North Central Regional Association of State Agricultural Experiment Station Directors

210th Meeting
Hyatt at the Bellevue, Philadelphia, PA
Tuesday, September 26, 2017, 8 am to 10 am
Room State Drawing Room

Final Agenda and Meeting Minutes (page 3)

Time	*Item #*	*Topic*	*Presenter*
8:00 am	1.0	Welcome and Call to Order	Archie Clutter, NCRA 2017 Chair
	2.0	Approval of Summer 2017 Minutes, see: https://docs.wixstatic.com/ugd/4081a5_804fb9d32b7d41b7b4a91b60c62fce02.pdf	
	3.0	Adoption of the Agenda	
8:05 am	4.0	Interim Actions of the Chair 4.1 NCRA Office Budget 4.2 ESS Agenda Discussion and Clarifications (NRSP1 vote, 2018 Multistate Award, etc.)	Archie Clutter, Jeff Jacobsen, Chris Hamilton
8:20 am	5.0	NCRA F&A Rate Discussion	Archie Clutter, Deb Hamernik
8:50 am	6.0	Campus Faculty Start-up Challenges and Opportunities	All
9:20 am	7.0	NAS Science Breakthroughs 2030 Update	Jeff Jacobsen, Chris Hamilton
9:25 am	8.0	USDA Capacity Fund Equipment Purchase Process Discussion	Doug Buhler, All
9:35 am	9.0	Spring NCRA Meeting Topic Ideas and Tour Updates	Archie Clutter, Marc Linit, All
9:40 am	10.0	Other Business/Announcements	All
9:50 am	11.0	NCRA Officer Changing of the Guard	Archie Clutter, 2017 Chair; Joe Colletti, 2018 & 2019 Chair
		Future Meetings: https://www.ncra-saes.org/calendar • 2017 APLU Annual Meeting, November 12-14, 2017, Marriot Wardman Park, Washington, DC • 2018 Joint CARET/AHS Meeting, March 4-7, Hilton Crystal City, Arlington, VA	

		• 2018 NCRA Spring Meeting, April 2-4, The Chase Park Plaza Royal Sonesta Hotel, St. Louis, MO	
10:00 am	*Adjourn*		

Meeting Minutes

Attendees: Archie Clutter, Becky Walsh, Bill Barker, Parag Chitnis, Marshall Martin, Deb Hamernik, Ernie Minton, Doug Buhler, Marc Linit, Dave Benfield, Joe Colletti, Ken Grafton, Greg Cuomo, Jeff Jacobsen, Chris Hamilton (recorder)

Item #	Notes	Action Taken
2.0	Approval of July 2017 meeting minutes	Approved
3.0	Adoption of September 2017 agenda	Approved
4.1	The current NCRA office budget was briefly discussed; see brief below for details on spending year-to-date. Jeff mentioned that the travel budgets will likely need to increase when Deb Hamernik becomes ESS chair, due to an increased number of meetings Jeff and Chris will attend while supporting the Chair. Contact Jeff and Chris if you have any questions. MSU admin fee remains pending.	For information only
4.2	The NRSP1 electronic vote will take place at the ESS business meeting. Brief discussion ensued regarding the proposal and its updated budget. The multistate award call for FY2018 will also be voted on to approve updated language supporting the submission of only one project per region, along with some minor date deadlines changes.	For information only
5.0	NCRA F&A Rate Discussion: Discussion ensued on how NC LGUs deal with F&A rates from different sponsor types, how and why policies were developed, and best practices for rate negotiations, especially with industry and commodity boards. For more details from each state, please refer to the Excel sheet sent prior to the meeting or the link in the brief here: NCRA F&A Rate Discussion (may be future discussion too)	For information and discussion
6.0	Campus Faculty Start-up Challenges and Opportunities. Archie Clutter presented the group with UNL's initial pre-hire data collection sheet (contact the NCRA office	For information and discussion

