

INTEGRATION AND DOCUMENTATION OF RESEARCH SUPPORT

A. Integration with extension or academic programs and use by other potential stakeholders.

Successful basic and applied agricultural genetics and genomics research is by necessity highly collaborative and multi-disciplinary. Most projects are performed by teams consisting of experts in molecular technologies, data management and statistical analysis of large datasets, specific phenotyping of large populations, and devising practical downstream applications. External and internal research proposals to private, institutional or federal funding agencies are typically evaluated to some degree on the quality and specific components of the research team. This integrated research team approach will continue for the foreseeable future.

It is a vital mission of this NRSP to provide a framework in which such animal genomics research teams can be established and thrive, and in which both fundamental and applied knowledge can be generated in the most efficient fashion. To accomplish this aim, the results of our original animal genome research are presented at a host of regional, national and international meetings, and published in a wide variety of peer-reviewed, publically-available journals. Furthermore, industry groups, in communication with our applied and extension experts, have and will continue to acquire major results and implications of our research via trade journal articles that are written by journalists familiar with their reader's backgrounds and interests. We predict that the NAGRP bioinformatics website, as well as the individual species websites, will be increasingly utilized by the research teams to communicate results to the public and, on a case by case basis, provide education materials to stakeholders. This means of communication will be actively encouraged by the species coordinators.

Beyond publication and bioinformatics avenues of integration, it is important to note that the vast majority of NRSP-8 members are in academia and engage in teaching and outreach as part of their daily responsibilities. Information and, in some cases, support that these members receive from NRSP-8 assist them in these activities. Most NRSP-8 research is accomplished through the efforts of undergraduate and graduate students, as well as postdoctoral trainees. Thus, the collaborations generated by NRSP-8 directly influence the training and careers of these individuals. As noted below, the coordinators actively encourage and financially support attendance of such lab trainees at our annual meetings and other relevant venues.

B. Partnerships and engagement.

The framework and partnerships from the existing NRSP project will continue to be utilized and in many cases enhanced. Species-specific collaborations, websites, and databases, particularly within the NAGRP bioinformatics program, will be maintained. The NRSP-8 bioinformatics team has been receptive to users' suggestions and needs, and the current portfolio of sites, programs, and databases is a direct result of this interaction. Our programs will increasingly begin to evaluate and use other platforms, such as iPlant/iAnimal, to assist with the complex and computationally intensive tasks using supercomputing cyber-infrastructure. This program takes advantage of the more universal aspects of high-throughput sequence and genotype analysis to provide a common means to perform our work and enable data sharing. This area is rapidly changing, and we will also be open to evaluating new systems for data management and analysis that meet our needs and promote efficient sharing of data and technologies.

The ability of the NRSP-8 program to leverage acquisition of additional animal genomics research funds is supported by data indicating that in FY2011 \$22.4 M in federal, \$6.9 M in other grants or contracts, and \$1.9 M in industry support has been secured, which is up from \$9.0 M federal, \$2.1 M

other grants and contracts and \$1.5 M industry funding over FY2010. The increase in external grants, contracts and industry support is encouraging and likely indicates our success in providing information that industry sees as essential to achieving their goals.

Species coordinators and, indeed, many NRSP-8 members have close relationships with relevant animal agriculture industries and engage in joint projects with, or receive financial support from these companies. As noted below, industry is well represented in our annual meetings. In the past 5 years, many breeding companies have embraced genomics methods (dense SNP genotyping, genomic selection, etc.). As a result, NRSP-8-industry cooperation has grown in parallel, and we anticipate that this trend will continue.

C. Support of research activities nationwide

We will continue to utilize annual species group meetings, currently associated with the annual PAG conference. With a total attendance of >3,200, PAG is the largest international scientific conference reporting on non-human genomics research. Over the course of several days, numerous opportunities are available for presenting and discussing current and future research and promoting essential interactions within and across species groups. This has often been the means by which multi-disciplinary research teams are brought together and the momentum of established teams is maintained. The NRSP-8 and PAG meeting has also been a major opportunity for the animal genomics community to acquire knowledge on the newest high throughput sequencing and genotyping technologies and the means of storing, analyzing, and sharing this data. The PAG meeting is also an efficient mechanism by which the needs of the research communities and the stakeholders can be brought to the attention of the species coordinators for group discussion and potential support from their coordinator funds.

The PAG meeting attendance has increased by 35% since 2008, and total scientific attendance in 2012 was 2,788, with 1,643 U.S. attendees and 1,145 international attendees. Of those attendees, 651 indicated an affiliation with the animal genome programs. Overall, >1,700 scientific abstracts were submitted, and 121 scientific and 27 industry workshops were organized. Animal-related workshops at the 2012 PAG conference included Aquaculture, Buffalo Project, Cat & Dog, Cattle/Sheep, Equine, Poultry, Swine, a combined Cattle/Sheep/Swine workshop, Animal Epigenetics, and the multi-species NRSP-8 Animal Genome workshop. General workshops of interest to animal genome researchers included, but were not limited to, Functional Genomics, Gene Expression Analysis, Gene Introgression, Host-Microbe Interactions, NCBI, and Sequencing Complex Genomes. In addition to NRSP-8 lab scientists, the various relevant commodity groups and Federal agencies are well represented at the PAG meeting and are encouraged to participate in our meetings. Representatives of national media are also in attendance.

The species coordinators have traditionally invested their funds in the promotion of communication and efforts that enhance the entire group's effort. Please see the attached appendix on Coordinator Expenses. Examples include partial PAG meeting travel support for graduate and postdoctoral students, support of the AnGenMap forum, support of scientific meetings of a more specific nature that occur outside of the main NRSP-8 venue at PAG, and specific activities that generate essential group tools and resources, such as SNP panels and arrays, hap-map data, microarrays, and now certain essential whole genome and/or RNA sequencing data. We envision that this flexible and diverse use of funds will continue.