



National Organic Coalition

3540 Route 52, Pine Bush, New York 12566
Liana@NationalOrganicCoalition.org 845-744-2304

AFRI Classical Breeding Analysis and Recommendations

June 15, 2011

“The greatest service which can be rendered any country is to add a useful plant to its [agri]culture” - Thomas Jefferson

Summary

Despite a clear mandate from Congress and significant public input, the USDA National Institute for Food and Agriculture (NIFA) and previously the Cooperative State Research and Education Service (CSREES) has failed to provide real funding for development of public cultivars and animal breeds.

Background Issue

The last several decades have seen a steady decline in development of new publicly available plant varieties and animal breeds. Although classical breeding provides the most cost effective way to develop new publicly available breeds and cultivars, both public and private institutions are failing to direct research dollars to this critical work. It is estimated that it costs approximately one million dollars to develop a new plant through classical breeding and that genetic modification may cost as little as five million dollars and as much as sixty million dollars¹

This shift away from breeding for publicly available cultivars and breeds has been closely tied to strengthened intellectual property rights and the now widespread practice of patenting new plant and animal varieties. Private funding has been redirected to other technologies such as genomics, and the scientists have followed. Since scientists in the private sector have little incentive to develop public cultivars and breeds, it is up to our public institutions to fill this role. Yet our public institutions are failing to provide this public good.

¹ Goodman, Major M., New Sources of Germplasm: Lines, Transgenes, and Breeders, Department of Crop Science. North Carolina State University Raleigh, NC 27695

NOC MEMBERS

Beyond Pesticides

Center for Food Safety

Equal Exchange

Food & Water Watch

Maine Organic Farmers and Gardeners Association

Midwest Organic and Sustainable Education Services

National Cooperative Grocers Association

Northeast Organic Dairy Producers Alliance

Northeast Organic Farming Association - Interstate Council

Organic Seed Alliance

Organically Grown Company

Rural Advancement Foundation International -USA

Union of Concerned Scientists

The impacts of these shifts are significant and are a key factor in our narrowing pool of publicly available germplasm. Lack of agricultural diversity undermines national food security and agricultural stability. By encouraging more uniform agriculture, our crops are more vulnerable to disease and pests. We are also handicapping our ability to adapt to climate change and related changes in precipitation. We are creating an agricultural system that is less agile in responding to economic trends, possibly hindering our global competitiveness. By failing to diversify our crops and livestock, we are failing consumers looking for foods that meet their nutritional needs and taste preferences, and failing farmers looking for locally suitable varieties of plants and animals. Organic farmers and others that rely on markets where GMOs are prohibited or undesirable are particularly affected as they now have fewer choices for commercially available seed.

This shift away from classical breeding has led to deterioration of capacity in our research institutions, including land grant universities. There has been a decline in the number of plant breeders at the State Agricultural Experiment Stations, plant breeding departments at universities are being closed, and we have seen a correlating decline in graduate students being trained in classical breeding methods making it even more difficult to assure our future in this critical scientific field.

The role of the AFRI program in reinvigorating the investment in public sector plant and animal breeding is critical. Addressing obstacles for classical breeders to be competitive is essential to ensuring a diverse and globally competitive food supply

Congressional Mandate

Recognizing the concerns about the decline in public plant and animal breeding, Congress has called on the USDA time and again to make funding for classical plant and animal breeding a priority within the USDA competitive research grant programs. Specifically, Congress has included report language calling on the USDA to prioritize classical breeding in most of the annual appropriation bills in recent years. For example:

Fiscal Year 2005 Senate Report language: Classical Research.--The Committee notes the substantial increase in public and private sector research related to genomics, genetics, and other breakthrough biotechnology developments. However, this shift in emphasis has resulted in a decline in classical research in the animal and plant sciences. The Committee encourages the Department, especially in the establishment of priorities within the National Research Initiative, to give consideration to research needs related to classical plant and animal breeding.

Fiscal Year 2006 Senate Report Language: Classical Research.--The Committee notes the substantial increase in public and private sector research related to genomics, genetics, and

other breakthrough biotechnology developments. However, this shift in emphasis has resulted in a decline in classical research in the animal and plant sciences. The Committee encourages the Department, especially in the establishment of priorities within the National Research Initiative, to give consideration to research needs related to classical plant and animal breeding.

Fiscal Year 2007 Senate Report Language: Classical Research.--The Committee notes the substantial increase in public and private sector research related to genomics, genetics, and other breakthrough biotechnology developments. However, this shift in emphasis has resulted in a decline in classical research in the animal and plant sciences. The Committee encourages the Department, especially in the establishment of priorities within the National Research Initiative, to give consideration to research needs related to classical plant and animal breeding and directs the Department to establish a specific category of grant application requests for classical plant and animal breeding to foster more diverse, energy efficient, and environmentally sustainable agricultural systems.

Fiscal Year 2009 Senate Report Language: Section 7406 of the Food, Conservation, and Energy Act of 2008 specifies priority areas within the newly created Agriculture Food and Research Initiative [AFRI], including an emphasis on conventional (classical) plant and animal breeding. The Committee strongly concurs with the intent of this section, and requests a report from the agency as to its plans for implementing the intent of this important conventional/classical plant and animal breeding requirement.

Fiscal Year 2010 Senate Report language: “The Committee recommendation includes \$296,681,000 for the Agriculture and Food Research Initiative [AFRI]. Section 7406 of the Food, Conservation, and Energy Act of 2008 specifies priority areas within the Agriculture and Food Research Initiative [AFRI], including an emphasis on conventional (classical) plant and animal breeding. The Committee strongly concurs with the intent of this section, and requests a report from the agency as to its plans for implementing the intent of this important conventional/classical plant and animal breeding requirement.”

Such previous recommendations from Congress were seemingly ignored, in 2008 Congress included explicit language in the Food, Conservation, and Energy Act of 2008 (aka the 2008 farm bill) by listing “conventional” breeding within both the “Plant Health and Production and Plant Products” and the “Animal Health and Production and Animal Products” priority areas of AFRI:

“conventional breeding, including cultivar and breed development, selection theory, applied quantitative genetics, breeding for improved food quality, breeding for improved local adaptation to biotic and abiotic stress, and participatory breeding.”

Congress further elaborated on these statutory changes in the Statement of Managers which accompanied the bill:

“The Managers are aware of the importance of supporting public sector conventional plant and animal breeding, as evidenced by the specific mention of this priority under the “plant health and production and plant products” and “animal health and production and animal products” priorities in AFRI. The Managers intend that the term “conventional breeding,” also known as “classical breeding,” refer to breeding techniques which rely on creating an organism with desirable traits through controlled mating and selection. Because conventional breeding is critical to the development of seeds and breeds that are well adapted to local conditions and changing environmental constraints, these efforts are important to the food and agriculture sector. The Managers are aware that participatory breeding programs, where producers are involved in the process of developing new plant varieties and animal breeds, yield varieties and breeds that are better adapted to local environments. The Managers encourage an emphasis on funding of conventional plant and animal breeding as part of the new AFRI.”