	if you need the Excel version), which opens up internal UNL discussion on expenses and how new hire start-up packages will be funded. “Request to search” forms are then released prior to beginning the hiring process. MSU indicated they do something similar. Discussion indicated that “carry-forward” funding issues with start-up packages can be addressed with the UNL form, since it addresses initial funds and how they are spent or carried over from year to year. The group discussed and shared their institutions’ start-up policies and best practices such as funding sources & cut-offs on expenditures of start-up funds, summer salary carry-forward, technical staff, start-up funding sources, trailing partner concerns, etc. Future discussion on spousal/partner accommodations and long-term implications	
7.0	NAS 2030 Breakthroughs: Jeff and Chris submitted, on behalf of ESCOP, the five 1-2 pagers developed from the Roadmap challenge areas.	Please consider making your own submissions to the NAS 2030 public input page and/or discuss thoughts and ideas with your reps attending the October Irvine, CA, NAS 2030 session. Also consider sharing the ESCOP Roadmap (2010) with attendees.
8.0	USDA Capacity Fund Equipment Purchase Process Discussion: $150,000 is the limit on specialized equipment before prior approval is needed. The group discussed briefly how these are handled across the region. Parag indicated that USDA-NIFA is still discussing this rule and will share more details as they become available.	For information and discussion
9.0	Spring NCRA Meeting Topics and Tour Updates: Wednesday will be our tour day for Monsanto and Danforth. Archie Clutter has been in touch with reps from both and is currently working on finalizing plans. Marc Linit also suggested having a rep from 39 North	For information and discussion. Marc Linit will follow up with Jeff after reaching out to 39

	give a presentation on their vision of the planned plant biology facility effort. He'll make contact with 39 North and also corn and soybeans commodity groups, then follow up with Jeff on meeting/presentation plans. Jeff indicated that reps from Lincoln University are also planning to attend the spring NCRA meeting. Topics mentioned for the spring BP sessions: Public/private partnerships, trailing partner accommodations.	North and corn and soybean grower groups. Please send any other best practice ideas to Jeff and Chris.
10.0	Other Business/Announcements: Jeff mentioned that his office at MSU has been moved. Marshall Martin indicated a possible move of NRSP3 to Purdue.	For information only.
11.0	NCRA Officer Changing of the Guard	Joe Colletti presented Archie Clutter with a recognition plaque for serving as NCRA chair and thanked him for his service. The group welcomed Joe Colletti as the FY2018 NCRA chair.
Meeting Adjourned at 9:53 ET.		

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Item 4.1: NCRA Office Budget
Presenters: Archie Clutter, Jeff Jacobsen, Chris Hamilton
Action Requested: For information only

NCRA Office Budget (as of 9/11/2017)

NCRA FY2018/19 Working Budget

INCOME				
	FY2017	FY2018		FY2019
Description	**Final**	**Budget**	**YTD*** **	**Budget**
State Assessments	425,763	425,763	425,761	425,763
Account Carryover (MSU)		43,495	43,495	43,707
TOTAL INCOME	**425,763**	**469,258**	**469,256**	**469,470**
EXPENSE				
	FY2017	FY2018		FY2019
Description	**Final**	**Budget**	**YTD*** **	**Budget**
NCRA				
Regional Initiatives	-	-	-	
NCRA Subtotal	-	-	-	
MICHIGAN STATE				
Executive Director Salary	196,000	205,000	205,000	205,000
Fringe*	51,156	53,505	53,505	53,505
Office Operating	3,885	3,000	31	tbd
Travel	31,781	30,000	4,765	tbd
Training	60	-	-	-
MSU Administrative/Service Fees****	5,603	5,830	5,830	5,170
MSU Subtotal	**288,485**	**297,335**	**269,131**	**263,675**
U of WISCONSIN				
Assistant Director Salary	72,255	79,480	79,480	79,480
Fringe**	30,675	34,462	34,462	34,462
Office Operating	1,258	3,000	388	tbd
Travel	9,852	8,000	1,115	tbd
Training	380	500	195	
Meeting Support	1,756	2,000	2,000	
UW Subtotal	**116,176**	**127,442**	**117,641**	**113,942**
TOTAL EXPENSE	**404,661**	**424,778**	**386,772**	**377,617**
BALANCE	**21,102**	**44,480**	**82,484**	**91,853**

