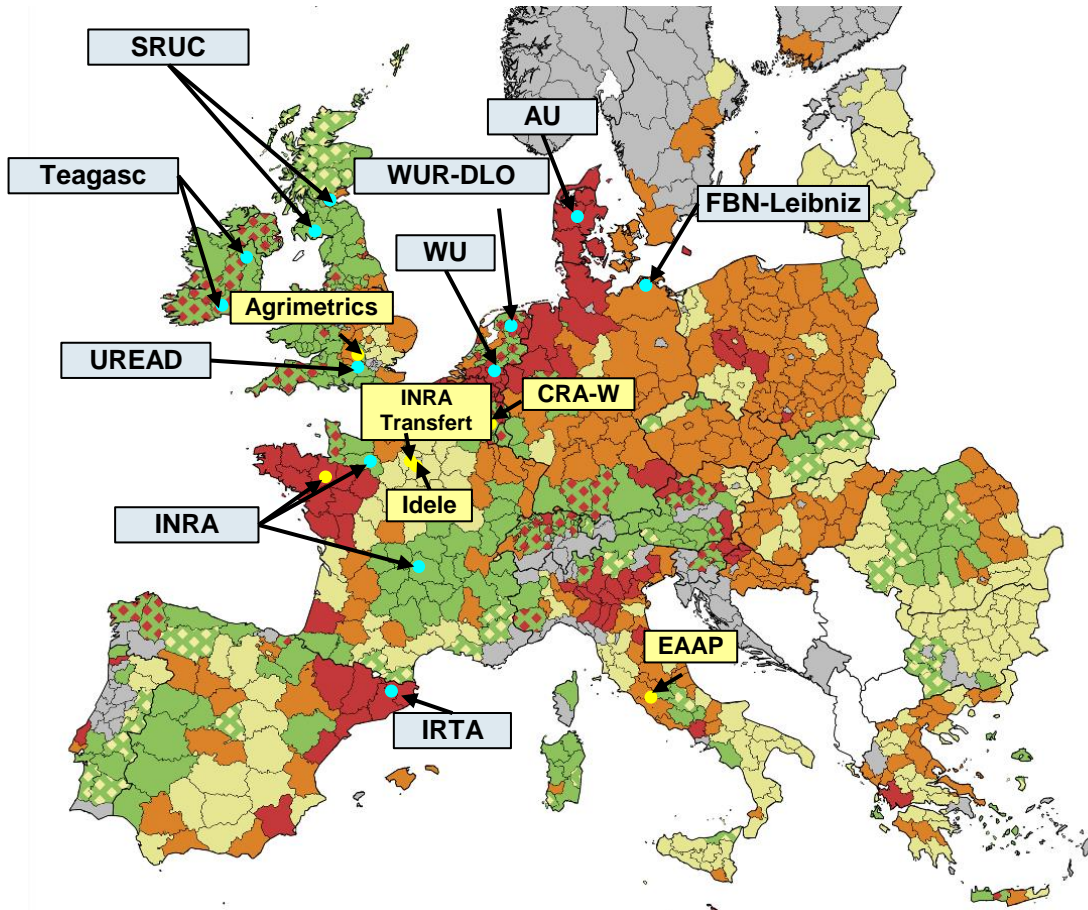
Improving quality and ethics through new research methods

Offering wider access to the most advanced research tools

Project partners

N°	Organisation	Country
1	Institut national de la recherche agronomique (INRA)	France
2	SRUC – Scotland's Rural College	United Kingdom
3	WU – Wageningen Universiteit	The Netherlands
4	WUR-DLO - Stichting Wageningen Research	The Netherlands
5	UREAD – The University of Reading	United Kingdom
6	FBN Leibniz – Institut Fur Nutztierbiologie	Germany
7	TEAGASC – The Irish Agriculture and Food Development Authority	Ireland
8	AU - Aarhus Universitet	Denmark
9	IRTA – Institut de Recerca I Tecnologia Agroalimentaries	Spain
10	CRA-W – Centre Wallon de Recherches Agronomiques	Belgium
11	IDELE - Institut de l'Élevage	France
12	EAAP – Federazione Europea di Zootecnica	Italy
13	Agrimetrics – Agrimetrics	United Kingdom
14	IT – INRA Transfert SAS	France

