North Central Regional Association of State Agricultural Experiment Station Directors

205th Meeting
Marriott Courtyard, Isla Verde
San Juan, PR
April 4-7, 2016

Final Agenda and Minutes

Date/Time	Agenda Item	Topic	Presenter
Monday, April 4			
3:00-5:00 pm		Multistate Research Committee (MRC) Meeting (for MRC members only, although others are welcome to attend if interested). • NC New/Renewal Projects • Midterm Reviews • NRSP Report • Selection of NC Nominee for ESS Excellence in Multistate Research Award	Joe Colletti, 2016 MRC Chair
6:00 pm	*Group Reception and Dinner*		
Tuesday, April 5			
7:00 am	*Breakfast*		
8:00 am	1.0	Call to Order and Introductions	Deb Hamernik, 2016 NCRA Chair
	2.0	Approval of September 2015 Minutes: (http://ncra.info/docs/Historical/Minutes/Sept2015.pdf)	
	3.0	Adoption of the Agenda	
	4.0	Interim Actions of the Chair 4.1 NCRA Nomination for ESS Leadership Award 4.2 NCRA FY2017 Office Budget	Deb Hamernik
8:15 am	5.0	NCRA Office Update 5.1 Activities and Accomplishments 5.2 NIMSS Update and Walk-Through	Jeff Jacobsen, Chris Hamilton
8:50 am	6.0	FFAR Board Update	Doug Buhler
9:05 am	7.0	Riley Foundation's Unified Message and NCRA Involvement	Joe Colletti
9:35 am	8.0	Cornerstone Update (Call-in)	Hunt Shipman
9:50 am	*Break*		
10:05 am	9.0	Ag Research Stations: Current Challenges and Solutions	Rick Lindroth, Neal Merchen, Archie Clutter, All
10:40 am	10.0	Plant Imaging and Phenotyping Facilities	Hector Santiago, Karen Plaut
11:00 am	11.0	NCRCRD Update	Mark Skidmore, NCRCRD Director

11:15 am	12.0	Diversity and Inclusion on Land Grant Campuses: Issues and Opportunities	Marc Linit, All
12:15 pm	*Lunch*		
1:00 pm	13.0	Fee for Service Models (NERA Cost-Recovery Document link; also included as a written brief at the end of agenda)	Rick Lindroth
1:30 pm		State Highlights	All
2:30 pm	*Break*		
2:45 pm	15.0	NIFA Update	Parag Chitnis
3:10 pm	16.0	ARS Update	Robert Matteri
3:30 pm	17.0	MRC Report and Recommendations 17.1 New/Renewal Proposals 17.2 Midterm Reviews 17.3 NC7 FY2017 Budget & Business Plan (hold for August) 17.4 NC Multistate Research Award Nominee 17.5 NRSP Report	Joe Colletti Doug Buhler
4:00 pm	18.0	Nominations Committee Report	Ernie Minton, Nominations Committee
4:10 pm	19.0	Other business/follow-up as needed • NCRA Spring Meeting 2017 location ideas • LEAD21 Update • ESCOP Standing Committees (written reports) Communications & Marketing Diversity in Leadership Task Force Budget & Legislative Science & Technology	All David Benfield Daniel Scholl Karen/Jeff/Chris Ernie/Karen Joe/Deb
4:20 pm	20.0	Future Meetings: http://ncra.info/Organization_UpcomingMeetings.php • Joint COPs Session, July 18-20, 2016, Sheraton Gunter Hotel, 205 East Houston Street, San Antonio, TX • NC Joint CARET/AHS Summer Session, July 31-August 2, 2016, The Embassy Suites, Chicago, IL • Fall ESS/AES/ARD Meeting and Workshop, September 19-23, 2016, Jackson Lake Lodge, Jackson Hole, WY • APLU Annual Meeting, November 13-15, 2016, Austin, TX	Deb Hamernik, Neal Merchen, All
4:40 pm	21.0	Executive Session	NCRA Directors Only
5:00 pm	*NCRA Business Meeting Adjourns, dinner on your own.*		

Wednesday, April 6:

- *All-day field tours; depart hotel at 6:45 am*
- *See schedule below*

Thursday, April 7

- *Breakfast available at 7 am. Depart or enjoy PR on your own!*

NCRA April 5 Business Meeting Minutes

Agenda Item	Topic	Notes/Action
2.0	Approval of September 2015 NCRA Minutes	Approved
3.0	Approval of the agenda	Approved
4.0	Interim Actions of the Chair 4.1 NCRA Nomination for ESS Leadership Award 4.2 NCRA FY2017 Office Budget	 Steve Slack's nomination was approved as our NC winner. Budget will be voted upon during executive session. **Action: NCRA FY2017 office budget approved.**
5.0	NCRA Office Update 5.1 Activities and Accomplishments 5.2 NIMSS Update and Walk-Through	**Questions and comments on any reported activity and accomplishments are welcomed any time by Jeff and Chris.** Jeff emphasized the protein highway activities, see handouts at the end of the meeting notes/packet. There has been discussion about creating a multistate project, but that is unlikely at this time due to the breath of the project. Status is in flux at this time due to Canadian Consul change in MN. There has been a request for a new multistate viticulture and enology project. Jeff will find out more information on this and share with the NCRA. NC AR (Antibiotic Resistance) roundtable: An opportunity to get NC academia together to discuss current status and begin planning university pilot projects and ideas for white paper topics. **Action item: Please let Jeff know for certain how many will be attending the AR roundtable from your state. Hotel deadline is April 18.** **Action Item: Please review the NC admin boot-camp document Chris has sent out and provide Jeff your feedback as soon as possible.** Chris showed and discussed www.nc-climate.org, our NCRA and NCCEA climate page, used to share AES and EXT institution main climate contacts, independent of the USDA climate hubs. **Action: Please share updated contact information, stories, pictures, etc. with Chris to add to this site.** Chris also discussed NIMSS and gave a brief walk-though of the new system.

		Action: Please continue to share with Chris any requests of updates/edits to the new system.
6.0	FFAR Board Update	Last meeting was in March. Non-federal match is required for funded initiatives. Sally Rockey is the current Executive Director. Key talking points of board meeting: • Unsolicited proposals will no longer be accepted, but they will listen to idea. • Focal areas: Soil health, diet and health/intersection of food and agriculture, pollinator health. • FFAR is trying to address the gaps within the USDA challenges so that USDA programs are not duplicated but the big issues are still addressed. For instance, co-sponsor convening-type events such as the annual Water for Food conference in Nebraska. **Action: Doug will send meeting flyer to Chris to share with the group:** http://waterforfood.nebraska.edu/2016-water-for-food-global-conference **(done, sent via email)** • FFAR is in the process of putting together staff and beginning to review projects. • Actual projects on the ground: New innovator in Ag award; rapid response program; soil health consortium; prize in food and agriculture research for early/mid investigators to compliment World Food Prize, will likely be a $100,000 award with a research focus; creation of advisory councils. • Creating and finding matching funds is an on-going challenge for FFAR.
7.0	Riley Foundation's Unified Message and NCRA Involvement	Joe Colletti's presentation
8.0	Cornerstone Update (Call-in)	We called Hunt Shipman, who gave appropriations process update. See also http://www.land-grant.org/documents/02.08.2016PBR.pdf FY2017 President's Budget includes increases in 1890s, mainly for Central State, as well as $25M increase in AFRI. BAA embraced the $700M Farm Bill authorized funding target for AFRI. The House started work on bills last week before break. They may work on agriculture bills when they return. The Senate may move its bills by the end of the month. Given the number of bills and the election year, a CR is likely this fall.
9.0	Ag Research Stations: Current Challenges and Solutions	Neal Merchen (IL): projected 7.5% state budget reduction, $3.7M in College of Ag. Closed many low ROI facilities. Especially difficult to cut employees. Redirect resources to strengthen, maintain, and grow programs. Lessons learned in communication, especially when employees were notified, that being available, transparent, and consistent

		is key. Emphasize to stakeholders that research sites don't do research, it's the employees that do it. Rick Lindroth (WI): WI AES is now down 17% in FTE for 12 research stations, with budget cut by 30%. Engaged in a long process of strategic planning before making decisions to cut programs. Again, communication and timing at all levels is critical. WI also reevaluated charge-back system (discussion later in the agenda). Critical to focus priorities and be strategic with available investments. New legislation now allows the sale of ag lands to purchase other ag lands in the state. Question: How do we illustrate to voters that colleges of agriculture are in dire financial straits and are part of public universities being cut? Answer: Involve commodity groups, keep talking and engaging, lots of communication, and be sure to recognize donors. Provide a mechanism for commodity boards to direct resources to their areas of interest. Encourage boards to also speak within their communities for further donations. Archie Clutter (UNL): UNL is pushing for deliberate optimization whenever possible, even when in relatively good budget times. Encourage strong integration between research and Extension, with transdisciplinary centers. Optimization of land resources with UNL programs across the state is on-going and faculty are kept aware of these goals and engaged. Land transfers are also being considered to create research endowments.
10.0	Plant Imaging and Phenotyping Facilities	Hector Santiago and Karen Plaut discussed new plant phenotyping facilities and programs underway at UNL and Purdue. Hector Santiago's Plant Phenotyping Presentation Karen Plaut (Purdue): Handouts and http://ag.purdue.edu/plantsciences Discussed research and education plant sciences pipeline and the Indiana Corn and Soybean Innovation Center, including their new controlled environment phenotyping and field phenotyping programs. Aviation technologists, geomatics people are assisting with the unmanned aerial systems and measurements in these field phenotyping facilities. How to handle these huge datasets will be challenging.
11.0	NCRCRD Update	Mark Skidmore's presentation Mark also requested feedback from NCRA directors on NCRCRD programs and how best to reach out to inventors for their Inventor-Investor Matching Program. Directors suggested that he contact university IP offices as a first step.