Public input

The sustainable agriculture community has been communicating with the USDA about this issue for years, participating in public comment periods, submitting letters, and scheduling meetings with key REE agency staff. Some examples of letters and written comments are below:

- *September 19, 2008:* Sustainable Agriculture Coalition letter to Dr. Hefferan following USDA Listening Session on AFRI recommending AFRI establish two new national programs for conventional plant and animal breeding beginning with the FY 09 RFA.
- *September 24, 2008:* National Organic Coalition ([NOC](#)) [comments](#) to CSREES on the Agriculture and Food Research Initiative (AFRI) newly authorized in the 2008 Farm Bill regarding the provisions of the Act which specify conventional plant and animal breeding as a priority area of research within AFRI.
- *September 2008:* Union of Concerned Scientists stakeholder comments to CSREES on the Agriculture and Food Research Initiative (AFRI), urging significant funding for classical breeding.
- *April 13, 2009:* Memo to Carol Jett from UCS, NSAC, and OFRF, in follow up to a request made for additional information on the groups’ recommendations for classical breeding.
- *May 31 2009:* National Sustainable Agriculture Coalition letter to Research, Education, and Extension Office (REEO) Directors recommended the USDA REEO Roadmap include increased coordination and major investments in classical plant and animal breeding.

- *September 11, 2009:* National Sustainable Agriculture Coalition written comments on fiscal year 2009 AFRI RFA strongly recommended that two new, separate national programs for conventional plant and animal breeding be established within AFRI, beginning with the FY 10 RFA.
- *September 14, 2009:* Sign-on letter regarding the implementation of the Cooperative State Research, Education, and Extension Service (CSREES) Agriculture and Food Research Initiative (AFRI), as authorized by the 2008 Farm Bill. Signed by: Rural Advancement Foundation, International, National Organic Coalition, ACTIVE, AERO, MT, California Climate and Agriculture Network, Carolina Farm Stewardship Association, Chemung County Council of Churches, Classic Organic, Cornucopia Institute, Crawford Stewardship Project, Ecological Farming Association, Edmonds Institute, Florida Organic Growers, Food and Water Watch, Food for Maine's Future, Friends of ETC Group, Frog Farm, Greenpeace, High Meadows Farm, Institute for Responsible Technology, Just Food, NY, Midwest Organic and Sustainable Education Service, National Family Farm Coalition, National Sustainable Agriculture Coalition, North American Limousin Foundation, Northeast Organic Farming Association of Connecticut, Northeast Organic Farming Association of New York, Northeast Organic Farming Association of Massachusetts, Ohio Ecological Food and Farm Association, Old Solar Farm, Oregon Physicians for Social Responsibility, Organic Farming Research Foundation, Organic Seed Alliance, Organic Seed Growers and Trade Association, Organic Trade Association, Peacework Farm, Rainy Creek Farm, Rocky Mountain Farmers Union, Safe Alternatives for our Forest Environment, The Nature Institute, Union of Concerned Scientists, Washington Biotechnology Action Council, Washington Sustainable Food and Farming Network, Wood Prairie Farm, and an additional 43 individuals.
- *December 7, 2009* In a letter to Dr. Beachy, specific recommendations for Establishment of AFRI Conventional Plant and Animal Breeding Programs were offered by the National Organic Coalition, National Sustainable Agriculture Coalition, Organic Farming Research Foundation, Seeds and Breeds for the 21st Century Coalition, and Union of Concerned Scientists.
- *January 27, 2010:* Letter to Secretary Vilsack, copied to Dr. Kathleen Merrigan, Deputy Secretary; Dr. Molly Jahn, Acting Under Secretary; Dr. Roger Beachy, NIFA Director signed by the National Organic Coalition, National Sustainable Agriculture Coalition, Organic Farming Research Foundation, Rural Advancement Foundation International, and Union of Concerned Scientists urging segregated funding streams in the FY 10 RFA for conventional plant and animal breeding.
- *April 13, 2010:* Union of Concerned Scientists submits written comments for the USDA workshop on stakeholder priorities in the area of Plant and Pest Biology recommending NIFA play a more active role in reinvigorating breeding of public cultivars.
- *June 7, 2010:* Union of Concerned Scientists submits written comments in response to the June 2, 2010 AFRI stakeholder meeting recommending the AFRI FY11 RFA fund classical breeding through a funding line distinct from genomics and other technologies.
- *September 24, 2010:* National Sustainable Agriculture Coalition (NSAC) letter to Secretary Vilsack regarding a resolution adopted at the NSAC meeting. One of the

points in the resolution was that the USDA AFRI needed to increase classical breeding for public cultivars and that this work should be funded through a separate RFA.

- *November 24, 2010: Letter* to Catherine Woteki, (USDA Under Secretary for Research, Education and Economics), regarding the importance of the Agriculture and Food Research Initiative (AFRI) investments in classical plant and animal breeding, signed by the National Organic Coalition, National Sustainable Agriculture Coalition, Organic Farming Research Foundation, Organic Trade Association, Rural Advancement Foundation International, and Union of Concerned Scientists.

Meeting and public listening sessions where concerns about the need for greater focus on classical breeding were expressed include:

- *September 2008*: NOC and UCS met with CSREES Administrator Colleen Hefferan to discuss specific recommendations for increasing competitive grant funding for classical plant and animal breeding.
- *September 15, 2008 AFRI listening session*: Sustainable Agriculture Coalition and National Organic Coalition made comments that addressed the need for classical plant and animal breeding.
- *June 2009*: Meeting with USDA Under Secretary Rajiv Shah – NOC presented him with the 2005 Seeds and Breeds report and had an in-depth discussion of the need for increased public investment in classical breeding.
- *September 2, 2009*: UCS met with Mary Peet, the NPL for Organic Agriculture, to discuss current research needs including classical breeding.
- *November 19, 2009*: UCS staff met with Maura O'Neill, Chief of Staff to USDA Research, Education, and Economics Under Secretary Rajiv Shah, and Jill Auburn, Under Secretary Shah's Advisor on Sustainability to discuss three research areas, one of which was the need for increased investment in classical public plant and animal breeding.
- *November 24, 2009*: NOC, OFRF and NSAC meet with Molly Jahn to discuss classical breeding needs.
- *January 6, 2010*: Sustainable and organic agriculture groups met with REE Undersecretary Catherine Woteki specifically to discuss classical breeding, concerns with the AFRI RFA, and possible solutions.
- *April 13, 2010*: At a USDA research stakeholder meeting, UCS presented on its priorities which included classical breeding.
- *June 2, 2010*: CSREES AFRI Stakeholder listening session comments by the Organic Farming Research Foundation, the National Sustainable Agriculture Coalition, the Union of Concerned Scientists, and the AFRI Coalition, all urged stronger emphasis on classical breeding.
- *November 29, 2010*: NSAC and OFRF met with REE Undersecretary Catherine Woteki and discussed the need for classical breeding, among other things.

