An infrastructure for farmed animal genotype to phenotype research in Europe and beyond

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Plant and Animal Genomes Conference 2023, San Diego, FAANG Workshop 13th January
A breeding & management programme = balanced and responsible combination of several traits

This is complex to achieve

Understanding more about the genetic code of farmed animals can benefit animal breeding and husbandry

Farmed animal genotype to phenotype research
Chief among the improvements required in animal breeding and management is the ability to more accurately use an animal's genetic code (genotype) to predict its characteristics (phenotype).

Thousands of genetic differences ("G")
Hundreds of different characteristics ("P")

Associate genetic code with characteristics ("G to P")

Generate prediction equation

Better Prediction Accuracy will lead to...

Breed the ‘best’ animals for:
- Disease resistance
- Reduced environmental impact
- Adaptation to changing environments
EuroFAANG
Accelerating genome to phenome research for farmed animals in Europe

- Disease resistance
- Biological efficiency
- Precision breeding
- Reduced environmental impact
- Feeding a growing population
- Adaptation to changing environment

www.eurofaang.eu
A timeline for EuroFAANG initiatives

- AgENCODE Workshop
- Pilot FAANG projects awarded
- Organizational meeting at PAG conference
- White Paper - Genome Biology
- First Intl. FAANG Workshop
- EU Animal Genomics Meeting
- USDA announces FAANG topic calls
- BovReg and AQUA- infrastructure concept
- FAANG projects start
- FAANG umbrella is established
- H2020 GENe-SWITCH
- 'EuroFAANG’ to-fork paper - Genome Biology
- H2020 GEoNIMO, RUMIgen projects start
- Horizon

Timeline:
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019
- 2020
- 2021
- 2022
- 2023
The remit of the ESFRI ‘Health and Food’ research infrastructures is to generate readiness to meet the current challenges and demands in the Agri-Food sector in Europe.

The need to bring together national facilities at the pan-European level in the field of animal genetic resources, phenotyping, breeding, and animal health was identified as a gap.
EuroFAANG - A European Infrastructure for farmed animal genotype to phenotype research

Aim: to realise the full potential of genotype to phenotype (G2P) research across species, breeds and populations of farmed animal in Europe.
The EuroFAANG Infrastructure has four main objectives:

1. Creation of a common data structure and data access.
3. Sharing and expanding capabilities in new breeding, phenotyping, and genomic technologies.
4. Connecting with existing projects and infrastructures to consolidate G2P research in farmed animals across Europe and globally.
Transnational ACCESS form organised connections with other EU projects and infrastructures.

Phase I

- Data Structure and Data Access
- FAANG Data Portal
- Elixir

Phase II

- Transnational ACCESS
- User defined priorities
- Training Opportunities
- FAANG Data Portal
- Data Structure and Data Access
- Organisation - FAANG Governance
- Accessible, highly curated in vitro systems
- New breeding, phenotyping and genomic technologies
- Shared capabilities in genome editing

User Defined Priorities

Connections with other EU Projects and Infrastructures
The concept we are developing for the EuroFAANG infrastructure will aim to underpin G2P research in farmed animals by providing:

1. Access to data, including genomic and phenotype data, and sample metadata.
2. Access to biobanks of reference samples, including organoids and genome edited cell lines.
3. Access to in vitro methodologies and tools to bridge G2P knowledge gaps.
4. Access to world leading expertise in G2P research for farmed animals.
5. Access to training, to establish the next generation of researchers in farmed animal science.
**HORIZON-INFRA-2022-DEV-01 Research Infrastructure Concept Development**

**Figure 1: Lifecycle approach of a research infrastructure**

1. **Concept Development**
   - Concept screening, consortium formation, access policy and funding concept, scientific and project leadership

2. **Design**
   - Design study, business case, political and financial support obtained, common access policy, top-level breakdown of costs, governance and HR policy

3. **Preparation**
   - Preparatory phase, business & construction plan, political and financial support secured, data policy & data management, cost book plan, legal entity identification

4. **Implementation**
   - Site construction and deployment of organisation and legal entity, recruitment, IPR & innovation policies, operation and upgrade plan, secure funding for operation

5. **Operation**
   - Frontier research results, services to scientific community, outreach, continuous upgrade of instrumentation and methods, political and financial support for long-term operation

6. **Termination**
   - E.g., dissolution, dismantling of facilities and resurrection of site, reuse, merger of operation and organisation, or major upgrade
Summary

• The EuroFAANG infrastructure will contribute to addressing the need to bring together national facilities at the pan-European level for animal genetic resources, phenotyping and breeding, and animal health.

✓ Filling the gap identified in the infrastructure landscape by the 2021 ESFRI Roadmap.

• The EuroFAANG infrastructure builds on the six H2020 projects and connects with existing infrastructures for data management and animal agriculture in the European research infrastructure landscape.

✓ Leading to a better alignment of the research infrastructure landscape for farmed animal science and frontier G2P research in Europe and globally.
Planned activities for the coming year

• Kick-Off Meeting in the first quarter of 2023.
• Hiring of project managers at FBN and INRAE.
• Virtual kick-off meeting for ‘in vitro’ models, work package 4.
• First meeting of the ‘think-tank’ for genome editing, work package 5.
• EuroFAANG session at EAAP in Lyon, France, 26th August - 1st September 2023.

• Expansion of the consortium for the next funding phase – if you would like to learn more please contact emily.clark@roslin.ed.ac.uk and kuehn@fbn-dummerstorf.de
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We are hiring:

- Assistant Research Manager
- Full-time position, 32 months
- English/French
- Animal Science
- EU Horizon Europe Infrastructure

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We are hiring:

- Project manager (m/f/d)
- Full-time position, 3 years
- English/German
- Animal Science
- EU Horizon Europe Infrastructure

Location: www.fbn-dummerstorf.de
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