BovReg

Identification of functionally active genomic regions relevant to phenotypic diversity and plasticity in cattle
BovReg features

- EU H2020 – funded consortium as contribution to global FAANG with focus on biology-informed breeding

Aim

To generate and validate functional genome data and standardized analysis technologies based on all FAANG core assays, providing a catalogue of functionally active genomic features relevant to phenotypic diversity and plasticity in cattle

- Annotation of the Bos taurus genome
- Key traits: robustness (fertility)
  - health (mastitis susceptibility)
  - biological efficiency (production – feed efficiency)
- Time line September 2019 – August 2023
BovReg Consortium

- 20 (19) partners
- 13 countries
- & 2 international organisations

Belgium (2)
Denmark
Finland
France (2)
Germany (2)
Netherlands (2)
Poland
Portugal
Spain
Switzerland
United Kingdom (2)
Canada
(Australia)

EAAP
EMBL-EBI
Establish laboratory and bioinformatics tools

Comprehensive genome annotation

Integrated data analysis for biological informed breeding

Open data distribution

Outreach and social impact

Activities within EU and global FAANG
Establish laboratory and bioinformatics tools

Development of Laboratory Tools and Resources for Bovine (WP1)

Tools, Data and Pipelines for Bioinformatic Analyses within and beyond Bovine (WP3)

diTommaso et al., 2017

Yue et al. 2014
Comprehensive genome annotation

Functional and structural genome annotation map (WP2, 4, 5, 6)

- Transcriptome
- Chromatin access
- Interacting regulatory regions
- MGE insertion sites
- eQTL/mQTL
- Meta-GWAS
- Methylome
- Epigenetic response
- Regulatory variant

Christa Kühn, Coordinator EU H2020 BovReg
PAG meeting, FAANG workshop, San Diego, Jan 10th, 2020
WP2: Functional and structural genomics annotation (C. Charlier, GIGA)

Animals from both sexes, different ontogenetic stages, different environments, ~24 FAANG mostly Tier1 tissues

- Transcriptome analysis (global RNA, mRNA, ncRNA, CAGE)
- Analysis of regulatory regions (ATAC, ChIP)
- Interactions of regulatory regions (ChIRP, Hi-C)
- Full map of genomic sites polymorphic for the presence / absence of mobile genetic elements
- Establish the full map of functionally active elements
WP4: Integrative genotype-phenotype data analysis (*H. Pausch, ETH*)

- Association testing between whole-genome sequence variants and BovReg key traits
- Effects of integration sites of mobile genomic elements
- eQTL and mQTL studies
- Integrating Omics data in GWAS

Comprehensive genome annotation
WP5: Modelling epigenetic inter/transgenerational effects (J. Vanselow, FBN)

WP 6: Functional validation of regulatory variants (WP6, H. Taniguchi, PAS)
Integrating Omics data in GWAS

WP7: Biology-driven genomic prediction models (M. Lund, AU)

- Models for biology driven genomic selection
- Validating biology-driven genomic selection within and across small breeds

Fully annotated genome
Open data distribution

WP10: Link to FAANG-DCC at EMBL-EBI (D. Zerbino, EMBL-EBI)

- Assay data distribution
- Metadata distribution
- Distribution of methods

FAANG-DCC  EMBL-EBI
ENA  ENA (European Nucleotide Archive)
Biosamples  BioSamples
WP8: Ethics and societal issues (*F. Meijboom, UU*)
- Mapping of societal context of livestock genomics: an ethical analysis
- Public engagement and social perception of new breeding technologies
- Synthesizing the analysis into framework(s) for stakeholder organizations

WP 9: Training, communication and dissemination (*J. Vilikki, LUKE*)
- Coordination with other proposals of the call topic, FAANG-Europe (CA15112) and global FAANG
- Wet-lab, bioinformatics and statistical modelling training courses
- Communication about the project and its activities
- Dissemination and Demonstration
Activities within EU and global FAANG

- Clustering with other EU funded FAANG projects: European FAANG node
- Joint meetings associated with international conferences
- Comparative work: providing plug-ins to other EU H2020 and FAANG projects
- Workshops on newly developed wet-lab, bioinformatics and genomic prediction methods
- Participation in global FAANG working groups
- Member of Steering committee in global FAANG
- Link to EU-COST action FAANG
- Link to Ovine FAANG
- Link to NIFA FAANG project
BovReg kick-off meeting in Dummerstorf
Sep 23/24 2019

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Thank you for your attention

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Hiring postdocs with expertise in molecular biology/cell culture: great opportunity to join the FBN team