*MSU FY18 fringe: 25.8%; FY17 26.1%, 25.75% estimated; FY16 25.45%.
**UW FY18 est. fringe: 43% (?) + monthly service charge of $23.84; FY17 fringe 42%, 37.5% estimated.
***Full FY expenditures for salary + fringe + MSU admin fees, YTD actuals, for other categories.
****Still awaiting final MSU FY2017 close-out admin fees

NCRA Accounts at MSU and UW

Account at MSU	FY17	FY18	FY19
MSU Starting Balance	17,371	43,495	43,707
MSU Income	425,763	425,763	425,763
MSU Budgeted Expenses	288,485	297,335	263,675
MSU Budgeted Expenses + UW invoice	405,072	425,551	391,891
Estimated MSU Ending Balance/Carryover	38,062	43,707	77,580
Actual MSU Ending Balance/Carryover***	43,495	**tbd**	

Account at UW	FY17	FY18	FY19
UW Starting Balance*	(1,184)	(773)	-
UW Income	-	-	-
UW Expenses	116,176	127,442	113,942
Actual UW Ending Balance/Carryover**	-	-	
UW Operating Reserve (3 mo)	*25,000*	*25,000*	*25,000*
*Estimated UW Invoice to MSU***	*115,602*	*128,215*	
Actual UW Invoice to MSU	*116,587*	*tbd*	

*Unexpected UW fringe rate change from 37.5% to 42%.

**UW will invoice MSU mid-quarter for actual expenses ($32,155 in August 2017; $32,155 in November 2017; $32,155 February 2017, and ??? In May 2018 to cover final 2018 expenses).

***Includes budgeted FY17 MSU admin fees, which haven't been charged yet.

FY2018 Assessments:

Illinois	Y
Indiana	Y
Iowa	Y
Kansas	Y
Michigan	Y
Minnesota	Y
Missouri	N
Nebraska	Y
North Dakota	Y
Ohio	Y
South Dakota	Y
Wisconsin	Y

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Item 5.0: NCRA F&A Rate Discussion
Presenters: Archie Clutter, Deb Hamernik
Action Requested: For information and discussion

Please refer to meeting handouts (also added at the end of this document) or visit:

https://drive.google.com/file/d/0B_jlSvOMDS36VzBpbkt6NHFxV1E/view?usp=sharing

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Item 6.0: Campus Faculty Start-up Challenges and Opportunities
Group Discussion, for information only.

IANR REQUEST FOR APPROVAL TO MAKE OFFER - STARTUP COMMITMENT FORM
(Academic/Administrative)
Institute of Agriculture and Natural Resources - University of Nebraska-Lincoln

Position Title:		Primary Dept/Unit:		2nd Unit:	
Candidate Name:		Salary:		Approved Range:	approval required for > range
Position #:		CY/AY:		Start Date:	
Term End Date: (non-tenure)					
Requisition #:		Rank:		Location:	
Apportionment:	E%:	R%:	T%:	Other%:	Tenure Home:
Budget %'s:					

Funding Source	FY1	FY2	FY3	Addit'l FY	Signature/Date	Estimated cost:
Dept/Unit						$ -
ARD						$ -
CASNR						$ -
Extension						$ -
VC for Research						$ -
Other						$ -
Other						$ -
TOTAL FUNDING SOURCES - Needs to Match "TOTAL INVESTMENT ITEMS" Below						$ -

List totals for items negotiated as part of this start-up package (use only rows that apply - add rows if needed):

Investment Item	FY1	FY2	FY3	Addit'l FY	Notes	Estimated cost:
Equipment						$ -
Personnel						$ -
Supplies, disposables						$ -
Core Facilites						$ -
Travel						$ -
IT						$ -
Summer Salary						$ -
GRA Support (indicate if support will come from State						$ -
Other						$ -
TOTAL INVESTMENT ITEMS - Needs to Match "TOTAL FUNDING SOURCES" Above						$ -

Equipment available to support this package:

Investment Item	Location	Item Manager	Details

NOTE: For tenure-line faculty, relocation expenses are reimbursed seperately and should not be included on this form. Please refer to the policy dated 9.24.2014.