12.0	Diversity and Inclusion on Land Grant Campuses: Issues and Opportunities	Diversity enhancement discussion led by Marc Linit, MO. Media-worthy events are what are reported, but it's often the subtle racial inequality culture that creates the problem, such as when students feel like the "other", as in different from general campus population and possibly marginalized. Early communication across all levels seems to be key to mitigate serious issue. Be aware of the media mentality; negative issues are more often reported over positive efforts. Further discussion ensued regarding improving diversity of students, faculty, and staff. To improve student recruitment: Contact students, help them apply, find resources and support systems.
13.0	Fee for Service Models (NERA Cost-Recovery Document link; also included as a written brief at the end of agenda)	This topic was skipped; we may perhaps bring it up again, as needed, during the summer NCRA meeting in August.
14.0	State Highlights	Brief state highlights were presented for each state from their directors.
15.0	NIFA Update	Please contact Parag Chitnis for a copy of his slides and update. He has asked that we not post them publicly here at this time. Parag discussed changes in NIFA leadership: Institute of Food Safety and Nutrition, Dr. Denise Eblen from FSIS Center for International Programs, Dr. Otto Gonzalez from Foreign Ag Service, Jeanette Thurston Several NPL and Division Director positions Recent hires: Jeff Steiner, Steve Thomson NIFA is partnering with Battelle, through new start-up group TEConomy Partners, to conduct a qualitative and quantitative survey of Capacity programs. NIFA has been in communication with the regional EDs, who have provided existing resources, ideas and reports on the value of Capacity programs.
16.0	ARS Update	Not in brief: Maureen Whalen (maureen.whalen@ars.usda.gov) is the new crop production and protection deputy administrator with ARS.
17.0	MRC Report and Recommendations (Items 17.1 to 17.4)	**Action: All MRC project renewal recommendations were approved.** **Action: NCERA3 approved as our NC nominee to the national Excellence in Multistate Research Award.** **Action: The NCRA will provide a certificate or appreciation/recognition to all participants for the regional winner of the Excellence in Multistate Research Award. A potential monetary award will be discussed next year.**

17.5	NRSP Report	MRC discussed NRSP_temp11 during the April 4, 2016 meeting. Concerns were expressed over the amount of funds going to only one state and whether it is too early to decide on such a product. It's unclear at this time if this is the way AES wants to move forward in the area of ag data management and if this presented system is the most appropriate. Perhaps at this time, other options and recommendations should be assessed more thoroughly. If the NCRA is interested, we can schedule a webinar with Jim Jones, the NRSP_temp11 lead. **Action Item: Jeff and Doug will continue to discuss before Doug goes to the NRSP-RC in early June with our regional recommendations. Please send your comments on to Doug and Jeff, as well.** **Action Item: Jeff will reach out to the other EDs to discuss the project further.**
18.0	Nominations Committee Report	**Action Item: New AA to NCCC307 needed. Please volunteer** **Action Item: We need two new MRC members for FY2017, since Rick Lindroth is stepping down from the WI AES this fall. Daniel Scholl (SD) and George Smith (MI) volunteered. Neal Merchen volunteered to move up to chair MRC for FY2017. Daniel Scholl will serve FY2017 to 2019 and George Smith will serve FY2017 to 2020. All of these positions were approved by the NCRA.** **Action Item: Ernie Minton approved to be the NC nominee for ballot consideration for the ESS slot on the PBD.**
19.0	2017 NCRA Spring Meeting location selection	**Action Item: San Antonio, TX was approved as a first choice location for 2017. Chris will look into arrangements and go from there.**
20.0	Future Meetings	IL will post registration information within the next few weeks. Rooms are booked for Sunday and Monday nights only, due to costs. Please be aware that your registration will include the hotel for both nights.

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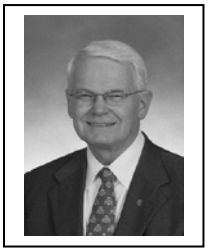

Nomination of Dr. Steven A. Slack
Experiment Station Section (ESS) Award for
Excellence in Leadership - North Central Region

Education and Experience

Steven A. (Steve) Slack received his B.S. and M.S. degrees from the University of Arkansas - Fayetteville and his Ph.D. degree from the University of California - Davis. In 1975, he joined the faculty of the Plant Pathology Department at the University of Wisconsin - Madison and in 1988 was named the Henry and Mildred Uihlein Professor of Plant Pathology at Cornell University, where he also served as department chair from 1995 - 1999. Steve subsequently joined The Ohio State University as Associate Vice President for Agricultural Administration and Director of the Ohio Agricultural Research and Development Center (OARDC). In this role, he provided direct oversight of the OARDC campus located at Wooster and 10 statewide outlying research stations. In addition, he was chief research administrator of the College of Food, Agricultural and Environmental Sciences and several affiliated programs in the Colleges of Arts and Sciences, Education and Human Ecology, and Veterinary Medicine on both the Columbus and Wooster campuses. During his 16-year tenure as V.P. and Director, Steve provided visionary leadership to one of the country's largest Ag-Bioscience complexes with over 200 faculty, 500 support personnel and revenues exceeding $80M per year. He retired from this position in December, 2015.

Administrative Accomplishments

Steve was a model of research excellence during his own academic career and encouraged his faculty to embrace a full gamut of scientific endeavor ranging from fundamental science, to applied problem solving, to technology development, to commercialization of products. Under his leadership, extramural funding in CFAES/OARDC more than tripled; an internal grants program (SEEDS) was established to enhance competitiveness for extramural support with a long-term return-on-investment of over $5.80 for every $1.00 awarded; the BioHio Research Park was founded as a public-private OSU affiliate; and infrastructure improvements were made that included a state-of-the-art nutrition and feed formulation facility ($6M), a Plant and Animal Agrosecurity Research (PAAR) bio-containment facility ($22M), a new LEED silver agricultural engineering building ($14M), and over $16M in additional campus enhancements. Steve led a strategic planning and re-envisioning process near the mid-point of his administration that resulted in the recognition of three signature areas of emphasis in a) Food Security, Production, and Human Health, b) Environmental Quality and Sustainability, and c) Advanced Bioenergy and Biobased Products that have served to guide the CFAES/OARDC research enterprise for much of the past decade.

Honors

Steve is a fellow and past President of the American Phytopathological Society, an honorary life member and past President of the Potato Association of America, and a fellow of the American Association for the Advancement of Science (AAAS). Other recognitions include a USDA Group Honor Award for Excellence on a non-pesticidal control strategy for the potato golden nematode, an Outstanding Alumnus award from the Dale Bumpers College of Agricultural, Food and Life Sciences at the University of Arkansas, a meritorious service award for research by the National Potato Council, and an Outstanding Achievement Award by the Ohio Soybean Council. In 2015, Steve was inducted into the National Institute of Food and Agriculture (NIFA) Hall of Fame.

Service

Steve's many achievements and honors are consistent with a record of institutional and professional service that is long, diverse, and distinguished. As a few examples, he has been a member of the Consultative Group on International Agricultural Research (CGIAR) Nomination Committee for Science Council 2003-2007, the International Sorghum and Millet Collaborative Research Support Program (INTSORMIL CRSP) Board of Directors, the Northeast Sun Grant Advisory Board, and is a past Chair of the National Agricultural Biotechnology Council. For the purpose of this nomination, however, it is appropriate to focus on those leadership activities that have most clearly advanced the cause and performance of the North Central Regional Association (NCRA) of Experiment Station Directors, the Experiment Station Section (ESS) and its executive body, the Experiment Station Committee on Organization and Policy (ESCOP), and the national Land-Grant System, in general.

From 2000 – 2007, Steve was administrative advisor at various times to no less than nine NC projects, committees and activities, and in 2003-04, he was Chair of the North Central Regional Association. He was a consistent attendee at regional meetings and was principal organizer of the NCRA meeting related to specialty crops. He played a primary role in coining the Ag-Biosciences brand that is now widely used throughout the region.