Location of the partners and of the RIs



- High livestock density areas
- Mixed crop and livestock areas
- Grass-based livestock areas
 - ▣ Grass-based with high livestock density
 - ▣ Grass-based with medium livestock density
 - ▣ Grass-based with low livestock density
- Low livestock density
- Not considered

Classification of livestock farming systems areas in EU after Dumont, Dupraz et al (2016) in "Roles, impacts and services provided by livestock in Europe (INRA collective expertise)"

- Infrastructures open to Transnational Access

Three types of activity in SmartCow

(Total budget = 5 M€, with 0.5 M€ for management)

Networking activities (≈ 1.5 M€)

- *Harmonizing measurement methods, coordinated data management, joint training activities and stakeholders involvement*

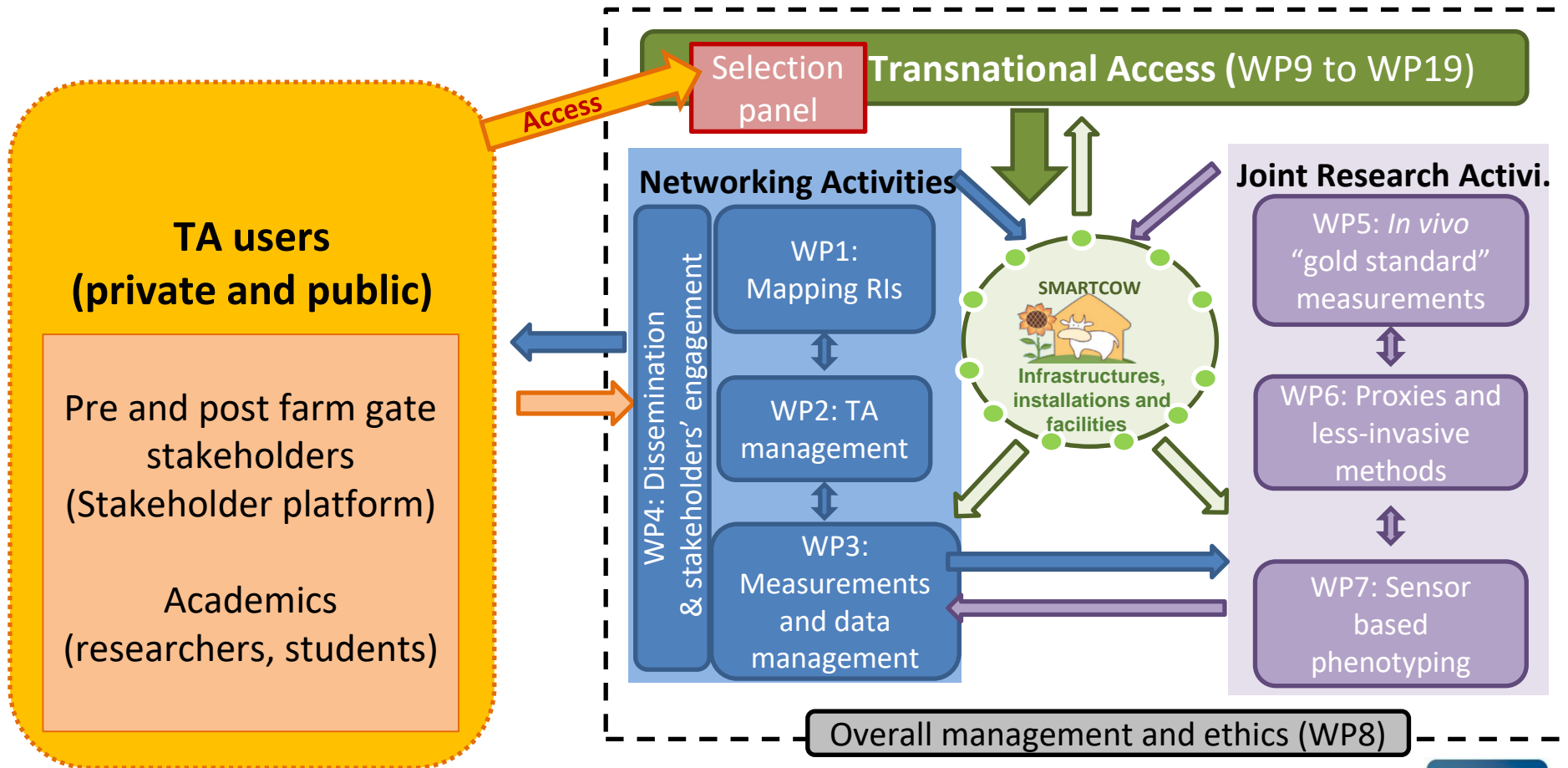
Joint Research Activities (≈ 1.5 M€)