Please send completed form to Becky Carter, becky.carter@unl.edu

Revised 9/2016

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Item 7.0: NAS Science Breakthroughs 2030 Update
Presenters: Jeff Jacobsen, Chris Hamilton
Action requested: For information only

(http://nas-sites.org/dels/studies/agricultural-science-breakthroughs/)

Five submissions submitted by S&T on behalf of ESCOP:

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Adapting and Mitigating the Impacts of Climate Change on Food, Feed, Fiber, and Fuel Systems in the United States

The text below was adapted from Grand Challenge 2, from the Association of Public and Land-grant Universities, Experiment Station Committee on Organization and Policy—Science and Technology Committee, "A Science Roadmap for Food and Agriculture," November 2010.

Major Challenge: The impacts of climate change on agriculture, food systems, and food security will have global socioeconomic, environmental, and human health implications. Scientists, especially those in agriculture and environmental arenas, need to be better prepared to take advantage of opportunities and minimize the risks and inequities of climate change impacts. Below, we list our current capacity and gaps, then suggest specific research needs and priorities necessary to ensure sustainable and secure agriculture systems for the future.

Current Capacity and Science Gaps:

- Uncertainties in climate model projections regarding precipitation, frequency of extreme events, and temporal and spatial climate variability.
- The need for better decision tools for determining the optimum timing and magnitude of investments for strategic adaptation to climate change.
- Improved tools for monitoring, accounting for, and applying value to greenhouse gas emissions reductions and soil carbon sequestration.

Research Needs and Priorities:

- Improve and evaluate existing models for their use in climate change and weather variability studies; for addressing carbon, nitrogen, and water changes in response to climate; and for assessing resource needs and efficiencies:
    - Develop and test new crop models beyond those currently available, including those for perennial fruit crops, vegetables, and other "specialty" food crops; wood products; and biofuel crops.

  - Develop and test new livestock models focused on heat stress and greenhouse gas mitigation in livestock facilities.

  - Develop and test new insect, pathogen, and weed models to project future range shifts, population dynamics, and epidemiology.

- Integration of models into adaptive management at farm and food system scales. Research should identify where investments in adaptive capacity will be most beneficial for both crop and livestock systems and for systems beyond the farm gate:

  - Develop adaptive strategies for livestock, including managing weather extremes; taking into account costs of and constraints to renovation or relocation of facilities; information on breeds more tolerant to new stresses; managing waste; and biofuel production.

  - Develop new, more tolerant crop varieties through conventional breeding, molecular-assisted breeding, and genetic engineering.

  - Develop new, rapid breeding technologies that can be used to quickly respond to emergent vulnerabilities as microclimates become suitable for previously nonthreatening diseases and pests.

  - Develop improved water management systems and irrigation scheduling technology.

  - Develop adaptive strategies for weed and pest control, such as improving regional monitoring and IPM communication regarding weed and pest range shifts and migratory arrivals; enhancing real-time weather-based systems for weed and pest control; developing nonchemical options for new pests; and developing rapid- response action plans to control invasive species.

  - Develop adaptive strategies for storage and transport systems, such as redesign and relocation of infrastructure, and assess impacts of rises in sea levels on port facilities.

  - Develop adaptive strategies for food processing and marketing systems.

- Further research is needed to establish the science base needed to implement greenhouse gas mitigation policies:

  - Systems and best management practices to reduce greenhouse gas emissions for crops, animals and animal waste systems, and food processing and other food system activities beyond the farm gate.

  - Systems and practices to offset emissions by sequestering carbon in trees and soil and methods to quantify offsets, taking into account measurement uncertainty.

- Greenhouse gas and carbon accounting tools for farmers and food system users.
- Policy mechanism design for greenhouse gas mitigation.

For more detailed information on this challenge, please refer to the full document online here: A Science Roadmap for Food and Agriculture

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Enhancing Environmental Stewardship through the Development of Sustainable Management Practices

The text below was adapted from Grand Challenge 6, from the Association of Public and Land-grant Universities, Experiment Station Committee on Organization and Policy—Science and Technology Committee, "A Science Roadmap for Food and Agriculture," November 2010.