Steve was also active in ESCOP, especially through its Board on Agriculture Assembly (BAA). He was a member of the CREATE 21 Executive Committee in 2006-07 and during the period of 2010 – 2012 was Chair of the ESCOP Budget and Legislative Committee and served on the ESCOP Science Roadmap and Chair Advisory Committees. During the same timeframe, he was elected to the BAA Policy Board and was its representative to the Committee on Legislation and Policy (Farm Bill Committee). He was also ESCOP representative to the BAA Budget and Advocacy Committee. He signed an agreement as Chair of ESCOP (2013-14) with the USDA Regional Climate Hubs for risk adaptation and mitigation of climate change. Even from this somewhat abbreviated summary of accomplishments and service, it is apparent that Steve has personified excellence in "enhancing the cause and performance of the NCRA and ESS in achieving their missions and the Land-Grant ideal." It is with great pleasure that we nominate **Steven A. Slack** for an ESS Award for Excellence in Leadership.

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Item 4.2: NCRA Office Budget

NCRA Budget

INCOME

	FY2015	FY2016		FY2017**
Description	**Final**	**Budget**	**YTD#**	**Budget**
State Assessments	370,763	370,763	370,763	425,763
Account Carryover (MSU & UW)	171,488	23,063	23,063	-31,875
TOTAL INCOME	**542,251**	**393,826**	**393,826**	**393,888**

EXPENSE

	FY2015	FY2016		FY2017
Description	**Final**	**Budget**	**YTD#**	**Budget**
NCRA				
Regional Initiatives	-	12,000	-	-
NCRA Subtotal	**-**	**12,000**	**-**	**-**
MICHIGAN STATE				
Executive Director Salary*	246,667	190,000	190,000	190,000
Fringe***	62,239	49,590	49,590	47,690
Office Operating	18,190	5,000	933	3,000
Travel	30,756	35,000	11,405	30,000
Training	-	19,000	8,550	-
MSU Administrative/Service Fees	6,368	5,972	4,910	5,414
MSU Subtotal	**364,220**	**304,562**	**265,388**	**276,104**
U of WISCONSIN				
Assistant Director Salary	61,141	67,255	67,255	67,255
Fringe****	21,399	24,884	24,884	25,221
Office Operating	4,245	5,000	2,201	3,000
Travel	13,221	10,000	5,393	8,000
Training	1,794	-	150	-
Meeting Support	2,000	2,000	-	2,000
UW Subtotal	**103,800**	**109,139**	**99,883**	**105,476**
TOTAL EXPENSE	**468,020**	**425,701**	**365,272**	**381,579**
BALANCE	**74,231**	**(31,875)**	**28,554**	**12,308**

*ED salary and fringe for 16 months (FY15 only).

**$55,000 reflects difference between MSU Budgeted Expenses, UW Invoice, and historical $370,763 assessment (FY10).

***MSU FY17 fringe 25.1% estimated; FY16 fringe: 25.45% actual, 26.1% estimated; (24% FY15).

****UW FY17 fringe 37.5% estimated; (FY16 37%).

#Full FY expenditures for salary + fringe, as of Feb 2016 actuals for other categories.

NCRA Accounts at MSU and UW

Account at MSU	FY15	FY16	FY17
MSU Starting Balance	-	6,543	(31,875)
MSU Income*	370,763	370,763	425,763
MSU Budgeted Expenses	364,220	316,562	276,104
MSU Budgeted Expenses + UW invoice	364,220	409,181	381,579
Estimated MSU Ending Balance/Carryover	6,543	(31,875)	12,308
Actual MSU Ending Balance/Carryover	6,543	tbd	tbd

Account at UW	FY15	FY16	FY17
UW Starting Balance**	171,488	16,520	-
UW Income	-	-	-
UW Expenses	103,800	109,139	105,476
UW Ending Balance/Carryover***	41,520	-	-
UW Operating Reserve (3 mo)	*25,000*	*25,000*	*25,000*
*Estimated UW Invoice to MSU****		*92,619*	*105,476*

*$55,000 increase in FY17 reflects difference between MSU Budgeted Expenses, UW Invoice, and historical $370,763 assessment (FY10).

**FY15 as rough estimate with future years being negligible due to established Reserve

***Verified actual FY15 ending balance.

****UW will invoice MSU quarterly for actual expenses ($25,000 on 11/23/15; $40,000 on 3/1/2016 and remaining actual on 6/1/2016).

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States' Shares of FY2017 Assessment

State	60% State Equal Share Assessments	40% Proportional to State's Share of MRF*		HISTORICAL FY17 Assessment	60% State Equal Share Assessments	40% Proportional to State's Share of MRF*		PROPOSED FY17 Assessment
Illinois	$18,538	9.86%	$14,623	**$33,161**	$21,288	9.86%	$16,792	**$38,080**
Indiana	$18,538	8.31%	$12,324	**$30,862**	$21,288	8.31%	$14,152	**$35,440**
Iowa	$18,538	10.55%	$15,646	**$34,184**	$21,288	10.55%	$17,967	**$39,255**
Kansas	$18,538	7.64%	$11,330	**$29,869**	$21,288	7.64%	$13,011	**$34,299**
Michigan	$18,538	8.75%	$12,977	**$31,515**	$21,288	8.75%	$14,902	**$36,190**
Minnesota	$18,538	8.72%	$12,932	**$31,470**	$21,288	8.72%	$14,851	**$36,139**
Missouri	$18,538	7.79%	$11,553	**$30,091**	$21,288	7.79%	$13,267	**$34,555**
Nebraska	$18,538	8.84%	$13,110	**$31,648**	$21,288	8.84%	$15,055	**$36,343**
North Dakota	$18,538	5.87%	$8,706	**$27,244**	$21,288	5.87%	$9,997	**$31,285**
Ohio	$18,538	9.45%	$14,015	**$32,553**	$21,288	9.45%	$16,094	**$37,382**
South Dakota	$18,538	5.92%	$8,780	**$27,318**	$21,288	5.92%	$10,082	**$31,370**
Wisconsin	$18,538	8.30%	$12,309	**$30,847**	$21,288	8.30%	$14,135	**$35,423**
TOTAL	**$222,458**	**100.00%**	**$148,305**	**$370,763**	**$255,458**	**100.00%**	**$170,305**	**$425,763**

*Proportion of State share of MRF based upon rolling 3-year average (FFY13-15) as provided by NIFA. NRSP and NC off-the-top allocations (IL, IA, MI, NE, WI) are not included.

**$55,000 reflects difference between MSU Budgeted Expenses, UW Invoice, and historical $370,763 assessment (FY10).

Item 5.1: NCRA Office Activities and Accomplishments

2015-2016 Summary of Activities
Jeff Jacobsen, NCRA Executive Director

1. REGIONAL ACTIVITIES

NCRA

- Participate in the monthly Executive Committee calls. Frequent calls and emails with AD. Supported the AD with the long-term audit of the UW NCRA Account and resolved to a verified actual FY15 ending balance. Monthly reports by the MSU financial staff enable the AD and ED to regularly reconcile the budget across the NCRA accounts. We developed the NCRA FY2017 budget which was vetted through the Executive Committee.
- Explore opportunities and participate with the US/Canadian Protein Highway scoping and branding effort as an innovation corridor. This effort is led by the Consulate General of Canada and an initial report is finalized (spring meeting attachment). Five NC states (IA, ND, NE, MN, SD) plus Montana and three Provinces are involved.
- Integrated elements of the NCRA Plan in regular meetings and future activities.
- Served as search committee member for the Director of the North Central Regional Center for Rural Development (NCRCRD). Connected the former director and staff with the other regional associations to enable involvement with their AFRI grant.
- Participated with the MRC, NCRA multistate research award, NCRA Leadership award reviews and selection. Provided feedback through the NCRA Chair to unsuccessful nominations. I anticipate working with a state-level communications expert to refine the NC multistate research award nomination to be more competitive nationally.
- Served on the Sightlines Infrastructure steering committee. Reviewed and edited webinar materials, requests for information and final report.
- NRSP1 as NCRA representative. Served as background support with the NIMSS redesign effort with NCRA AD and WAAESD AD as the technical leads, trainers and primary interface with Clemson ITT. Assisted in the polishing of the nomination of the NC140 Project with MSU staff and AA which went on to win the national recognition. Participated in the development of NCDC230 AMR. Administrative Advisor to NC multistate committees as opportunities arise (tbd).
- Reviewed preproposals and participate with the NC Sun Grant Program. Served on the Climate and Corn-based Cropping Systems CAP advisory group.
- Facilitated the (slowly) forming Great Lakes Specialty Crop Climate Consortium and the emerging North Central Antimicrobial Resistance Roundtable with The OSU and APLU/AAVMC.
- Secured a place for Deb Hamernik, NCRA Chair and NCDC230 AA, to participate in the Antibiotic Resistance Summit as part of a panel.