- *Improving measurement methods and ethics, developing new methods, enhancing phenotyping capacity*

Transnational Access (≈ 1.5 M€)

- *Supporting access to key research infrastructures; developing a more efficient and attractive European Research Area*

SmartCow WPs organisation



Expected results of Networking Activities

- An **interactive map** of national and regional facilities
- **Inventory** of cattle databases and samples banks
- A **cloud-based data platform** to gather and share data
- Publication of **protocols** for research and routine data recording (book of methods)
- An improved **trait ontology** (animal and environment)
- Effective ongoing **dissemination and knowledge transfer**
- Developing **co-ordinated training** across the sector

A training and study tour program

It consists of:

- Face-to-face training courses (1-3 days)
- Web conference training courses, accessible with PC, Internet + phone (2 hours)
- One-day study tours

It aims to share the results of the project : methods, techniques, use of tools...

- *CH4 emissions, Feed efficiency, Ethics in animal experimentation, NIRS, Sensors...*

It includes lectures, exchanges with scientists, visit of RI facilities and farms...



Expected results of Joint Research Activities

- **Refining methods** in the field of nutrient efficiency and emissions (WP5)
 - Development of proxies (biomarkers) and **non-invasive methods (WP6)**
 - Development of a multivariate approach to phenotype behavioural, health and feed efficiency traits based on **sensor data (WP7)**
- ***Implementation of 3R principles (Replace, Reduce, Refine)***

Transnational Access to SmartCow RIs

- **Access to 18 European research installations**
 - Around 2,500 dairy and 1,000 beef cattle
 - Diversity of breeds and environmental conditions
 - High quality measurements (feed efficiency, emissions, digestion, metabolism...)
- **Budget \approx 1.5 M€ : supporting around 30 experiments**
 - Call for access and project selection run within the project
 - Two types of experiments:
 - Focusing on animal performance and trade-offs between functions
 - Investigating underlying digestive and metabolic processes



Transnational Access Calls

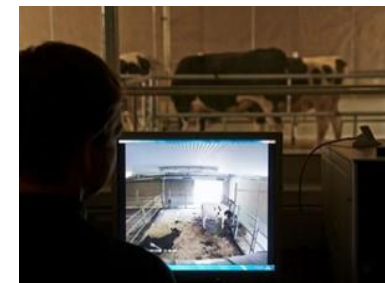
- **In line with SmartCow scientific challenges**
- **In line with the capabilities of SmartCow infrastructures**
- **Taking into account discussions with academics and industry stakeholders**
- **1st Call widely open**
- **Can evolve in the course of the project**

Conclusions

- SmartCow is a first step towards the integration of Research Infrastructures for the European cattle sector
- Integration is necessary to develop more efficient approaches to address global issues and societal concerns, using:
 - A common language, the best standardized techniques and data sharing
 - Improved and new methods to enhance phenotyping of new and more complex animal traits
 - With the full range of genetic (breeds) and environmental diversity across Europe



Thank you for your attention



Further information on: www.smartcow.eu