- *December 3, 2010*: USDA Under Secretary for REE Woteki Stakeholders Session
- *December 9, 2010*: NSAC and OFRF met with Roger Beachy, NIFA Director, and discussed the importance of classical breeding.
- *January 19, 2011*: NIFA Stakeholders Meeting, during which NSAC and NOC provided comments on classical breeding.
- *April 5th, 2011*: UCS met with REE Undersecretary Catherine Woteki and discussed the need for increased classical breeding, among other things.

Requests for Proposals

Despite the clear call from Congress and significant public input for USDA to address our nation's classical plant and animal breeding needs, the AFRI RFAs released since the passage of the 2008 Farm Bill have fallen far short of prioritizing public breed and cultivar development. The Requests for Proposals (RFA) in 2009, 2010 and 2011 all included classical breeding, but put them in the same pool as genomics.

The 2009 RFA stated there was significant opportunity for breeding and mentioned classical breeding specifically in several places. In the Response to Stakeholder Input section the RFA said: *“Conventional plant and animal breeding are receiving greater support in the Plant Breeding and Education Program, Plant Genome, Genetics and Breeding Program, Applied Plant Genomics Coordinated Agricultural Program and in Translational Animal Genomics.”* The Department was acknowledging the concerns and making incremental steps to address them, but failed substantively to do so by lumping classical breeding and the development of publicly available breeds and cultivars with genomics work and/or fundamental research. The problem in the RFA was reflected in the lack of classical breeding projects funded.

The 2010 review had several problems. Specifically, conventional breeding was only mentioned in the Climate Change RFA under National Cereal Germplasm Phenotyping. Although there is a need for breeding to develop cultivars resilient to environmental changes resulting from climate changes, the RFA for this program did not have any focus on development of public cultivars. Although there was good language about participatory plant breeding and organic farming being desirable aspects of a proposal, they were not part of the core needs listed for obtaining a grant. The RFA also failed to fund development of new breeds and cultivars.

The 2011 RFA acknowledged that the 2010 RFA fell short of addressing classical breeding needs and stated that the 2011 RFA was more inclusive of conventional breeding: *“Areas believed to have been under-represented in the FY 2010 RFAs, such as conventional plant and animal breeding, weed science, and food technology are more clearly offered in this FY 2011 RFA ...”*. The RFA included specific reference to cultivar development, but it was relegated to a subheading within the “Biology of Agricultural Plants” subprogram that also includes genomics and biotechnology. The 2011 RFA's “Animal Breeding, Genetics, and Genomics”

was even less specific about classical breeding and again the classical breeding projects competed against other technologies.

Analysis

The combined approach of traditional breeding competing for the same pool of funding as genomics, biotechnology and other breeding technologies is not working. The 2009, 2010 and 2011 AFRI-funded projects (see **Appendices I, II, and III**) include almost no funding for projects focused on actual development of publicly available cultivars and breeds. On the animal side, almost all the research was focused on fertility issues, not development of new breeds. On the plant side, the majority of the projects were fundamental research focused on genomics. Nearly all projects that did actual breeding involve genomics and/or MAS.

Of 127 funded projects in 2009, 2010, and 2011 related to plant breeding and genomics, we were able to identify only one project that was truly classical breeding, a 2010 funded grant: *Development And Management Of Canola In The Great Plains Region* at Kansas State University for \$210,000. Of the 59 projects in animal breeding, fertility and genomics we found no projects that we considered classical animal breeding.

Based on reviewing actual funded projects and anecdotal information from AFRI applicants, it seems that classical breeders are not finding places in the RFAs that are clear homes for their proposals. Also, the classical breeding proposals that are submitted are not considered competitive if they do not contain use of technologies such as MAS or genomics. Research proposals for classical plant and animal breeding that have sought AFRI or NRI funding in the recent years have been consistently declined. Although information on applications is not publicly available, anecdotal evidence suggests that after being consistently denied, breeders are no longer bothering to submit applications.

Funded projects have had a heavy focus on fundamental genomics. Many of these projects provide genome sequencing that they state will be freely available, through on-line data bases and other mechanisms. However, it is our belief that such information will primarily be useful to those breeders using advanced technologies rather than classical breeding.

In livestock breeding, there were a significant number of research projects related to reproductive efficiency, but almost no breeding projects.

By confusing genomics-centered research with true classical breeding, we are hindering the ability of our research community to pursue diverse approaches to problems. Research aimed at breeding animals and development of new, publically held plant cultivars is critical for adapting to climate change, increasing efficiency of energy crops, developing resistance to insect, disease and other plant stresses, and supporting regional diversity. Perhaps most significantly, we are

failing our farmers by not supporting a diverse array of seed and breed choices that may be suited to their region. This failure may have a direct effect of the competitiveness of US agriculture as well as our national food security.

Recommendations

In order to foster a more environmentally sound and economically sustainable agriculture it is critical to significantly increase Agriculture and Food Research Initiative (AFRI) investments in classical plant and animal breeding. To this end, we offer the following recommendations:

1. Create two new NIFA programs with segregated funding streams for conventional plant and animal breeding. These funding streams should be for classical breeding only, and be distinct from other breeding research that utilizes genomics, biotechnology, or MAS. These can be programs within AFRI or separate grant programs, but must be managed as separate research areas with distinct RFAs.
 - a. The RFAs for these programs should each include a clearly stated goal that conventional breeding projects result in the release of publicly held cultivars or breeds.
 - b. Combined, these two programs should have a minimum funding of \$20,000,000 per year.
 - c. Awards under each of these programs should be eligible for projects up to ten years.
 - d. The review panels for both of these programs must include a majority of reviewers with strong demonstrated expertise or experience in classical breeding and public cultivar development.
 - e. At least in the first 5 years of their existence, do not make the RFAs for these two programs should not be commodity specific. The backlog of classical breeding work needed is huge and affects too many sectors to limit requests to only targeted crops or animals.
 - f. Because development of public cultivars and breeds is a public good, serving larger societal goals of diversity and agricultural security, classical breeding projects that propose to develop public cultivars and breeds should be exempted from matching requirements. At a minimum they should be provided more flexible criteria.

- g. Both RFAs should contain language that specifically encourage proposals with participatory breeding and meaningful farmer and NGO participation.
2. Track grants for new public cultivars or improved breeds separately from genomic or molecular genetics activities. In this way, the funding and overall public breeding capacity trends will be more easily monitored and analyzed. This tracking system should be extended to include USDA ARS projects to provide more accurate assessment of overall USDA commitment to public breed and cultivar development.
3. Continue strengthening financial incentives for graduate and undergraduate training in classical plant and animal breeding to ensure the next generation of public plant and animal breeders.