2. NATIONAL ACTIVITIES

- Serve the ESCOP S&T Committee as Executive Vice-chair, and with the AD's support and engagement, provide administrative leadership and assistance. Identify and review materials and actions on behalf of ESS and provide narrative for committee recommendations to ESCOP. Facilitate the review and recommendation on the multistate research nomination process. Discussions occur during the monthly calls.
    - Formal recognition of the Multistate Research Project Award and the ESS Leadership Awards from all five regions are part of the APLU - A Community of Scholars Honoring Excellence program at the national meeting. In that S&T was the originator of these recognitions and the need for a central and consistent leader to collect and create a quality narrative, the Executive Vice-chair will help to create and manage the materials and secure the actual awards.
    - The National IPM Coordinating Committee (NIPMCC) was initiated by ESCOP and ECOP as a mechanism to formally engage the IPM community. Operating guidelines have been approved and the membership and purpose of the group is being finalized. This is a subcommittee of S&T and the ED supports the group.

    - The Social Sciences Subcommittee (SSSc) is a formal group comprised of ag communication, ag economists, ag education, human sciences and rural sociologists faculties with regional configurations. This is a subcommittee of S&T and the ED facilitates the group.
- Helped to create and support the ESCOP Diversity in Research Leadership Task Force. I support this 16-member group, chaired by Karen Plaut, and maintain and contribute to the Basecamp collaboration too. Working recommendations are due during the summer with final reviews and approval targeted for the fall.
- Served as a 2016 ESS/CES Planning Committee member for the Jackson Hole, WY meeting.
- Will serve on the BAA Committee on Legislation and Policy (CLP, formerly Farm Bill Committee).
- Facilitated the creation of an amendment to the ESS Rules of Operation to build an ESCOP budgeting process with accountability reporting.
- For ESCOP, participate in monthly Chairs Advisory Committee (CAC) calls and participate (as available) in the monthly Budget & Legislative Committee calls.
- Served as Panel Manager for the Critical Agricultural Research and Extension (CARE) for the second and final time. Served on the grant review panel for the New Technologies in Ag Extension grants.
- Create and edit materials as needed. For example, ESCOP Agenda Briefs, an ESCOP response for the OSTP Summit and the group ED edits on the one-pagers managed by Cornerstone Government Affairs and used by CARET-AHS during their Hill visits.

3. PROFESSIONAL DEVELOPMENT

- Michigan State University – COI, Excel, Open Access, Harassment and others as appropriate/required.
- Wharton Executive Education – Leading and Managing People.
- Diversity and Inclusion (tbd based upon ESCOP Task Force).

4. TRAVEL

- Fall ESS, Sept 28-Oct 1, 2015, Charlotte, NC [National and NCRA].
- NIPMCC, Oct 5-7, 2015, Washington, DC [ESCOP S&T and NC].
- Leading and Managing People, Oct 25-30 Philadelphia, PA [professional development].
- CARE Panel Manager, Nov 2-6, 2015, Washington, DC [Panel Manager].
- APLU Annual Meeting, Nov 15-18, 2015, Indianapolis, IN [Network and ESCOP].
- Steve Slack Retirement, Dec 13-14, 2015, Wooster, OH [NCRA and National perspective remarks].
- Antibiotic Resistance Summit, Jan 19-21, 2016 Washington, DC [National and NCRA].
- CARET-AHS, March 6-9, 2016, Washington, DC [National and ESCOP].
- NCERA222, March 21-23, 2016, Columbus, OH [NCRA].
- Spring NCRA, April 3-7, 2016, San Juan, PR [NCRA].
- NERAOC, April 24-27, 2016, Philadelphia, PA [National and NCRA].
- North Central AMR Roundtable, May 19-20, Columbus, OH [NCRA].
- NMCC, May 24-26, 2016, Washington, DC [All EDs meeting].
- Joint COPS, July 18-20, 2016 San Antonio, TX [National, ESCOP and NCRA].
- Mini Land-grant Meeting, July 31-Aug 2, Chicago, IL [NCRA].
- Fall ESS, Sept 19-23 Jackson Hole, WY [National and NCRA].
- APLU Annual Meeting, Nov 13-15, 2016 Austin, TX [National and NCRA].

Chris Hamilton, NCRA Assistant Director:
2015-2016 Tasks and Accomplishments

1. REGIONAL ACTIVITIES

NCRA

- Manage all aspects of the NCRA office (meetings, financials, website maintenance, etc.), working closely and effectively with UW's CALS business services and also MSU (NCRA and ED budget). This year, we conducted what was essentially an audit of the long-term UW NCRA account, analyzing revenue and expenses going back to 2000.
- Worked with NCRA ED on the FY2017 NCRA budget
- Participate in monthly NCRA Executive Committee calls
- Continue to work closely with Robin Shepard of NCCEA to maintain strong communications between NCRA and NCCEA. Our current focus is on the regional USDA climate hubs and the role of EXT and AES.
- Create reports and spreadsheets useful to the NC region, as needed and upon request (salary data, AES allocations, etc.).
- Continue to maintain NCRA Twitter account (@NCRegionalAssoc), posting relevant stories about AES research, news, etc. and leveraging stories to national attention. Twitter account now has 129 followers, including several association colleges and universities, national organizations, government partners, industry, and others.
- Created and maintain the www.nc-climate.org website, showcasing NCR climate research, collaborations, and providing a central site for climate researchers contact information
- Attended the March 1-2, 2016 Midwest Climate meeting in Madison, hosted by the USDA Midwest Climate Hub
- Provide high-level technical services to the NCRA and other regions
    - Webinar hosting
    - Conduct remote screen shares with users to help solve local and NIMSS issues/questions, as well as lead training sessions
    - Regular back-ups of all NCRA office files at UW-Madison
    - Facilitate easy data sharing through cloud-based file servers (MRC files, ESCOP materials, etc.)
    - Online Qualtrics Survey creation
    - Manage all NC email lists and NCRA Directories

North Central Region Multistate Research Portfolio

- **Regular Support:** Regularly provide support to Administrative Advisors and SAES staff on navigating the NIMSS and interpretation of national and regional multistate guidelines. Prior to the NIMSS redesign, I continued to answer questions and provide information on ways around NIMSS' malfunctions and manually complete many NIMSS tasks and messages that used to be automated. Once the new NIMSS went online, I provided regular technical support and assistance to NC and other national NIMSS users, as well as hosted several online, webinar based training sessions.
- **FY2017 Renewing NC Projects**: Facilitated the renewal of NC multistate projects expiring in 2016 and midterm review evaluations. Coordinated the NC AAs, NC Advisory Committees, and the Multistate Review Committee. See the April 2016 MRC report for details.

- **ESS Excellence in Leadership Award**: Coordinated NC nominations for the Excellence in Leadership Award for 2016.
- **National Excellence in Multistate Research Award:** Solicited and coordinated the NC nominations for this award. I also read and will assist with the review and selection process during our spring MRC meeting. We received two nominations this year.

2. NATIONAL ACTIVITIES

- With the NCRA ED, provide administrative leadership and assistance to NRSP1. Schedule calls, take minutes, coordinate committee activities, etc. I also provided the annual NIMSS REEport report for Clemson University.
- With the NCRA ED, provide administrative leadership and assistance to the ESCOP Science and Technology (S&T) Committee. Schedule calls, take minutes, coordinate committee activities, coordinate review and ranking of national multistate research award nominations, etc.
- Assisted Sarah Lupis with streamlining the ESS NRSP voting process at the Fall ESS meeting. All voting is now done online and in real time.
- I participate as a member to the newly formed ESCOP Diversity Task force. We hold monthly teleconferences and are currently discussing ways to provide ideas and actions for consideration, and to supplement institutional, regional and national diversity and inclusion efforts.
- Provided general NIMSS support to Rick Lindroth (lead AA) and John Bamberg (ARS, NRSP6 technical lead) for NRSP6 by authorizing annual meetings and uploading reports.
- Will participate in NIMSS update at the NERAOC meeting with Sarah Lupis again in April.
- NIMSS Redesign: I continue to serve as the ESCOP-side lead project manager for the Clemson ITT NIMSS redesign. Along with Sarah Lupis, we hold weekly to bi-weekly calls with the NIMSS developers and serve as the liaisons between all NIMSS users and the development team. In this role, we help solve user issues and/or forward them on to the programmers, as needed. This partnership allows us to solve NIMSS issues quickly and efficiently. Going forward, we will continue to provide user support and work with our developers and users on improvements and updates to the system.
- Created and will maintain the new NIMSS Manual, http://ncra.info/docs/Handbook/NIMSS%20Manual%20V02102016.pdf
- Partner with NIFA multistate team to coordinate NIMSS project/participant approvals, occasionally serve as regional liaison for REEport issues, and other regional-USDA administrative tasks, as needed.