Major Challenge: U.S. agricultural research has historically focused on increasing production of food, feed, and fiber. That intense focus tended to ignore the impact of agricultural production decisions on ecosystem balance. In the coming 20 years, scientific research must lead agricultural landowners and producers toward a new standard that values not only the food, fiber, ornamental plants, and fuel products of agriculture, but also the ecosystem goods and services from sustainable management of agricultural land, woodlots, and forests.

Current Capacity and Science Gaps: Forests, wetlands, riparian corridors, deserts, and prairies provide important havens for biodiversity and valuable ecosystem services, including water and air filtration, carbon sequestration, nutrient cycling, and biological control of pests. For example, climate change, invasive species, pollution (air, water, soil), urbanization, and resource consumption influence complex interactions in balancing optimization of agricultural production systems with multifunctional ecosystem services.

Research Needs and Priorities:

- Reducing inputs in agriculture, integrating life cycle analysis and improving the efficiency of resource use to improve environmental impacts and greater economic returns.
- Developing technologies to improve production efficiencies using less and conserving water.
- Improving storm water management and sediment and erosion control, as well as onsite wastewater treatment systems and wellhead protection are needed. This includes implementing technologies and practices to protect or improve water quality at a watershed level.
- Developing and implementing efficient and sustainable farming and food processing systems that rely on renewable energy systems and that decrease need for nonrenewable forms of energy. Systems that convert agricultural wastes, such as animal manure, into biomass fuels can further improve efficiency of production and reduce environmental impact.
- Assess the capacity of agricultural and other managed systems to deliver ecosystem services, including trade-offs and synergies among ecosystem services.
- Assess food animal production in relation to ecosystem services.

- Develop innovative waste management technologies.

For more detailed information on this challenge, please refer to the full document online here: A Science Roadmap for Food and Agriculture

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Ensuring a Safe, Secure, and Abundant Food Supply for the United States and the World

The text below was adapted from Grand Challenge 4, from the Association of Public and Land-grant Universities, Experiment Station Committee on Organization and Policy—Science and Technology Committee, "A Science Roadmap for Food and Agriculture," November 2010.

Major Challenge: Advances in science and technology are essential to assure a safe, secure, and abundant food supply as we face global concerns such as environmental degradation, terrorism, food safety issues, and shortages in the agricultural labor force, which challenge the sustainability of natural resources and necessitate concomitant increases in food production, nutritional quality, and distribution efficiencies.

Current Capacity and Science Gaps: Almost all global science and technology efforts are influenced by the wide gap in research capacity between developed and developing countries. Although much US federally funded agricultural research conducted at Land-grant universities is devoted to a safe, secure, and abundant food, most does not have an international focus, despite the more vulnerable populations existing abroad. The research needs and priorities listed below are applicable to both domestic and global food supply and food security research.

Research Needs and Priorities:

- Develop technologies to maximize the genomic potential of plants and animals for enhanced productivity and quality.
- Develop effective methods to prevent, detect, monitor, control, and respond to potential food safety hazards throughout production, processing, distribution, and service of food crops and animals grown under all production systems.
- Develop more effective tools to trace the origin of microbial, chemical, and physical food contaminants for applications in forensic investigation and attribution.
- Develop food systems and technologies that improve the nutritional values, diversity, and health benefits of food.
- Design strategies and tools to detect and eliminate bioterrorism agents, invasive species, pathogens (foodborne and other), and chemical and physical contaminants affecting plants, humans, and animals.
- Decrease dependence on chemicals that have harmful effects on people and the environment by optimizing effective crop, weed, insect, and pathogen management strategies.
- Identify plant compounds that prevent chronic human diseases (e.g., cancer), and develop and encourage methods to enhance or introduce these plants and compounds into the food system.