For More Information please contact:

Steve Etko, steveetka@gmail.com, 703-519-7772

Michael Sligh, msligh@rafiusa.org, 919-929-7099

APPENDIX I – AFRI Awards Funded in 2009

Plant Breeding Related Awards

Marker Assisted

Project Title	Organization	State	Amount
Simultaneous Genetic Analysis Of Winter Hardiness Traits And Development Of Winter Malting Barley Varieties	Oregon State University	OR	\$448,000
Genomewide Selection To Introgress Exotic Dwarf-Corn Germplasm Into U.S. Corn Belt Germplasm	University Of Minnesota	MN	\$448,000
Evaluating Genomic Selection For Applied Plant Breeding	University Of Minnesota	MN	\$449,000
Expanding The Scope Of Association Mapping In Important Crop Species With Methodology Development In Statistics	University Of Nebraska	NE	\$282,000
Scanning For Yield: High-Throughput Discovery Of Candidate Agronomic Loci For Marker-Assisted Selection In Maize	University Of California, Davis	CA	\$448,000

Genomics

Project Title	Organization	State	Amount
Exploiting Antixenosis In Wheat Blends For Improved Pest Management; Management Of Wheat Stem Sawfly Using Oviposition Non-Preference Cultivars	Montana State University	MT	\$320,500
Barley Coordinated Agricultural Project: Leveraging Genomics, Genetics, And Breeding For Gene Discovery And Barley Improvement	University Of Minnesota	MN	\$955,000
Single Nucleotide Polymorphism (Snp) Markers For High-Throughput Genotyping To Advance Genomic, Genetic And Breeding Research In Wheat	Kansas State University	KS	\$441,000
Drought Tolerance And Functional Staygreen In Maize	Purdue University	IN	\$348,321
Improving Alfalfa As A Biofuel Feedstock	University Of Georgia	GA	\$705,000

Genetics And Genomics Of Rapid-Onset Water Stress Tolerance In Tomato	University Of California, Davis	CA	\$349,853
Oat Snp Development And Identification Of Loci Affecting Key Traits In North American Oat Germplasm Using Association Genetics	USDA-ARS	ID	\$450,000

Classical Breeding

None

Fundamental Genomics

Project Title	Organization	State	Amount
Understanding The Mechanisms That Define Cereals: Unraveling The Function Of Lineage Specific Genes Within The Poaceae	Michigan State University	MI	\$450,000
Efense Versus Symbiosis: Host Genetic Control Of Nodulation Specificity In Soybean	University Of Kentucky	KY	\$150,000
Comparative Protein Networks Controlling Disease Resistance In Rice And Wheat	University Of California Davis	CA	\$447,000
Molecular Quantitative Genetics Of Forest Trees	University Of Florida Gainesville	FL	\$643,000

Other

Project Title	Organization	State	Amount
2009 Epigenetics Gordon Conference	Gordon Research Conferences West Kingston, Rhode Island	RI	\$10,000
International Conference On Legume Genomics And Genetics	The Samuel Roberts Noble Foundation, Inc. Ardmore	OK	\$10,000
Strategies For Promoting Reliable Crop Pollination By Native Bees	Rutgers University New Brunswick,	NJ	\$400,000
Support For Junior Scientists To Attend The 9th International Congress On Plant Molecular Biology	University Of Missouri Columbia	MO	\$5,000

Knowledge For Policy: Critical Research For Understanding Potential Impacts Of Abs On Eight Sectors Of Genetic Resources For Food And Agriculture	University Of Illinois Chicago	IL	\$249,994
How Do Western Corn Rootworm Beetles Use Refuge And Transgenic Corn	University Of Illinois Urbana	IL	\$349,936
The World Soybean Congress Viii Conference Proposal	Purdue University	IN	\$10,000
Use Of Non-Wheat Cereal Proteins As Functional Viscoelastic Polymers	Purdue University	IN	

Animal Genome, Genetics, and Breeding Related Awards

Animal Genome and Genetics

None

Fundamental genomics

None

Classical breeding

None

Fertility and Other

Project Title	Organization	State	Amount
Tomorrows Poultry: Genomics, Physiology And Well-Being	Agricultural Research Service	AK	\$10,000
Honey Bee Primer Pheromone Regulation Of Colony-Level Reproduction	Texas A&M University	TX	\$344,217
Functional Role Of The Cart Peptide In Control Of Dominant Follicle Selection In Cattle	Michigan State University East Lansing	MI	\$349,782
Swine Genome Sequencing Consortium [Sgsc] Pig Genome Assembly And Annotation Conference	University Of Illinois Urbana	IL	\$10,000
Nutritional Programming Of Puberty In Heifers	Texas A&M University	TX	\$338,086
Developmental Requirements Of Importin Alpha Mediated Nuclear Trafficking In The Porcine Embryo	Purdue University	IN	\$315,000

Transcriptional And Epigenetic Regulation Of Embryonic Development By Gm-Csf	University Of Florida Gainesville	FL	\$349,260
Physiological Roles Of Prostaglandins And Interferon Tau In Conceptus Development And Endometrial Function	Texas A&M Univ College Station	TX	\$349,287
Mechanism Of Progestin Regulation Of Sperm Hypermotility In Southern Flounder	University Of Texas At Austin Port Arkansas	TX	\$325,000
Pregnancy-Induced Chemokine Receptor 4 And Associated Immune Cells: Implication In Vascularization And Formation Of The Bovine Placentome.	Colorado State University, Ft. Collins	CO	\$125,000
Function And Regulation Of Prr15 In Sheep Conceptus Development	Colorado State University Fort Collins	CO	\$340,000

APPENDIX II – AFRI Awards Funded in 2010

Plant Breeding Related Awards

Marker Assisted

Project Title	Organization	State	Amount
Conifer Translational Genomics Network	University Of California Davis	CA	\$1,250,000
An Integrated Approach To Breeding Resistance To Phytophthora Capsici In Pepper	University Of California Davis	CA	\$500,000
Marker-Assisted Breeding To Enhance Disease Resistance In Corn, Rice, And Sugarcane	Louisiana State University Baton Rouge	LA	\$499,857

Genomics

Project Title	Organization	State	Amount
Investigation Of Branched-Chain Amino Acid Metabolism Involved In Aroma Formation In Melon	University Of California Davis	CA	\$297,000
Cell-Type Specification In The Embryo Sac Of Rice	University Of California Davis		\$349,964
Advancing The Barley Genome	University Of California Riverside	CA	\$500,000
Regulation Of The Maize Mir172 MicroRNA And Its Targets By Gibberellic Acid	USDA-ARS-WRRC Albany	CA	\$347,555
Lam1 Is A Wuschel-Like Homeobox Gene Regulating Formation Of Leaf Blades	Connecticut Agricultural Experiment Station New Haven	CT	\$125,753
Directing The Metabolic Flux Towards Overexpression Of Flavonoid Nutraceuticals In American Native Grapes.	Florida A&M University	FL	\$125,000
Advanced Pine Breeding Through Association Genetics And Biotechnology	University Of Florida Gainesville	FL	\$499,386
Improving Salt Stress Tolerance In Tomato By Engineering A Ubiquitination Resistant Transcription Factor	University Of Idaho Moscow	ID	\$148,831