3. PROFESSIONAL DEVELOPMENT

- Due to the time involved in NIMSS redesign project this year, I was unable to participate in any formal professional development programs. However, as time allows, I regularly use the UW's Lynda.com self-paced software training application to stay up-to-date on applications applicable to my role in the NCRA. I have completed "Foundations of Programming: Fundamentals" and "Foundations of Programming: Databases", specifically to improve my understanding of the NIMSS database and re-development process. In addition, I have completed Dreamweaver basics, Dreamweaver Word Press training sessions, and sessions on installing BitNami (a web development stack application that allows me to run a local webserver on my computer, for the purposes of improved website development).
- Going forward in 2016 and 2017, I plan on attending local Emotional Intelligence-based management and leadership sessions offered through UW-Continuing Education's Leadership, Management, and Workplace skills (http://continuingstudies.wisc.edu/leadership).

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Item 17.0: MRC Report
Presenter: Joe Colletti, 2016 MRC Chair

Item	Proj Type MRC Rvwr	Current Proj # (Temp #)	Title	NCRA AA	MRC Comments	MRC Recommendations
17.00	**New/Renewal Projects**					
17.10	**NC-Type**					
	Colletti	**NC1029 (NC_temp1029)**	Applied Animal Behavior and Welfare	J. E. Minton, KS (08)	first reminder sent 1/9/2015. Objectives uploaded and invites sent on 10/15. Submitted as final and AA review assigned on 11/17. The statement of issues and justification is sufficient. The section entitled "Related, Current and Previous Work" is very weak and unacceptable. It should clearly articulate the advances in science that were achieved in the previous 5-years' research. A strong literature review should be in this section as well to point to the new/revised objectives and methods involving production animal behavior and welfare. There are two objectives stated. However, it is very confusing because objective one "1. To develop novel measurement techniques and to evaluate animal behavior and physiology as indicators" is really two objectives in one statement. A better and more accurate objective one is: "To assess animal behavior and physiology as indicators of animal welfare." A particular technique to be used in the methodology for this assessment of poultry and cattle is sensors. Objective two contains statement of the methods to be used. A more accurate objective two is " To strengthen animal welfare assessment and auditing programs." The Methods section is lacking	Defer approval pending major revision

					clarity of the approaches actually to be taken. The methods involving sensors is sufficient and should serve as a model for the rest of the Methods section. Overall, this is an important project, but NC_Temp1029 needs major revision.	

	Jacobsen	**NC1030 (NC_temp1030)**	Sustainable Families, Firms and Communities in Times of Change	C. Hamilton, NCRA	NC_TEMP1030 proposes to build upon prior multistate projects that provided insight into the interaction of families, business firms with urban and rural communities. Their body of work has led to new understandings with family and family firm interactions, survival and demise of firms and the development of new sustainable family business theory. The team has created data base resources on business over a 10-year period as well as other data sets on small business disaster recovery that includes business, family characteristics and community characteristics. This research group has integrated the aspirational goals within the recent USDA Science – REE Action Plan by looking at generating new information on rural business innovation and growth. They propose to expand their historical focus into more economic, environmental, social, community and technological disruptions on family and other businesses in communities. Participants have been highly interactive resulting in new multi-author scholarly works, enhancing the Sustainable Family Business theory, securing extramural funding, integration across research, Extension and multiple-sector stakeholders and presentations at professional conferences that all serve to evolve policies and practices. Correct typos and formatting consistencies needed in Outputs and in Milestones. Please check for reference in the text yet not in Literature Cited (Kolbe, 2007 (maybe a typo in narrative); Danes, Lee, Stafford and Zackary, 2008; Danes and	Approve with minor revision.

					Stafford, 2011). In addition, the three Valdivia et al. 2008; 2010; 2012 and the Haynes, Danes and Stafford, 2011; were in the Literature Cited yet not in the narrative. (NOTE: If I missed these, please excuse my error!). Continue to enlist other participants to directly join (Appendix E) the new NC1030 Project as indicated in past projects. In addition and if possible, are the data sets and appropriate metadata available for additional research and innovation?	

	Merchen	**NC1034 (NC_temp1034)**	Impact Analyses and Decision Strategies for Agricultural Research	M. Martin, IN (02)	Request approved 9/15. George Frisvold editor. Obj uploaded and invites sent 10/16. Submitted as final, AA review assigned on 10/29. AA review completed and favorable. Proposal for renewal of a longstanding NC group of experts on agricultural technology transfer and impact assessment comprised of land grant university and USDA-ERS agricultural economists. Focus of the committee has been on evaluation of public and private investments in agriculture and food system research. The topic continues to be a high priority and activities of this committee provides information that is useful to university and government officials in decision making. The proposal is lengthy and detailed and includes details on background of the problem, likely impacts of the work, plans for research to address project objectives, and milestones to fulfill objectives. This reviewer found the proposal to warrant recommendation for approval with minor revision. Extensive reviews were provided by the AA and by NCAC-12. The review from the AA was positive and identified a couple of areas for revision (cited in the following recommendation). The NCAC-12 reviewer recommended major revision, primarily requesting significantly more detail on most aspects of the proposal. This should be discussed in our MRC meeting prior to finalizing the MRC recommendation.	MRC Recommendation (tentative): Approval with normal revision. It would be helpful to have more specificity of the expected contributions of the participants from each state. Also there should be some discussion as to how results of the multistate project will be integrated into Extension and related engagement efforts and programs.

	Lindroth	**NC1189 (NC_temp1189)**	Understanding the Ecological and Social Constraints to Achieving Sustainable Fisheries Resource Policy and Management	D. Buhler, MI (11)	request approved 9/14/2015, Bill Taylor is editor. Obj uploaded and invites sent. Submitted as final and AA review assigned 12/2. AA review favorable with minor revision requested. The major goal of this regional research project is to determine the factors that facilitate or hinder fisheries sustainability and food security in the United States. Participants will address how climate change and invasive species affect fish habitat, communities, and production dynamics, in order to conserve and restore sustainable and economically viable inland aquatic ecosystems and fishery resources. Specific objectives are to: 1. Foster a collaborative, coupled human and natural systems research framework to assess the ecological and socioeconomic effects of climate change and invasive species on inland fisheries and aquatic resources. 2. Analyze the ecological, environmental and socioeconomic factors that mitigate or exacerbate the introduction, establishment, or effects of invasive species and climate change effects at multiple spatial and ecological scales. 3. Determine the socioeconomic and environmental factors that influence the ways in which individuals and organizations respond to invasive species and climate change and the likely consequences of those responses for effective inland fisheries and aquatic resource management. The proposal is well-written, with well-developed plans for measurement of outputs, projected impacts, and	Approve with minor revision.

					milestones. The outreach plan is thorough. Overall, this is a very fine project, with potential for significant impact toward achieving sustainable fisheries. If anything, the project may be overly ambitious; the team is encouraged to seek additional sources of funding to fulfill the objectives proposed. No evidence of a CRIS literature search is provided.	

	Lindroth	**NC1190 (NC_temp1190)**	Catalysts for Water Resources Protection and Restoration: Applied Social Science Research	J. Colletti, IA (11)	The goal of this multistate research committee is to address the gap in the knowledge base of social-human interactions with respect to water resource management. The major research question is: What are the key catalysts that interact with social and ecological conditions to create change in conservation behaviors, resource management, and governance within a water context? In particular: a. How are key catalysts for change in conservation behavior, resource management, and governance translated into individual, collective, and institutional action? b. How are catalysts influenced by socio-economic, institutional, and ecological conditions? c. What types of outcomes emerge from various types of catalysts? d. What are the various institutional roles in addressing these processes? NC1190 has an excellent history of integrated, cross-region research. This proposal is very well researched and written, with thoughtful, hypothesis-driven methods. The research team is exceptional and expected contributions from each are nicely detailed. Overall, this is an excellent proposal. Although considerable literature is cited, there is no statement in the proposal that a CRIS literature search was conducted.	Approve with minor revision.

	Cuomo	**NC1192 (NC_temp1192)**	An integrated approach to control of bovine respiratory diseases	N. Merchen, IL (14)	Request approved, Brian Van Der lay is editor. Obj uploaded and invite sent. Submitted as final and AA review assigned 12/2. Committee wishes to renew under their original NC107 designation. AA review completed, favorable, with minor revision. This is a well-defined proposal that complies with all formatting recommendations per Appendix A of the Guidelines for Multistate Research Activities. The committee membership includes multiple disciplines and aggregation of interest that ranges from fundamental discovery to field application. The efforts of this committee represent the most comprehensive collaboration to address bovine respiratory disease (BRD) in the United States. The proposal does a good job of identifying advances in knowledge and technology that have resulted from previous work of the committee and demonstrates how the synergies of the multidisciplinary effort will advance further work. The main focus of the new proposal concerns determination how viral and bacterial pathogens are able to evade the host immune system. Methods are adequately described and well-itemized by contributing station and by objective. Recommendation is for approval of the proposal. There is no reference to a CRIS search having been conducted and the committee should specifically address the issue of how duplication with other multistate projects will be avoided.	Recommend approval pending minor revision.