- Establish plant and animal breeding programs that balance and optimize nutritional value and complement production characteristics.
- Examine the impacts of changes in the food supply and food transportation systems relative to preservation practices, safety, and energy efficiency at local and regional scales.
- Provide the balanced, targeted scientific data needed for the development of reasonable and effective food production regulatory policies by the USDA, FDA, Environmental Protection Agency (EPA), and other federal agencies.
- Develop mechanisms for cooperative international initiatives to enhance food safety, security, and abundance globally.

For more detailed information on this challenge, please refer to the full document online here: A Science Roadmap for Food and Agriculture

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Improving Human Health, Nutrition, and Wellness of the U.S. Population

The text below was adapted from Grand Challenge 5, from the Association of Public and Land-grant Universities, Experiment Station Committee on Organization and Policy—Science and Technology Committee, "A Science Roadmap for Food and Agriculture," November 2010.

Major Challenge: Health care costs are driving the need for innovation in medicine and public health. Disease prevention can reduce human suffering and provide cost savings. Improvements in human health through promotion of a healthy diet and lifestyle choices offer cost effective and a quality path forward. Rather than singular investigations, an approach that considers the entire food system will lead to profound results.

Current Capacity and Science Gaps: A systemic approach, rather than the traditional single-discipline-focused nature of research, to food and human health dictates quality results from the entire system of production through consumption, coupled with lifestyle behaviors. Improving human nutrition and lifestyle (e.g. exercise behaviors) requires research that validates interventions yielding substantial health benefits. Technology – nanomaterials, phytochemicals, plant genetics, cultural practices influence nutritional profiles of plants.

Research Needs and Priorities:

- Assess whether organic and other sustainable production systems produce more nutritious or healthier foods.
- Comparisons of the healthfulness of food products must be made on a per-serving basis and set against an accepted standard, such as the FDA/ USDA requirement.
- Identify, characterize, and determine optimal serving size and frequency of intake for health benefits of consumption of specific foods containing bioactive constituents.
- Assess roles of longevity genes (e.g., insulin-signaling genes), regulation of gene expression by diet and exercise, mitochondrial dysfunction and attendant oxidative stress, and the efficiency of apoptosis.
- Investigate the potential of nutritional genomics (nutrigenomics) in personalized prevention or delay of the onset of disease and the maintenance and improvement of health based upon an understanding of our nutritional needs, our nutritional and health status, and our genotype.
- Assess nanocochleate-based nutrient delivery for micronutrients and antioxidants. The nanocochleate system protects micronutrients and antioxidants from degradation during manufacture and storage and helps deliver active compounds.

- Investigate the metabolic potential of gut microbes after obtaining the bulk DNA. Subject it directly to random DNA sequencing. Apply metagenomics, which focuses on studying the metabolic potential of microbes in a given environment based on the contents of the genomic DNA found in that environment. Study gut microbes in their communities.

- Expand research on selection and breeding of staple plant cultivars, as well as on cultural practices, to optimize nutrient profiles. Cutting-edge metabolomic characterization of these whole foods is an essential element of this work.

- Assessment of potential health outcomes in appropriate animal models, with subsequent long-term human studies, is another essential element. Identify health-promoting bioactive components of whole foods (including nutrients and other phytochemicals) as well as potentially harmful components, and optimize their plant levels for human health.

For more detailed information on this challenge, please refer to the full document online here: A Science Roadmap for Food and Agriculture

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Sustainability, Competitiveness, and Profitability of U.S. Food and Agricultural Systems

The text below was adapted from Grand Challenges 1 & 6, from the Association of Public and Land-grant Universities, Experiment Station Committee on Organization and Policy—Science and Technology Committee, "A Science Roadmap for Food and Agriculture," November 2010.

Major Challenge: Agricultural and food production systems are increasingly vulnerable to rising energy costs, loss of key fertilizer sources (e.g., phosphorus deposits), and climate variability. We need new cross-disciplinary, systems-based approaches for ecological management and more energy-efficient agricultural practices to meet food needs, provide sufficient economic returns to producers, and deliver multiple environmental benefits. There is also a need for research that focuses on preserving and optimizing the genetic resources of plant and animal systems to maintain long-term sustainability of food and agricultural systems.