Improving Soybean Production In Elevated Ozone: Selecting Genotypes And Understanding Mechanisms Of Tolerance In The Field	USDA ARS Urbana	IL	\$349,670
New Vistas In Plant Breeding Education: Investigating The Genetics Underlying The Ability To Yield Under High Planting Density In Maize	University Of Illinois Urbana	IL	\$500,000
Genome Sequence For Phaseolus	Purdue University	IN	\$497,000
Translating Solanaceae Sequence Diversity And Trait Variation Into Applied Outcomes Through Integrative Research, Education, And Extension	Michigan State University East Lansing	MI	\$1,250,000
Building Expertise In Plant Breeding That Focuses On Drought Tolerance In Common Bean	Michigan State University East Lansing	MI	
<i>The Role Of Soybean G-Proteins In Hormonal Regulation Of Growth And Development</i>	University Of Missouri Columbia	MO	\$348,889
Development Of Bio-Based Lubricants In A Dedicated Industrial Oilseed Crop	University Of Nebraska	NE	\$500,000
Common Bean Coordinated Agricultural Project	North Dakota State University Fargo	ND	\$1,000,000
Assessing The Cost Of Pyramiding Host Resistance To Biotic Stress In Crop Species	South Dakota State University Brookings	SD	\$499,315
Improving Drought Tolerance And Aflatoxin Resistance In Maize; Education, Extension, And Translational Breeding Via Altered Lipid Metabolism	Texas A&M University College Station	TX	\$499,994
Genomics Of Energy Sorghum Biomass Accumulation	Texas A&M University College Station	TX	\$1,000,000
Enhancing Leaf Spot Resistance In Peanut	University Of Florida Gainesville	FL	\$497,748

Fundamental Genomics

Project Title	Organization	State	Amount
Development Of A High Resolution Snp Chip (600k) And Genotyping Of 850 Diverse Rice (Oryza Sp.) Accessions	Cornell University Ithaca	NY	\$500,000

Gibberellin Signaling And Parthenocarpic Fruit Development In Tomato	Duke University Durham	NC	\$350,000
Mechanisms Of Ethylene And Auxin Cross Talk In Root Development	Wake Forest University Winston-Salem	NC	\$349,999
Effectors Of Pathogenicity In The Stagonospora Nodorum-Wheat Pathosystem, Characterization Of How S. Nodorum Induces Disease	USDA-ARS Fargo	ND	\$399,000
Gene Flow And Fitness Studies Of Switchgrass: Implications For New Biofuel Crops	Ohio State University Columbus	OH	\$400,000
Understanding Virus Cell-To-Cell Movement And Its Application To Virus Resistance In Plants	The Samuel Roberts Noble Foundation, Inc. Ardmore	OK	\$399,000
The Douglas-Fir Climate Change Transcriptome Observatory For The Pacific Northwest	Forest Service Corvallis	OR	\$454,545
Transcriptomic Determination Of Genes Involved In The Nutritional Ecology Of Fall Armyworm Plant Host Strains	Pennsylvania State University University Park	PA	\$99,500
Seed Grant To Assess The Role Of Specific, Highly Abundant Viral Small Rnas In Viral Pathogenesis In Corn	University Of South Carolina Columbia	SC	\$150,000
Characterization Of Root Proteomes For Drought And Salt Tolerance In Wild Tomato Species	Tennessee State University Nashville	TN	\$124,552
Linking The Genetic Loci In Wheat That Regulate The Distinct Wax Cuticle Layers And Its Variable Composition To Improved Drought Tolerance	Texas A&M Univ College Station	TX	\$349,078
Pseudomonas Syringae Induction Of Host Programmed Cell Death Through The Regulation Of The Tomato Protein Kinase Adi3	Texas A&M Univ College Station	TX	\$399,000
Improving Plant Productivity By Altering Nitrogen Transport Processes	Washington State University Pullman	WA	\$350,000
Genetic Variation In Dalmatian Toadflax Performance And Defense Traits And Phenotypic Plasticity In Response To Herbivory And Competition	Colorado State University Fort Collins	CO	\$124,962
The Role Of A Novel Apomixis-Linked Ap2-Domain Transcription Factor In Parthenogenetic Embryo Development	University Of Georgia Athens	GA	\$350,000

Deciphering Proanthocyanidin Biosynthesis In Alfalfa	The Samuel Roberts Noble Foundation, Inc. Ardmore	OK	\$336,000
Single-Step National Evaluation Using Phenotypic, Full Pedigree And Genomic Information	University Of Georgia Athens	GA	\$388,343
Function Of Rhamnogalacturonan-I In Tomato Cell Walls	Purdue University		\$350,000
Biochemistry Of Oilseeds: New Strategies For Improving Oils	Washington State University Pullman	WA	\$350,000
Investigations Into The Genetic And Physiological Mechanisms Of Aluminum Tolerance In Rice (Oryza Spp.)	Boyce Thompson Institute Ithaca	NY	\$350,000

Classical Breeding

Project Title	Organization	State	Amount
Development And Management Of Canola In The Great Plains Region	Kansas State University Manhattan	KS	\$210,000

Other

Project Title	Organization	State	Amount
Interdisciplinary Graduate Research For The Production And Marketing Of Oilseed Biofuel Products	Colorado State University Fort Collins	CO	\$500,000
Aba And Oxygen Crosstalk During Seed Development	University Of Connecticut Storrs	CN	\$135,000
A Multigenerational Assessment Of The Fate And Impact Of Crop Gene Introgression Into Wild Sunflower	University Of Georgia Res Foundation Athens	GA	\$400,000
Dissection Of The Molecular Mechanisms Regulating Wood Formation In Poplar	University Of Georgia Athens	GA	\$349,658

Translational Genomic Approaches For Enhancing Disease Resistance In Plants, An Internet-Facilitated Education Program For Training Plant Breeders	University Of Georgia Athens	GA	\$499,884
Undergraduate Training And Research In Plant Breeding	Western Illinois University Macomb	IL	\$500,000
Partnership For Research & Education In Plant Breeding And Genetics	Purdue University		\$497,672
Biochemical Processes Governing The Balance Of Metabolic Flux To Amino Acids, Proteins, And Starch Stored In Maize Grain	Iowa State University Ames	IA	\$350,000
Role Of Histone H3 Lysine 36 Methylation In Regulating Developmentally Important Genes In Rice	Mississippi State University Mississippi State	MS	\$134,815
<i>The Role Of Cytokinin Signaling And Type-B Response Regulators In The Apical Meristems Of Arabidopsis And Rice</i>	Dartmouth College	NH	\$125,000
Enhancing Education And Research In Breeding For Plant Disease Resistance	Cornell University Ithaca	NY	\$499,392
10th Japan-U.S Seminar: Genome Enabled Integration Of Research In Plant-Pathogen Systems.	Oregon State University Corvallis	OR	\$5,000
Collection And Evaluation Of Ornamental, Flowering And Nursery Plants For Adaptation In The Lower Mississippi Delta Region	University Of Arkansas Pine Bluff	AR	\$173,568

Animal Genome, Genetics, and Breeding Related Awards

Animal Genome and Genetics

Project Title	Organization	State	Amount
Whole Genome Sequencing Of Catfish	Auburn University	AL	\$800,000
Mining Hymenoptera Genomes For Functional Sequences	Georgetown University	DC	\$704,044
Use Of High-Density Snp Genotyping For Genetic Improvement Of Livestock	Iowa State University Ames	IA	\$449,939
Implementation Of Whole Genome Selection In The Us Dairy And Beef Cattle Industries	USDA, ARS, ANRI, Bovine Functional Genomics Laboratory Beltsville	MD	\$625,000