	Colletti	**NC1193 (NC_temp1193)**	Assessing and addressing individual and environmental factors that influence eating behavior of young adults	D. Savaiano, IN (98)	Request approved 9/15. Kendra Kattleman is editor. Submitted as final and invites sent on 10/14. AA Review assigned 10/15. AA Review completed and very favorable. A very well written proposal. The cohort of PIs have been together for some time and clearly have had multiple outputs and impact. The Methods section could benefit from indication of the PIs (and institution) associated with each objective/method. Further, the Milestones could benefit from have time (years) inserted per milestone. Overall, a very important project. I recommend approval with minor revisions (see above).	Approve with minor revision.

	Merchen	**NC1194 (NC_temp1194)**	Nanotechnology and Biosensors	V. Bralts, IN (04)	Request approved 8/25. Chenxu Yu editor. Obj uploaded and invites sent. Reminder sent 12/2. Requested extension and will submit by 12/15. Submitted and AA review favorable. MRC Comments: Proposal for continuation/renewal of a project that was initiated in 2011Objectives 1 to 5 of the renewal are same as in the original project while Objective 6 (Improve academic-industry partnership to help move the developed technologies to commercialization) is new. There are 13 participants enrolled in the project and the group includes a very diverse representation of disciplinary expertise which should lend itself well to linking technology developers with scientists who can identify problems to which the technology might be applied. Based on annual reports, the expiring project was active and productive. While applications of nanotechnology and biosensors to the food and agriculture system are broad, this committee's primary focus seems directed to applications for pathogen detection to improve food safety and plant/animal health. Objectives are to be fulfilled through multidisciplinary experimentation and modeling methods at both bench and field scale. The proposal provides only a high level experimental plan with little detail on methods and roles of individual stations. However, good milestones for expected outcomes are provided and there is a good outreach plan. Reviews of Administrative Advisor and NCAC were very positive with only some minor recommendations for revision.	Approval with minor revision.

					Approval with minor revision. Per comments of NCAC reviewer, the committee should consider 1) providing more detail and specifics about course materials projected for development and sharing; and 2) adding additional expertise related to risk assessment research.	
	Jacobsen	**NC1195 (NC_temp1195)**	Enhancing nitrogen utilization in corn based cropping systems to increase yield, improve profitability and minimize environmental impacts	S. Blodgett, IA (07)	NC_TEMP1195 proposes to study N utilization in corn-based cropping systems with an emphasis on production and environmental issues. Nitrogen cycling in association with landscape processes, weather, climate and management practices provides an endless suite of interactions to understand and to develop strategies for innovative implementation practices. This effort is an evolution of prior multistate projects and has extremely strong relevance to the region and nation. The Outreach Plan is strong and the Organization/Governance is well articulated. As written, the proposal needs significant	Defer approval pending major revision

					organization and content changes before approval. The highlighted examples below provide some examples of specific changes that should be rectified before re-review. The authors will likely find more after considering the review comments and re-reviewing their submission. *Providing selected citations in the Issues and Justification section would provide additional clarity, detail and support for this proposed work. This would give some sense of the documented issues and why this work needs to be conducted with multiple states in order to be successful. *In the Issues section it is stated 'to use this new knowledge obtained to reduce the N fertilizer application to corn in the US by 10% over the next decade'. While the timeframe spans beyond this 5-year proposal, a metric that describes an output in advance of the decade timeframe would be a powerful outcome of this effort. If plausible, this should be included in the Outcomes or Project Impacts section. *In the Related, Current and Previous Work section there are numerous references to individual components, e.g. a current Minnesota experiment…, several committee members …, two committee members have promising…, committee member Drijber…, etc. Some additional synthesis as to how these projects integrate rather than just a collection of individual activities and ideas would be illustrative of the combined efforts and key purpose of a multistate committee. Demonstrate why a	

					multistate project will succeed where an individual project will not. In addition, it is not clear that a review of NIMSS was conducted to see if there were any multistate projects that are active in order to address duplication, synergy, differences and so on (e.g. NEERA1402, SERA17, SERA46). *A particular strength and a laudable activity is the potential suite of activities associated with utilizing existing datasets and enhancing these through the addition of other datasets. Additional information on how the data will be handled and processed would be beneficial and the expertise required will ultimately allow results to be scaled up. This could be a very tangible Objective with potential to add to the body of work and overall impacts of the integrated project. In the emerging era of open access to data and publications this would be very timely and an important milestone for the group to consider. *More information on the responsibilities of participants in the narrative would be a valuable addition to the proposal. One reviewer requested that the Milestones need to be expanded to reflect the work being proposed and with more detail provided. *The Outputs and the Outcomes or Projected Impacts are highly duplicative. Papers and presentations are certainly good Outputs. As a result of these Outputs, one should be able to articulate an answer to the questions: Who cares? and Why do they care? and What	

					difference does this research make? One key example is referenced in the second bullet above. In addition, in the rework of these elements, it may also inform the existing and creation of new milestones that will occur over the life of the 5-year project. *There is reference to CSREES in the Organization/Governance section. CSREES has not existed for many years. NIFA may be the acronym desired. Similarly, information is not uploaded to the NCRA website; however, annual reports, projects and proposals are uploaded into NIMSS (National Information Management and Support System. *The Tilman et al. 2002 reference is not in Literature Cited. *The Proposal lists MN, NE and KY as participants and Appendix E adds IA, MI, MO and WI. Please make sure these stations add their participants.	

	Cuomo	**NC1196 (NC_temp1196)**	Food systems, health, and well-being: understanding complex relationships and dynamics of change	CY Wang, SD (05)	Request approved 9/15, Sandy Rikoon is editor. Obj loaded and invite sent 10/5. Submitted as final and AA review assigned 11/30. AA review favorable. This is a well-defined proposal that complies with formatting recommendations per Appendix A of the Guidelines for Multistate Research Activities. The committee membership includes multiple disciplines and aggregation of interest that ranges across disciplines. The efforts of this committee represent broad geographical and community groups and provides a comprehensive collaboration in an attempt to address the broad and complex relationship of food, food access, nutrition and health. The proposal does a good job of describing the issues and how the synergies of the multidisciplinary effort will advance further work. The main focus of the new proposal is a holistic and aggressive approach to the complexities of addressing providing abundant, nutritious food to all segments of the population. Recommendation is for approval of the proposal. The committee should specifically address the issue of how duplication with other multistate projects will be avoided. *As noted in the comments on objectives and methods, objective #3 seems outside the scope of this work and how it will be obtained is not clear in the methods.	Approve with minor revision.

	Jacobsen	**NC1197 (NC_temp1197)**	Practical Management of Nematodes on Corn, Soybeans and Other Crops of Regional Importance	S. G. Pueppke, MI (98)	NC_temp1197 reflects an on-going body of work in the North Central Region that is both scientifically intriguing to research building upon their (and other multistate projects) bodies of work, while continuing to have significant economic impact to various stakeholders. The proposal is extremely well-written and follows the published guidelines and formats. This was a pleasure to read. Annual reports from teh prior project were detailed and consistent across the years. Thank you!Given the excellent quality of the individual members of this committee there should be additional examples of accomplishments that could be shared to demonstrate successful collaborations, leveraging and outcomes across integrated teams. One reviewer specifically challenged the group to think about evolving the Milestones beyond merely a copy of the last project Milestones. Building upon the point mentioned above about project accomplishments, in this proposal an expanded narrative should describe the nature of the integrated, collaborative and leveraged expertise that will provide outcomes that are more significant than a collection of individual contributions. Some very minor considerations: 1) Objectives do not need to be rearticulated in the Issues an Justification section and in the Objectives section. Pick the Objectives section. 2) Similarly, the Outputs provided at the tend of the Issues and Justification section do not need to be rearticulated in the Outputs section. Pick the Outputs section.	Approve with minor revision.

					3) The Avendano et al. (2003) reference is not in the proposal.	

	Lindroth	**NC_temp1203**	Lipids In Plants: Improving and Developing Sustainability of Crops (“LIPIDS of Crops”)	J.E. Minton, KS (15)	Note: No Administrative Advisor Review provided. The overall goal of the LIPIDS of Crops MRC is to collaborate to characterize lipid-related metabolism and traits relevant for crop improvement, and to develop crops with improved yield, biotic and abiotic stress tolerance, and/or nutritional and industrial qualities. This multistate effort will provide a framework to enhance collaboration and sharing of resources, expertise, and instrumentation to accelerate progress among plant lipid researchers in the North Central Region. The proposal incorporated a thorough and informative statement of background information on former and current research. This review included information in the CRIS database. Specific objectives are to: 1. Improve and extend methods for lipid characterization and measurement. 2. Identify and characterize lipid-related metabolism and traits relevant for crop improvement. 3. Develop crops with improved yield and/or functionality. The proposal incorporates nicely detailed methods for how the objectives will be pursued. Milestones for measuring progress and results are clearly presented. The Outreach Plan targets numerous audiences, and is fully detailed. Overall, this is an excellent proposal and important research.	Recommend approval as-is.

