



PIONEERING OPEN SCIENCE FOR A MORE ACCESSIBLE AND COLLABORATIVE SCIENTIFIC LANDSCAPE IN MONOGASTRIC BREEDING:

The GENE-SWitCH Project

The **GENE-SWitCH** project has embarked on an ambitious journey to transform the scientific ecosystem in monogastric breeding through the principles of open science. This collaborative effort has yielded significant contributions. In this article, we delve into the project's remarkable achievements, focusing on their commitment to enhancing the FAIR Guiding Principles for scientific data management and stewardship (Findable, Accessible, Interoperable and Reusable) in monogastric genomics.

THE ISSUE

The scientific community has long tackled issues related to data accessibility, transparency, and reproducibility. Research data, scattered across various platforms and in diverse formats, often remain underutilised due to these barriers. The GENE-SWitCH project recognised this challenge and sought innovative solutions to promote open science in monogastric genomics

GENE-SWitCH CONTRIBUTION TO SOLUTIONS

The **GENE-SWitCH** project proposed a multifaceted approach to tackle the problem. Through clustering activities with five other European projects working on farmed species (AQUA-FAANG, BovReg, GErNIMO, RUMIGEN, and HoloRuminant) **GENE-SWitCH** has strongly contributed to the continuing growth of the FAANG Data Coordination Centre at the European Molecular Biology Laboratories European Bioinformatics Institute (<https://data.faang.org/>).

A dedicated agricultural genotype to phenotype platform with robust data standardization and validation tools, followed by intuitive data search and visualization capabilities was developed, ensuring that research data became more findable. This user-friendly interface has empowered researchers to access data efficiently and facilitated data-driven decision-making.

APPLICATIONS AND POTENTIAL IMPACT

1 FINDABILITY OF DATA

GENE-SWitCH's dedication to improving the discoverability of research resources ensures valuable data is no longer obscure. Researchers from diverse backgrounds can now locate and leverage existing data from a single data and metadata portal. The GENE-SWitCH data has also been utilised to advance the pig and chicken reference annotations of the world-renowned Ensembl Genome Browser: (<https://projects.ensembl.org/gene-switch/>).

2 ACCESSIBILITY

By emphasizing data accessibility and open access, the project fostered a culture of sharing and collaboration. This accelerated scientific progress and ensured that knowledge could reach a broader audience. The project made data rapidly available to the scientific and industry communities through pre-publication data sharing in public data archives.

3 INTEROPERABILITY

Promoting data interoperability broke down silos within the scientific community. GENE-SWitCH's efforts to standardise formats and encourage data sharing across disciplines enable interdisciplinary research and innovation.

4 STANDARDISATION AND DATA DESCRIPTION

The project's commitment to data standardisation and meticulous data description set new standards for data quality. Metadata standards for specific species and the utilisation of metadata ontology further enhanced data integrity, enabling robust meta-analyses and facilitating biotech applications. The GENE-SWitCH project placed significant effort in standardising and enhancing ontologies for the monogastric community, the vocabulary of terms used to unambiguously describe research data.

5 ENHANCED ACCESSIBILITY

GENE-SWitCH's dedication to open access and global collaboration fostered transparency, efficiency, and collaboration in the scientific ecosystem. This approach not only benefited researchers but also extended its advantages to diverse sectors, catalysing scientific progress on a global scale.

6 GROWTH OF OPEN SCIENCE

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CONCLUSIONS AND NEXT STEPS

The GENE-SWitCH project has led a transformational shift toward open science principles, ensuring that research data becomes more accessible, transparent, and collaborative. Our commitment to open access, standardization, and global cooperation is an important example for the future of science.

By promoting unrestricted access to knowledge and fostering collaboration across the globe, we can create a brighter future for scientific innovation and discovery.

To increase the long-term impact of GENE-SWitCH and make open science more accessible to both research and businesses, the following steps are recommended:

1

SUPPORT THE CONTINUATION AND EXPANSION OF DATA COLLECTION AND INTEGRATION

Support the integration of new research data from diverse sources, including public repositories, private institutions, and industry partners. This expansion will broaden the knowledge base and provide a more comprehensive understanding of livestock genomics not only at a European level but also on a global one.

2

FACILITATE PUBLIC-PRIVATE PARTNERSHIPS

Establish partnerships and collaborations with industry players, policymakers, and other stakeholders to bridge the gap between research and practical applications. This will ensure that open science benefits to the scientific community and the broader society, particularly if partnership can be fostered to collaborate in the precompetitive space for the advancement of research and industry priorities.

3

DEVELOP OPEN SCIENCE INFRASTRUCTURE AND TOOLS

Invest in developing and long-term sustainable investment in open-source software tools, data platforms, and infrastructure to support open science practices. This will lower the barriers to entry for researchers and businesses and promote wider adoption of open science principles.





GENE-SWITCH

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