Turkey Genomic Research And Genetic Improvement: Development Of High-Density Snp Content For Design Of A Genome-Wide Assay	USDA, ARS, ANRI, Bovine Functional Genomics Laboratory Beltsville	MD	\$341,755
Utilization Of Linkage Disequilibrium For Development Of Low Density Single Nucleotide Polymorphism (Snp) Panels To Genotype Domestic Pig Breeds	Michigan State University East Lansing	MI	\$443,491
Development And Field Evaluation Of Genome-Wide Marker-Assisted Selection (Gwmas) Over Multiple Generations In Commercial Poultry	Midwest Area, Agricultural Research Service East Lansing	MI	\$625,000

Fundamental Genomics

Project Title	Organization	State	Amount
Assembly Of The Ovine Whole Genome Reference Sequence	Utah State University Logan	UT	\$930,000
Effects Of Variation In Pathogen Detection And Signaling Pathways On Resistance To Bovine Mastitis	University Of Vermont Burlington	VT	\$360,000
Reference Genome Sequence For The Turkey, Meleagris Gallopavo	Virginia Polytechnic Institute Blacksburg	VA	\$908,280
Mechanisms Mediating The Regulation Of Fatty Acid Synthesis By Fibroblast Growth Factor-19 In Chickens	West Virginia University Research Corp. Morgantown	WV	\$350,000
Across-Breed Comparison Of Genomics Of Host Susceptibility To Infection By Mycobacterium Avium Subsp. Paratuberculosis.	University Of Wisconsin Madison	WI	\$449,747
Genomic Structure And Function Of The Bovine Y-Chromosome Genes In The Male-Specific Region	Pennsylvania State University University Park	PA	\$450,000
Impact Of Maternal Nutrition On Expression Of Genes Regulating Offspring Growth, Carcass Composition, And Meat Quality.	South Dakota State University Brookings	SD	\$319,883
Whole Genome Functional Analyses In Horses To Dissect Important Diseases	Texas A&M University College Station,	TX	\$597,902

Identifying Porcine Genes And Gene Networks Involved In Effective Response To Prrs Virus Using Functional Genomics And Systems Biology	USDA-ARS Animal Parasitic Diseases Lab Beltsville	MD	\$749,975
Fase: Genetic Characterization Of Absolute Varroa Mite Resistance In Honey Bees	University Of North Carolina Greensboro	NC	\$136,463

Classical breeding

None

Fertility and Other

Project Title	Organization	State	Amount
Improving Fertility During Heat Stress In Lactating Dairy Cows	University Of Florida Gainesville	FL	\$1,000,000
Advancing Technology For Practical Use Of Cryopreserved Boar Sperm To Improve Opportunities For Profitable Pork Production	University Of Illinois Urbana	IL	\$900,000
The Physiological Basis Of Differences In Efficiency, Metabolism And Energy Partitioning Between Lines Of Pigs Selected For Residual Feed Intake	Iowa State University Ames	IA	\$349,421
Aspen Perinatal Biology Symposium: Intrauterine Stress And Adverse Fetal Outcomes: Linked By Perinatal Mechanisms Of Adaptation	North Dakota State University Fargo	ND	\$10,000
An Integrated Approach To Improving Dairy Cow Fertility	University Of Wisconsin Madison	WI	\$1,000,000
The Next Generation Bovine Genome Database	Georgetown University	DC	\$970,000
Easily Accessible Web-Based Tools For Analyzing Next-Generation Sequencing Data From Agricultural Animals	Michigan State University East Lansing	MI	\$689,921

APPENDIX III – AFRI Awards funded in 2011

Plant Breeding Related Awards

Marker Assisted

Project Title	Organization	State	Amount
Improving Barley And Wheat Germplasm For Changing Environments	University of California Davis	CA	\$5,000,000
Analysis Of Clinal Variation In Maize: Implementation Of An Experimental Framework For Studying Crop Adaptation	University Of Delaware Newark	DE	\$1,749,707

Genomics

Project Title	Organization	State	Amount
Loblolly Pine Genome Project	University of California Davis	CA	\$2,925,000
Enhancing Photosynthesis By Modifying Carbon Allocation	Colorado State University	CO	\$408,795
Engineering High Value Oil Production Into Biofuel Crops	University Of Kentucky	KY	\$199,373
Reducing Losses To Potato And Tomato Late Blight By Monitoring Pathogen Populations, Improved Resistant Plants, Education, And Extension	University of California Riverside	CA	\$1,800,000
Adapting Kernel Metabolism To Enhance Cereal Yield Under Adverse Conditions	University Of Florida Gainesville	FL	\$1,999,998
<i>The Impacts Of Lignin Modification On Fungal Pathogen And Insect Interactions In Sorghum For Cellulosic And Thermal Bioenergy</i>	USDA Agricultural Research Service Lincoln	NE	\$194,626
Evaluation And Mitigation Of Anthracnose Disease Pressure Due To The Introduction Of Sorghum For Feedstock Production	Pennsylvania State University University Park	PA	\$199,548
<i>Genetic Engineering For Septoria Disease Resistance In Hybrid Poplar</i>	Clemson University	SC	\$149,861
<i>Integrated Management Of Oomycete Diseases Of Soybean And Other Crop Plants</i>	Virginia Polytechnic Institute Blacksburg	VA	\$1,856,250

Management Of Switchgrass Rust Disease By Deploying Host Resistant Genes And Monitoring Dynamics Of Pathogen Populations	Virginia Polytechnic Institute	VA	\$200,000
--	--------------------------------	----	-----------

Classical Breeding

None

Fundamental Genomics

Project Title	Organization	State	Amount
Light Regulatory Networks Connecting Phytochromes & Photoperiod In Wheat Development	University of California Davis	CA	\$499,607
Identification Of Genes Controlling Disease Resistance To Mitigate Disease Pressure Of Bioenergy Crops	University of California Davis	CA	\$199,984
Epigenetic Regulation Of Seed Maturation And Germination In Soybean	University of California Riverside	CA	\$500,000
Regulatory Networks Controlling Hormone Signaling During Woody Growth Of Forest Trees	USDA Forest Service	CA	\$498,875
Cell Type-Specific Epigenetic Gene Regulation In The Maize Endosperm During Seed Development	University Of Florida	FL	\$480,153
Analysis Of Imprinted Genes With Developmental Functions In The Maize Seed	University Of Florida	FL	\$499,320
Epigenetic Regulation Of The B3 Transcription Factor Network In Maize Seed Development	University Of Florida	FL	\$499,048
Transcriptome Analysis Of The Photoperiodic Response On The Flowering Gene Networks In Soybean	University Of Illinois	IL	\$499,983
Adaptive Responses Of The Maize Epigenome To Selection For Improved Nitrogen Utilization	University Of Illinois	IL	\$499,983
Insect Effectors In Molecular Plant-Insect Interactions	Purdue University	IN	\$453,658
Environmentally Induced Directed And Stochastic Epigenomic Changes In Maize	University Of Minnesota	MN	\$499,538