	Colletti	**NC_temp1204**	Advancement of Brassica carinata	D. Scholl, SD (15)	Request approved 9/15. William Gibbons is editor. Obj added and invites sent 10/15. Submitted as final and AA review assigned 11/30. This is a new NC project. There is real potential from optimization of Brassica carinata as a non-food oilseed crop. The project proposal is strong in certain regards and very weak in others. A solid statement of issues and justification section is followed by a strong related, current and previous work. However, both sections need more background on the economics of biofuels production, including impacts from changing national policy. There are nine objectives. Too many objectives for a five year project purported to move toward "optimization" of Brassica carinata. The methods for many of the objectives are sufficient. For the ninth objective - Assess live cycle impacts of carinata production and utilization for the full value chain needs to be coupled first with a strong techno-economic analysis. It is also concerning that very few states/institutions are involved. I recommend postponement until significant revisions have been made.	defer approval pending major revision.
17.12	**NCCC**					

	Lindroth	**NCCC167 (NCCC_temp167)**	Corn Breeding Research	K. Lamkey, IA (15)	This Coordinating Committee addresses corn breeding research, which is of fundamental importance to U.S. agriculture. Continued breeding efforts are critical to improving yields, adapting to climate change, and marketing to specialized user groups. Coordinated efforts across multiple universities will enable phenotyping of varieties in diverse environments. The objectives of this NCCC are to: 1. Identify opportunities to conduct cooperative research with regional or national scope and coordinate existing cooperative corn breeding research projects. 2. Train people to carry out corn breeding research. 3. Develop and make available corn breeding tools such as databases, software and methods. 4. Communicate research results to committee members and stakeholders. 5. Promote interaction between the corn breeding research community and seed companies, commodity groups, Multistate Research Committees, the maize genetics community and other stakeholders. This Committee has a long history of productive work, both in terms of research and graduate student training. These are anticipated to continue with a renewed project. The Procedures and Activities description is appropriate for an NCCC activity. Participation by graduate students in the annual meeting is a positive element of the proposal. The Educational Plan describes the significant success of the	Approve with minor revision.

					group, but does little to state what the plans are for educating students in the next funding round. Additional information would be helpful. The Committee is encouraged to broaden participation by additional land grant institutions and USDA-ARS, as appropriate.	

	Jacobsen	**NCCC170 (NCCC_temp170)**	Research Advances in Agricultural Statistics	B. Craig, IN (15)	The NCCC_temp170 proposes to continue a long-term project associated with statisticians who provide leadership and collaborative roles across the national research community affiliated with Agricultural Experiment Stations. Their coordinated efforts create a forum for rich topical discussions, sharing of latest analytical approaches, and creation and refining of educational materials to be used at their institution and in other professional venues. Their work and impact is further exhibited through their high quality scholarly outputs documented in their substantive annual reports with refereed articles across many diverse disciplinary outlets. The annual reports are detailed and provide strong evidence of integration, collaboration and impact. This proposal builds upon their historical efforts and activities that have proven to be successful and, as such, the proposal is largely similar to prior versions. This is acceptable for a Coordinating Committee. This proposal should be approved with the very minor updates as provided below. In the Procedures and Activities section: 1) mention is made of an ASA workshop presented in 2010 and many times since, this could be reworded to be more descriptive and current (e.g. We have conducted 15 workshops at ASA (and maybe other professional societies) over time, 2) regarding the book sales, could more tangible data be provided and 3) the last sentence in paragraph five regarding Literature Cited section should be moved to this particular section as it defines what the	Approve with minor revision.

					listing of outputs are rather than the traditional Citation section would be expected to do. Lastly, given the national reach of the proposal, the Land Grant Participants/Institutions should align with Appendix E to include USDA ARS.	
	Colletti	**NCCC212 (NCCC_temp212)**	Small Fruit and Viticulture Research	V. Baird, MI (11)	Request approved 9/15. Elina Coneva is editor. Full proposal uploaded 10/15. Participation invite sent. Submitted as final and AA review assigned 10/16. AA review completed and favorable. A well -written NCCC project. Three appropriate research objectives to be achieved by coordination across multiple institutions. Articulation of past achievements in the section "Statement of Issues and Justification" would help strengthen the case for the three objectives and, more	Approve with minor revision.

					importantly, which crops will be prioritized under each objective. I recommend approval with minor revisions (a few past accomplishments and crops to be researched under each objective).	
	Cuomo	**NCCC65 (NCCC_temp65)**	Indicators of Social Change in the Marketplace: Producers, Retailers and Consumers	E. Bye, MN (15)	Request approved 9/14, Leslie Stoel editor. Objectives loaded 9/18 and invites sent. Submitted as final and AA review assigned 12/2. AA Review completed and very favorable. This is a well-defined proposal with clear objectives and approaches. The efforts of this committee to address the broad and complex relationships of social change in the marketplace is to be commended. The flexibility described in the proposal to respond to changes over the life of the project is also to be complimented. For an important topic like this, the committee would be enhanced by additional participation. Also, the topic of Alternative Energy in the background section seems like an 'add-on' and is not addressed again in the proposal.	Approve with minor revision.

	Lindroth	**NCCC_temp216**	Understanding weed biology and ecology to address emerging weed management challenges	D. Buhler, MI (15)	NC1191 renewing as an NCCC. Obj uploaded and invites sent 10/16. Reminder sent 12/2. Submitted as final and AA review assigned 12/4. AA review good with a few revisions suggested. This project proposal was developed after many years of successful NC weed projects, and a more recent decline in activity reflective of reduced investment in weed biology by universities and USDA-ARS. Clearly, continued research in weed biology is needed, as herbicide-resistant weeds continue to evolve. Objectives of this research program are to: 1. Review current research on biology and ecology of emerging weed issues and coordinate future work among multi-state and multi-disciplinary partners. 2. Identify high priorty opportunities and challenges on weed species issues in the North Central region, and develop collaborative efforts to address these issues. 3. Continue to have regular and focused discussions on new and impactful research opportunities on weed biology and ecology. 4. Develop educational and outreach materials, such as teaching case studies and scientific reviews and publications to address key weed biology, ecology, and management issues for our clientele in the north central region. The major components of the proposal are fairly briefly described. I would appreciate seeing: 1. a specific objective about tools for outreach. 2. additional details about the educational plan, particularly in	Approve with minor revision.

					regard to students. 3. potential plans to broaden participation by other states.	
17.13	**NCERA**					

	Cuomo	**NCERA101 (NC_temp101)**	Controlled Environment Technology and Use	R. S. Kanwar, IA (97)	Objectives loaded and participation invite sent 10/12. Submitted as final and AA review assigned 12/1. Favorable AA review. 1. Goals and objectives clearly stated and appropriate to committee activity(s). ___X__ 1 Excellent _____ 2 Good _____ 3 Fair _____ 4 Needs Improvement 2. There is a good potential to attain the objectives and plan identified in the activity. ___X__ 1 Excellent _____ 2 Good _____ 3 Fair _____ 4 Needs Improvement 3. Activity addresses priority research and is not duplicative with existing activities. ___X__ 1 Excellent _____ 2 Good _____ 3 Fair _____ 4 Needs Improvement 4. Activity has moved beyond individual activity(s) and ideas to a collective, interdependent activity. ___X__ 1 Excellent _____ 2 Good _____ 3 Fair _____ 4 Needs Improvement 5. For renewal projects only: a. Attendance of the preceding project has been adequate and reflects broad participation by designated project participants. ___X__ 1 Excellent _____ 2 Good _____ 3 Fair _____ 4 Needs Improvement b. The project has developed and demonstrated technology transfer to clientele. _____ 1 Excellent __X___ 2 Good _____ 3 Fair _____ 4 Needs Improvement Overall Comments: This is a well-defined proposal with clear objectives and approaches. With the increased use of controlled environments in research a	Recommend approval as-is.

					committee like this one that works across academia, education and users is needed. This group is to be commended for leading an effort that is not set up to happen elsewhere. Recommendation: ___X__ Approve/continue with normal revision.	

	Lindroth	**NCERA13 (NCERA_temp13)**	Soil Testing and Plant Analysis	K. Grafton, ND (06)	Request to write approved 9/9/2015. Editors are Dorivar Ruiz Diaz and Antonio Mallarino. Participation invite sent 9/14. Submitted as final and AA review assigned 12/1. Good AA review. Proper soil testing and plant analysis protocols are essential for economically and environmentally sustainable crop production systems. These procedures continue to evolve as instrumentation and production strategies change. There is an evident need for a regional committee to encourage interstate cooperation and transfer of soil testing and plant analysis information among land grant universities, commercial laboratories, state and federal agencies, and other clientele. The NCERA013 Committee has historically met that need by facilitating cooperative research and educational programs in soil testing and plant analysis throughout the North Central region. Recent work by the Committee has been productive and influential. The objectives of this renewal proposal are to: 1. Develop a regional guidance manual explaining appropriate methods for soil sampling. 2. Develop a regional guidance document for the concepts and rationale used to develop phosphorus and potassium fertilizer recommendations. 3. Develop a more formalized structure for information exchange between university and commercial soil test laboratory personnel throughout the region. 4. Develop and improve a website to improve the marketing of the products and activities generated by this committee.	Recommend approval as-is.