Current Capacity and Science Gaps:

- Although we understand that agriculture consists of many interlinked physical, biological, economic, and human variables, we require better recognition of the value of holistic, systems-level solutions to food and agricultural concerns.
- We would benefit from greater collaboration with engineering programs and other disciplines that develop and use system-oriented research tools. The data and analytical tools for evaluating, comparing, and developing agricultural systems as combinations of interlinked physical, biological, and social variables have not yet been well developed.

Research Needs and Priorities:

- Improved water resource management:
    - Improve water use efficiency and productivity through development of more water-efficient crop and livestock systems.
    - Employ groundwater management and protection programs that include real-time data networks and decision support systems to optimize conjunctive use of surface water and groundwater.
    - Develop more effective strategies to capture and store water during increasingly intense precipitation events.
    - Develop cropping systems and irrigation strategies that use impaired and recycled water, while protecting soil health and quality.
    - Explore marginal water treatment technologies and methods to reduce energy requirements for treatment.

    - Investigate use of brackish water to supplement freshwater resources; consider new approaches to reduce costs for desalination; and develop salt-tolerant crops.
    - Develop new approaches to reduce nutrients, pathogens, pesticides, salt, and emerging contaminants in agricultural runoff and sediments; develop methods for onsite treatment of tile drainage water; and explore new methods to reduce water quality impacts from animal waste.
- Improved plant production and better integrated biosystems:
    - Research on responsiveness of crops to fertilizer (organic and nonorganic); herbicide and insecticide resistance; drought and frost tolerance; improved hardiness in the face of handling, processing, and shipment; and other important aspects of production, such as mechanical harvesting in the case of certain tree fruits.
    - Bioengineering research to develop composters/digesters and biofuels-based energy generators that allow farmers to sell into the local electricity grid and provide them with renewable energy sources.
    - Continue to use and further develop integrated pest management (IPM) cropping techniques.
- Improved animal production practices, technologies, and products that incorporate sustainability of their support system (e.g., feed supplies) and consideration of environmental variability:
    - Maximize animal genome capacities and develop new animal breeds and stocks that optimize their relationship with the environment.
    - Develop technologies for animal health, well-being, and welfare in all production systems to enhance nutrition, efficiency, quality, and productivity.
    - Enhance energy and nutrition efficiencies in animal production systems.
    - Develop technologies for sustainable animal feeding and waste utilization and management to reduce the impact of agricultural production on the environment.
- Improve agricultural productivity by sustainable means, considering climate, energy, water, and land use challenges:
    - Develop management strategies and tools that improve agricultural pest, weed, and disease control; soil building; and green manures and crop rotation; improve integrated animal-plant and other management strategies for sustainable production.

- Examine the multifunctional costs and benefits of certified organic agriculture, including environmental conservation, production, health and nutrition, profitability, and energy efficiency; investigate ways to reduce reliance on cultivation in organic farming for weed control, using systems-based approaches.
- Develop environmentally friendly crop and livestock production systems that better utilize sustainable feeding and IPM strategies.
- Integrate animal and plant systems for efficient "closed-loop" nutrient cycling, with energy generation as an additional opportunity for managing nutrient cycles without waste or leakage.
- Develop methods to protect the environment both on and beyond the farm from any negative impacts of agriculture through optimum use of cropping systems, including agroforestry, phytoremediation, site-specific management, multi-crop diversified farms, and perennial crops.

For more detailed information on this challenge, please refer to the full document online here: A Science Roadmap for Food and Agriculture

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Item 8.0: USDA Capacity Fund Equipment Purchase Process Discussion
Presenter: Doug Buhler
Action Requested: For information and discussion

MSU's Policy:

A link to the policies pertaining to purchase of equipment on federal capacity funds.
https://nifa.usda.gov/program/capacity-grantee-resources

No prior approval needed for complete equipment purchases below $150K. Faculty signed certification should be attached to requisition:

- The Principal Investigator (PI) must provide the following certification. "I certify that this equipment is necessary and will be used for the project charged or in relative proportion to the projects to which the costs will be charged and that similar equipment is not available for use."

- Must be attached to Requisition, Purchase Order, or Asset Fabrication document.

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