The Role Of SWI/SNF Chromatin Remodeling Complexes In The Regulation Of Grain Filling In Rice (<i>Oryza Sativa</i>)	Mississippi State University	MS	\$498,215
Mitigating Insect Herbivory Of Warm-Season Bioenergy Grasses Getting Ahead Of The Curve	USDA-ARS	NE	\$199,548
Hormone Regulatory Networks In Maize Growth And Development	Cold Spring Harbor Laboratory	NY	\$496,716
Epigenetic Regulation Of Water-Use-Efficiency Related Genes In Tomato	Augustana College	SD	\$58,832
Molecular, Physiological, And Agronomic Characterization Of Salt Tolerant Alfalfa Germplasm	USDA-ARS	UT	\$0
Regiospecific Synthesis Of High-Value Cellulosic Esters And Ethers From Biomass	Virginia Polytechnic Institute	VA	\$181,994
Plant Genotypes To Mitigate Human Bacterial Pathogens	University Of Wisconsin	WI	\$499,993
Functional Genomics Of Salmonella-Tomato Interaction And Crop Driven Pathogen Limitation: The Role Of Agricultural Practices In Outcomes	University Of Florida Gainesville	FL	\$499,531
Integrating Research, Education And Extension For Enhancing Southern Pine Climate Change Mitigation And Adaptation	University Of Florida Gainesville	FL	\$4,000,000
Molecular Mechanisms Underlying The Interactions Of Enteric Pathogens With Postharvest Leafy Vegetables	Illinois Institute Of Technology Chicago	IL	\$499,685
Plant-Microbe Communication In The Medicago Truncatula Rhizosphere: Functional Metagenomics, Biochemistry, And Community Analysis	University Of Kentucky Lexington	KY	\$452,000
Bioinformatics Tools For Interpreting Snp-Phenotype Relationships	University Of Minnesota St Paul	MN	\$495,050
Regulation Of Shb1 On Canola Seed Development And Seedling De-Etiolation	University Of Minnesota St Paul	MN	\$500,000
<i>Mitigating Insect Herbivory Of Warm-Season Bioenergy Grasses Getting Ahead Of The Curve</i>	Agricultural Research Service Lincoln	NE	\$199,548
Hormone Regulatory Networks In Maize Growth And Development	Cold Spring Harbor Laboratory	NY	\$496,716

Role Of Two-Component Elements In Cytokinin Signaling In Rice	University Of North Carolina Chapel Hill	NC	\$499,680
<i>Plant Detection Of Herbivore Cues: A Comparative Approach Towards Understanding Host Evasion</i>	Pennsylvania State University University Park	PA	\$456,929
<i>Molecular, Physiological, And Agronomic Characterization Of Salt Tolerant Alfalfa Germplasm</i>	Agricultural Research Service Logan	UT	\$0
<i>Plant Genotypes To Mitigate Human Bacterial Pathogens</i>	University Of Wisconsin Madison	WI	\$499,993

Other

Project Title	Organization	State	Amount
Gordon Research Conference On Quantitative Genetics And Genomics: From Genome To Phenotype	Gordon Research Conferences West Kingston	RI	\$10,000
Co2 Assimilation In Plants: Genome To Biome - A Gordon Research Conference	Gordon Research Conferences West Kingston	RI	\$10,000
<i>Equipping South Dakota State University Beef Research Facilities With Individual Feeding Units To Study Genotype By Nutrition Interactions</i>	South Dakota State University Brookings	SD	\$48,914
<i>An Economic Analysis Of Productivity, Technology Adoption And Profitability: The Impact Of Biotechnology On Agriculture</i>	University Of Wisconsin Madison	WI	\$292,112

Animal Genome, Genetics, and Breeding Related Awards

Animal Genome and Genetics

Project Title	Organization	State	Amount
Adapting Chicken Production To Climate Change Through Breeding	University Of Delaware Newark	DE	\$831,200

<i>National Program For Genetic Improvement Of Feed Efficiency In Beef Cattle</i>	University Of Missouri Columbia	MO	\$1,000,000
---	---------------------------------	----	-------------

Fundamental Genomics

Project Title	Organization	State	Amount
Store-Operated Calcium Entry In Pig Oocytes	Purdue University	IN	\$499,937
Improving Nutrient Utilization And Feed Efficiency Through Research And Extension To Enhance Pig Industry Sustainability And Competitiveness	Iowa State University Ames	IA	\$938,043
Statistical Methods And Bioinformatics Tools For Multiple Trait Whole Genome Precision Selection For Heterogeneous Environments	Michigan State University East Lansing	MI	\$677,108
<i>Bovine Sperm Transcriptome: Sequencing And Translation In The Bovine Embryo</i>	University Of Rhode Island	RI	\$150,000
<i>Integrated Program For Reducing Brdc In Beef And Dairy Cattle</i>	Texas A&M University College Station	TX	\$1,950,000
<i>Generation Of A High Density Snp Chip For Genomic Analysis In Rainbow Trout</i>	USDA- ARS Kearneysville	WV	\$678,000
<i>Inferring Causal Phenotype Networks In Livestock Using Genomic Information</i>	University Of Wisconsin Madison	WI	\$467,290

Classical breeding

None

Fertility and Other

Project Title	Organization	State	Amount
<i>Endocrine Action Of Interferon-Tau</i>	Colorado State University Fort Collins	CO	\$499,937
Functional Analysis Of Oviductal Glycans That Bind Porcine Sperm	University Of Illinois Urbana	IL	\$396,826
Swine In Biomedical Research Conference 2011: Creating The Building Blocks - Genomics, Transgenesis And Cloning	University Of Illinois Urbana	IL	\$10,000

Knowledge Representation Resources For Animal Agricultural Researchers	Mississippi State University	MI	\$733,845
Ubiquitin Dependent Proteolysis In Farm Animal Spermatogenesis And Fertilization	University Of Missouri Columbia	MO	
<i>Induced Ungulate Trophoblast Stem Cells: Derivation From Fibroblasts</i>	University Of Missouri Columbia	MO	\$341,252
<i>Pregnancy-Induced Chemokine Receptor 4 And Associated Immune Cells: Implication In Vascularization And Formation Of The Bovine Placentome</i>	New Mexico State University Las Cruces	NM	\$69,554.43
A Gene-Based, Quantitative Definition Of Semen Quality	Oregon State University Corvallis	OR	\$498,286
<i>Poultry Workshop: Plant & Animal Genome Conference Xix</i>	Texas A&M University College Station	TX	\$17,000
<i>System Biology Analysis And Modeling Of Complex "Omic" Data: A Service Center Approach</i>	Texas A&M University College Station	TX	\$749,891
<i>Trophoblast-Derived, Non-Classical Mhc Class I Proteins: Essential Factors For The Maintenance Of Bovine Pregnancy</i>	Utah State University Logan	UT	\$486,870
<i>Control Of Oxidative Stress During Bovine Folliculogenesis</i>	Middlebury College	VT	\$150,000
<i>Regulation Of Corpus Luteum Lifespans: Developmental Differences In Signal Transduction Mechanisms Associated With The Luteal Pgf2a Receptor</i>	West Virginia University Morgantown	WV	\$191,172
<i>Arginine And Secreted Phosphoprotein 1 Mediate Mtor Cell Signaling For Conceptus Development And Survival</i>	Texas A&M University College Station	TX	\$500,000
<i>Mechanism Of Gonadotropin Action</i>	University Of Nebraska Medical Center	NW	\$500,000

