

USDA PIG GENOME COORDINATION PROGRAM ACTIVITIES

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Overview: Coordination of Pig Genome Coordination Program is under the National Animal Genome Research Program (NAGRP) and is the effort of personnel at Iowa State University (ISU) and Michigan State University (MSU). Support is allocated from NRSP-8 and provided to the Agriculture Experiment Stations by off the top funding. The NAGRP is made up of the membership of the Animal Genome Technical Committee, including the Swine Species Subcommittee.

Facilities and personnel: Christopher K. Tuggle, Department of Animal Science, ISU, and Cathy Ernst, Department of Animal Science, MSU, have served as Joint Coordinators since 2013 and have a five-year appointment. Iowa State University staff help support the national pig genome coordination effort as part of Iowa State University's contribution.

NRSP8 Objectives (2013-2018):

Objective 1: Advance the status of reference genomes for all species, including basic annotation of worldwide genetic variation, by broad sequencing among different lines and breeds of animals. **Objective 2:** Develop strategies to identify and exploit genes and allelic variation that contribute to economically relevant phenotypes and traits, in part through improving functional annotation of the genomes of our species. **Objective 3:** Facilitate analysis, curation, storage, distribution and application of the enormous datasets now being generated by next-generation sequencing and related "omics" technologies with regard to animal species of agricultural interest.

Policy Updates

We have developed an Advisory Committee, who will provide guidance on policy as well as help evaluate requests for funding. The members of this Advisory Committee represent the swine industry, swine genomics and biotechnology researchers, NRSP-8 Stations and participating USDA labs. The members are: Jack Dekkers (ISU), Chris Hostetler (National Pork Board), Joan Lunney (USDA-BARC), Randy Prather (U. Missouri), and Juan P. Steibel (MSU). Thanks to this group for volunteering for this important role!

Database Activities: The Pig Genome Database continues to receive considerable updating through the work of the Bioinformatics team. The PigQTLdb (<http://www.animalgenome.org/QTLdb/pig>) is an excellent repository for QTL and candidate gene association results. As of January 8, 2015, in the Animal QTLdb there are **12,618** pig QTLs from **461** publications curated into the database, a 30% increase over the end of 2013. Those QTLs represent **656** different traits. Throughout 2014, the NAGRP bioinformatics team has continued their efforts to make improvements to the Animal QTLdb, which includes a new mirror site in China, facilitate the addition of gene network analysis data, improved search tools and data analysis tools. Users are encouraged to register an account to enter new QTL data. Find out more from <http://www.animalgenome.org/QTLdb>. In addition, the pig genome build 10.2 annotations are continuing to be updated in the BioMart (<http://www.animalgenome.org:8181>) and for the Animal QTLdb.

Shared Materials and Funding: NRSP8 funds are available to support community activities to find associations with many different traits. In 2014, a policy was developed and approved by the Advisory Committee that for swine genomics projects to be eligible for NRSP8 Coordination support, the project must materially involve two or more NRSP8 member groups (university or ARS research locations) and that substantial funding will only be provided for projects that have matching funding from another agency. In FY 2014 one project was approved to work toward a genetic analysis of PEDV resistance. Any questions on this policy, please contact the Coordinators.

Porcine SNP chips update: Illumina and the International Porcine SNP Chip Consortium developed a porcine 60K BeadChip that has been used worldwide for numerous genome wide association studies (GWAS) studies. GeneSeek, a supplier of genotyping services, has a low density chip, the GeneSeek Genomic Profiler for Porcine LD (GGP-Porcine LD) that utilizes Illumina Infinium chemistry and features approximately 8,500 SNPs for high density chip imputation. GeneSeek also released a new chip in 2014, the GGP - Porcine HD that features nearly 70,000 SNPs that span the pig genome, as well as several markers that directly impact disease and performance traits. Details on these chips can be obtained from GeneSeek (geneseekinfo@neogen.com). A new high density SNP chip is being developed by Affymetrix, and will be announced in 2015.

International Efforts: Communication with all international groups and individuals is excellent. The Swine Genome coordinators have been working with a large number of individuals in many countries to develop a new initiative, called Functional Annotation of ANimal Genomes (FAANG). This group proposes a project to identify all functional elements in animal genomes, and has presented their plans on a website organized by the Swine Coordination effort (see www.faaang.org). The following is a description of the project from the website:

It is critically important to coordinate international efforts to maximize efficiency and data quality, as evidenced in the ENCODE project. Initially, the FAANG project will deliver standardized functional genomics datasets from a limited set of individuals representing species that have reference quality draft genome assemblies and substantial publicly available phenotypic datasets. The FAANG project will establish an infrastructure capable of efficiently analyzing genome-wide functional data for animal species. Such large-scale analyses will contribute to our understanding of how variation in gene sequences and functional components determine phenotypic diversity. This understanding will inform the development and exploitation of improved models for predicting complex phenotypes from sequence information.

Communication: The *Pig Genome Update* has now published 120 issues and has been distributed electronically to over 2,300 people worldwide. PGU will be electronically published three times a year, and in addition to general updates, the issues will be published to coincide with major events of interest to the genome community:

Feb (a wrap-up report of the PAG meetings);
June (summer meetings reminders); and
October (summer meetings report, PAG abstract submission deadlines, preparations).

Travel and Meeting Support: Travel of some scientists was partially funded to attend important pig genomics meetings. These included:

Chris Easley 2014 Neal Jorgenson Travel Award winner
Joan Lunney 2014 Distinguished Lecturer NRSP-8 Workshop
2015 commitments:
Melanie Trenhaile, 2015 Neal Jorgenson Travel Award winner
Elisabetta Giuffra, 2015 NRSP-8 special speaker on FAANG
Huaijun Zhou, Midwest ASAS Functional Genomics Workshop

2014 Research Support Activities: The goals are to help support all of the objectives of this project. Major activities included helping facilitate collection of phenotypes and sharing use of SNP chips in the future. New bioinformatic tools relevant to the swine genomics community will also be developed with help of the bioinformatics team. Constructive suggestions from researchers to help this coordination and facilitation program grow and succeed are appreciated.

Projects approved for funding during period:

1. FAANG project led by Huaijun Zhou, University of California-Davis. This project also had funding promised by the NRSP8 Bovine and Poultry Coordinators, as well as funding by the National Pork Board.
2. PEDV genetics resistance project led by Max Rothschild with collaborators Daniel Ciobanu and Canadian swine genetics companies.