

BUDGET JUSTIFICATION DOCUMENT FOR 2012

OVINE

NRSP-8 funds have contributed to the development of resources that advance research in sheep genomics. For many of the resources, the NRSP-8 money served as the initial seed for projects that were subsequently funded from other sources, including USDA grants.

Ovine genomic resources that have been funded at least in part by NRSP-8 funds include a high coverage BAC library, end-sequencing of 100% of the BAC library, a high radiation hybrid panel, an integrated ovine genetic map, development of a virtual sheep genome (<http://www.livestockgenomics.csiro.au/vsheep/>), a whole genome BAC physical map, a high density 50K SNP array, and a global diversity panel of commercially important and rare sheep breeds. NRSP-8 funds will also contribute to the development of an ovine whole genome reference sequence.

BOVINE

NRSP-8 was established to provide a venue for cooperation and resource sharing among U.S. investigators working in animal genomics research. The species coordinators play an important role in this process by coordinating the accessibility of resources for young investigators, and in providing leadership and support in the development genomic tools. The funding provided to coordinators has been essential in achieving these goals.

In bovine, NRSP-8 seed funding and collaboration was important in bringing groups and resources together for the development of the bovine genome sequence and the structural genomic resources currently in use. The application of genomics provides an opportunity to develop sustainable animal breeding programs based on the understanding of traits that affect reproduction, health, efficiency, product quality and animal well being. For this to be accomplished we need to be focused in promoting research leading to the understanding of the underlying causes and interactions of quantitative traits that determined economic value in livestock. Funding in bovine will be used for travel to national and international meetings to promote collaborations among investigators and to have a presence in international projects, such as the European Quantomics initiative. Funding will also be utilized to support the improvement of the coverage and annotation of the bovine genome reference sequence and for the development of functional genomic resources such as high density microarrays, new generation sequencing and protein data.

EQUINE

The funds are used to leverage several-fold greater funds from industry and funding agencies and to stimulate scientists to do experiments they might not otherwise contemplate. Unfortunately, the costs of many items are the same regardless of species, such as costs for development of BAC libraries and bioinformatics tools. In other cases, there are different approaches to the same problem; for example, funding of genome sequence for poultry, cattle, horse and pig were leveraged and developed differently for each species. Benefits also accrue across species lines such that work occurring in cattle suggests approaches in horses and vice versa. We are very excited about an approach pioneered by one of our scientists to look at the transcriptome; we look forward to its adoption by scientists working on other species. The needs are comparable for each species, regardless of economic impact, and the NRSP8 funds leverage funds and stimulate research.

PORCINE

Coordinators receive funding to accomplish many things. These include supporting wide-ranging projects that involve several state experiment stations for each species. The funding while nice is still limited (\$65K). We often carry over funding from one year to accomplish our goals – especially to assist several stations in purchase of genotyping materials (SNP chips) or in sequencing efforts. This is extremely effective because it allows PIs to get other funds based on the contribution from the Coordinator's funds. Two recent examples is the use of \$130K for SNP genotyping for the PRRS project and \$60K for the PCV2 project that together will produce over \$1.2M in funding from outside. At present

some additional funds have been committed for other multistate projects if outside funding is secured. One other part of the funding is used for travel to develop collaborations among PIs, speak at national and international meetings and to help PIs look for new funding. All these activities are the same across species.

POULTRY

There are two major points to be mentioned. The vast majority of each committee's budget goes for "post-genomic" technical support of one sort or another, such as SNP chips, microarrays and related technology. These are used by the members to get started on a project, produce preliminary results and/or to complement limited funds they currently can access themselves. This provides a boost for these members to get over the initial activation energy hump required to begin working with a new technology, and it also nucleates community efforts. In the past FY, poultry support went to Agilent chips (~\$10K), a high throughput RNA-sequencing project (~\$25K) and genomic high throughput sequence generation (~\$17K) with the remainder going towards miscellaneous computer costs and mostly member travel to the annual meeting.

Second, and more important, funding is used to leverage other support (AFRI/NRI, industry, international, State) in an entrepreneurial way that changes from year to year as new opportunities and technologies appear. As an example, in FY09, there was an opportunity to provide critical seed funding to the turkey genome sequencing effort at Virginia Tech. We provided \$28K towards a consortium effort generating about \$282K in additional funds and supplies/data from VA Tech, Virginia Biotech Institute, Roche, U. Minn., other companies and USDA-ARS. Together this generated enough preliminary results to attract two AFRI tools and reagents grants totaling nearly \$1.4M by themselves in FY09. Similarly, poultry genomics/bioinformatics research generated over \$1M in NIFA support in the FY10 round.

Overall, poultry committee members estimated nearly \$7.5M in collateral support (almost \$6M Federal, about \$0.5M State and nearly \$1M industry) in the 2009 survey and about \$4.8M in the 2010 survey. These are mostly multiyear projects and there may be some overlap, so we've chosen a conservative yearly estimate of \$2.6M of collateral support. In particular, this probably grossly underestimates the amount of industry funding (and in-kind effort and supplies) into GMAS and SNP genotyping research related to projects that include at least partial coordinator support (not counting extensive effort by the co-coordinator who has led these two projects). It's difficult to estimate the fraction of this money that supports public vs. proprietary research, and companies are not always willing to disclose the details of their support for some of these projects.

AQUACULTURE

Aquaculture is an underfunded sector of agriculture. Aquaculture genomics is a highly specialized field where the need to train the next generation of scientists is crucial. We provide travel awards to help graduate students and postdoctoral fellows participate scientific exchange and discussion at national and international platforms.

Funding is also provided to support poster session presentations, invited speakers at various events and for species coordinators travel to attend various meetings including the PAG Aquaculture workshops.

In addition to supporting species-specific workshops and informatics training sessions funds are used to provide species-specific reagents and for the sharing of BAC libraries, primers, kits and other reagents.

BIOINFORMATICS

Funds will be utilized to pay for Zhiliang Hu's salary (100%) along with a part-time database curator (12.5%).

Travel funds will be used to cover expenses associated with NRSP-8 activities including work on NRSP-8 computers and attendance at the NRSP-8 annual meeting in San Diego, CA and to cover travel expenses of NRSP-8 members to international conferences. Funds will be used to fund external research projects at other institutions that meet the goals of NRSP-8 and to cover costs associated with hosting the NRSP-8 computers (Infrastructure).