AFRI Classical Breeding Analysis and Recommendations

Public Input Documents List

1. *September 19, 2008*: Sustainable Agriculture Coalition letter to Dr. Hefferan following USDA Listening Session on AFRI recommending AFRI establish two new national programs for conventional plant and animal breeding beginning with the FY 09 RFA.
http://www.nationalorganiccoalition.org/policycomments/2008_09_24_SAC%20Comments%20on%20AFRI%20Implementation.pdf
2. *September 24, 2008*: National Organic Coalition (NOC) comments to CSREES on the Agriculture and Food Research Initiative (AFRI) newly authorized in the 2008 Farm Bill regarding the provisions of the Act which specify conventional plant and animal breeding as a priority area of research within AFRI.
<http://www.nationalorganiccoalition.org/AFRIwrittencommentsFINAL9-24-08.pdf>
3. *September 2008*: Union of Concerned Scientists stakeholder comments to CSREES on the Agriculture and Food Research Initiative (AFRI), urging significant funding for classical breeding.
<http://www.nationalorganiccoalition.org/policycomments/UCS%202008%20AFRIstakeholderCommentsCSREESFinal.pdf>
4. *April 13, 2009*: Memo to Carol Jett from UCS, NSAC, and OFRF, in follow up to a request made for additional information on the groups' recommendations for classical breeding.
<http://www.nationalorganiccoalition.org/policycomments/Memo%20to%20Carole%20Jett%204%2014%202009.pdf>
5. *May 31 2009*: National Sustainable Agriculture Coalition letter to Research, Education, and Extension Office (REEO) Directors recommended the USDA REEO Roadmap include increased coordination and major investments in classical plant and animal breeding.
http://www.nationalorganiccoalition.org/policycomments/2009_05_31nsac-reeo-roadmap-comments.pdf
6. *September 11, 2009*: National Sustainable Agriculture Coalition written comments on fiscal year 2009 AFRI RFA strongly recommended that two new, separate national programs for conventional plant and animal breeding be established within AFRI, beginning with the FY 10 RFA.
http://www.nationalorganiccoalition.org/policycomments/2009_09_11_NSAC%202009%20AFRI%20RFA%20Comments.pdf
7. *September 14, 2009*: Sign-on letter regarding the implementation of the Cooperative State Research, Education, and Extension Service (CSREES) Agriculture and Food Research Initiative (AFRI), as authorized by the 2008 Farm Bill. Signed by: Rural Advancement Foundation, International, National Organic Coalition, ACTIVE, AERO, MT, California Climate and Agriculture Network, Carolina Farm Stewardship Association, Chemung County Council of Churches, Classic Organic, Cornucopia Institute, Crawford Stewardship Project, Ecological Farming Association, Edmonds Institute, Florida Organic Growers, Food and Water Watch, Food for Maine's Future, Friends of ETC Group, Frog Farm, Greenpeace, High Meadows Farm, Institute for Responsible Technology, Just Food, NY, Midwest Organic and

Sustainable Education Service, National Family Farm Coalition, National Sustainable Agriculture Coalition, North American Limousin Foundation, Northeast Organic Farming Association of Connecticut, Northeast Organic Farming Association of New York, Northeast Organic Farming Association of Massachusetts, Ohio Ecological Food and Farm Association, Old Solar Farm, Oregon Physicians for Social Responsibility, Organic Farming Research Foundation, Organic Seed Alliance, Organic Seed Growers and Trade Association, Organic Trade Association, Peacework Farm, Rainy Creek Farm, Rocky Mountain Farmers Union, Safe Alternatives for our Forest Environment, The Nature Institute, Union of Concerned Scientists, Washington Biotechnology Action Council, Washington Sustainable Food and Farming Network, Wood Prairie Farm, and an additional 43 individuals.

<http://www.nationalorganiccoalition.org/AFRI9-14.pdf>

8. *December 7, 2009* In a letter to Dr. Beachy, specific recommendations for Establishment of AFRI Conventional Plant and Animal Breeding Programs were offered by the National Organic Coalition, National Sustainable Agriculture Coalition, Organic Farming Research Foundation, Seeds and Breeds for the 21st Century Coalition, and Union of Concerned Scientists. <http://www.nationalorganiccoalition.org/policycomments/Beachy%2012-7-09.pdf>
9. *January 27, 2010*: Letter to Secretary Vilsack, copied to Dr. Kathleen Merrigan, Deputy Secretary; Dr. Molly Jahn, Acting Under Secretary; Dr. Roger Beachy, NIFA Director signed by the National Organic Coalition, National Sustainable Agriculture Coalition, Organic Farming Research Foundation, Rural Advancement Foundation International, and Union of Concerned Scientists urging segregated funding streams in the FY 10 RFA for conventional plant and animal breeding. <http://www.nationalorganiccoalition.org/policycomments/AFRI%20classical%20breeding%20letter%20to%20Vilsack%201-27-10.pdf>
10. *April 13, 2010*: Union of Concerned Scientists submits written comments for the USDA workshop on stakeholder priorities in the area of Plant and Pest Biology recommending NIFA play a more active role in reinvigorating breeding of public cultivars. <http://www.nationalorganiccoalition.org/policycomments/Brise%20comments%20to%20NIFA%20on%20research%204-13-10.pdf>
11. *June 7, 2010*: Union of Concerned Scientists submits written comments in response to the June 2, 2010 AFRI stakeholder meeting recommending the AFRI FY11 RFA fund classical breeding through a funding line distinct from genomics and other technologies. <http://www.nationalorganiccoalition.org/policycomments/UCS%20stakeholder%20comments%20on%20AFRI%20written%206-7-10.pdf>
12. *September 24, 2010*: National Sustainable Agriculture Coalition (NSAC) letter to Secretary Vilsack regarding a resolution adopted at the NSAC meeting. One of the points in the resolution was that the USDA AFRI needed to increase classical breeding for public cultivars and that this work should be funded through a separate RFA. http://www.nationalorganiccoalition.org/policycomments/2010_09_24_NSAC_AFRI_letter.pdf

13. *November 24, 2010*: Letter to Catherine Woteki, (USDA Under Secretary for Research, Education and Economics), regarding the importance of the Agriculture and Food Research Initiative (AFRI) investments in classical plant and animal breeding, signed by the National Organic Coalition, National Sustainable Agriculture Coalition, Organic Farming Research Foundation, Organic Trade Association, Rural Advancement Foundation International, and Union of Concerned Scientists.
http://www.nationalorganiccoalition.org/policycomments/2010_AFRIWotekiletter.pdf