					5. Organize every other year a soil testing and plant analysis conference/workshop targeted to public laboratories to foster the use and understanding of improved soil/tissue testing methods and interpretations in the North-Central region. 6. Update specific chapters of the book “Recommended Chemical Soil Test Procedures for the North Central Region”. The Procedures and Activities, Expected Outcomes, and Educational Plan are all well developed and described. Overall, this is a fine proposal on an important regional activity.	

	Merchen	**NCERA180 (NCERA_temp180)**	Precision Agriculture Technologies for Food, Fiber, and Energy Production	V. Kelley, SD (10)	Request approved 9/22. John Fulton editor. Obj uploaded and invite sent 10/16. Reminder sent 12/2. Submitted as final and AA review assigned 12/4. Favorable AA review. MRC Comments: Proposal for continuation of this NCERA committee. Only 7 participants are listed in current Appendix E but the previous project had a lengthy list of about 40 participants and annual reports indicate participation by 12 or so attendees. There were no reviews provided from the AA or NCAC group in the folder. This is an important and very rapidly emerging topic. Precision agriculture (PA) refers to ability to measure, quantify and manage field level variability. PA technologies are being rapidly adopted but there is potential for much greater development and application. The NCERA-180 proposal identifies three broad objectives: 1) Facilitate cross-disciplinary academic/industry research partnerships to address complex issues within cropping systems and regions; 2) Build experiential learning opportunities in PA for secondary education, community colleges and universities; and 3) Provide human expertise and a comprehensive body of resource materials to test and validate new precision offerings, promote adoption, and expedite applications across cropping systems and regions. Given the expectation that NCERA committees retain a broad base of activities in research and education, these objectives seem suitable. Expected outcomes and impacts for research and education are somewhat vague and could be strengthened by	Approval with revision. Recommend 1) addition of some specifics per assimilation and dissemination of research as a coordinated activity rather than a collection of individual station activities; and 2) Expand on the nature of “Materials that will be provided to educators…” as mentioned in the Educational Plan.

					some exemplification of past accomplishments or future projections. Approval with revision. Recommend 1) addition of some specifics per assimilation and dissemination of research as a coordinated activity rather than a collection of individual station activities; and 2) Expand on the nature of “Materials that will be provided to educators…” as mentioned in the Educational Plan.	

	Merchen	**NCERA219 (NCERA_temp219)**	Swine Production Management to Enhance Animal Welfare	E. Minton, KS (14)	Request approved 9/15. Steven Moeller editor. Obj uploaded and invites sent 10/16. Reminder sent 12/2. Submitted as final and AA review assigned 12/4. MRC Comments: This is a proposal for renewal of a project by a group of participants that have an active and productive history. Members of the committee include many of the major players in the NC region in areas of swine management, nutrition, and facilities engineering. One surprising omission in expertise on the committee is the field of animal welfare and(or) behavior and the group might be strengthened with addition of someone from that discipline(s). However, the make-up of the group is good and seems to have synergy. The proposal identifies five good objectives, three of which deal with research and two that target extension and education. Although not expected to be as formally research intensive as a NC committee, this group does conduct a good deal of research across stations and has developed guidelines for participation that assure that work can be meaningful and represent good multi-institutional research. As might be expected from a NCERA, the proposal provides an excellent educational plan and specific "success stories" from the previous plan are presented. The NCAC-6 committee offers a very positive review. No AA review was available in the folder.	Recommed approval as is.

	Colletti	**NCERA220 (NCERA_temp220)**	Biological Control of Arthropods and Weeds	J. S. Yaninek, IN (01)	All sections uploaded. Invites sent. AA review assigned. Favorable AA review. In the Statement of Issues and Justifications more needs to be said about the past accomplishments of this project. There are four stated objectives that are appropriate for an NCERA project. Objective 2 however, needs to be re-written. It is incorrect to say that the "goal of this objective is. . . ." Re-write Obj. 2. A general statement for this project an all other NC projects: A Goal is a broad aim such as Improve health of food crops. An objective is a specific statement of something to be achieved such as: "To reduce the incidence of damage from soybean aphids by 20% by 2020." In the NC context an objective is really a goal. But there is no such thing as the goal of an objective! For each objective (nee goal) the project could be improved by indication of the PIs/states involved. The overall impression one is left with in reading this project is that there is a loose confederation of extension entomologist who do good things with Extension stuff that they collect and put on the web, but are not coordinated on research or education. So, the research and educational aspects of this NCERA project needs enhancement. This project needs some revisions.	Defer approval pending major revision.

	Cuomo	**NCERA221 (NCERA_temp221)**	Turfgrass and the Environment	R. Gaussoin, NE (11)	Request approved 9/14. Nick Christians and Tom Voigt are editors. Obj uploaded and invites sent. Submitted as final and AA review asigned 12/1. This is a well-defined proposal with clear objectives and approaches. Research objective to address key issues with limited but unique resources across states makes the best of limited staffing at participating units and each unit's contributions are clear. Also a clear and thorough Extension and outreach plan. Discussion of value to graduate students is in the Justification, but not clearly highlighted in the body of the proposal. Outcomes around nitrogen, water use, roadside use, fungicide, and discovery are well articulated and are clearly critical issues in the turfgrass industry. 4. Activity is not duplicative with existing activities and address priorities in: This is not clear, but with the relatively light staffing and fairly recent interest in sustainable turfgrass production, one would assume there is much new to discover and share. 5. Activity has moved beyond individual activity(s) and ideas to a collective, collaborative activity with appropriately balanced involvement of research, extension, and/or academic participants. Comments (Max 3000 characters): It is clearly described so it is easy to see how the of the sum of the parts	Approve with minor revision.

					leads to greater impact across the region, Recommendation (provide specific recommendations in Comments below): • Approve/continue with normal revision. Comments: A very clear and well documented proposal that addresses important issues to the turfgrass industry.	
	Jacobsen	**NCERA222 (NCERA_temp222)**	Integrated Pest Management	W. Wintersteen, IA (01)	Request approved 9/14, James Janiski is editor. Obj uploaded and invites sent 10/16. Submitted as final and AA review assigned 11/24/2015. See Jeff's re-write.	Defer pending major revision.

	Jacobsen	**NCERA59 (NCERA_temp59)**	Soil Organic Matter: Formation, Function and Management	R. Turco, IN (11)	NCERA_temp59 is a long-standing and critically important multistate committee given the importance of soil organic matter to all ecosystems. A renaissance of soil science, in general, and soil health, in particular, has been actively taking place and soil organic matter is an essential element of the global awareness and on-going research, education and management activities. As articulated, the proposal reflects prior multistate projects in terms of overall perspectives, approaches and content with some modifications. It is acknowledged that the prior project has comprehensive and detailed annual accomplishment reports which are greatly appreciated (except 2015). In the Procedures and Activities section there is not an itemized narrative associated with Objective 3. The Literature Cited section provides examples of member recent papers. It is generally the practice that this section provides citations that support the (above) proposal narratives. Recent papers by members are typically acknowledged in the annual meeting reports. Lastly, the citations: Cihacek et al. (2010) and Ruark et al. (2009) are from the prior project (2006-2011) and not the current project (2011-2016), and don't necessarily reflect a 'recent' designation given the productive nature of NCERA59. Given that "many scientists outside the NCR participate regularly…", ideally the formal membership of the group could and should be expanded to reflect this reality. As a point of information, all multistate projects are open to members from other regions.	Approve with minor revision.

					The above observations are very minor edits and are, therefore, easily rectified. The proposal should then be approved.	
17.20	**Mid-Term Reviews**					
17.21	**NC-Type**					
		NC2040	Metabolic Relationships in Supply of Nutrients for Lactating Cows (NC-1009)	D. Benfield, OH (99)	Meets regularly, all reports available in NIMSS. Favorable AA review. Recommended for continuation.	
		NC1170	Advanced Technologies for the Genetic Improvement of Poultry (was NC-168)	S. Lamont, OH (13)	AA Review completed, very favorable. All reports available and committee meets regularly. Recommended for continuation.	

		NC2042	Management Systems to Improve the Economic and Environmental Sustainability of Dairy Enterprises	D. Benfield, OH (04)	Meets regularly, all reports available in NIMSS. Favorable AA review. Recommended for continuation.	
		NC213	Marketing and Delivery of Quality Grains and BioProcess Coproducts	S. Slack, OH (14)	Meets regularly, all reports available in NIMSS. AA review very favorable, recommend continuation.	
		NC2169	EFNEP Related Research, Program Evaluation and Outreach	D. Hamernik, NE (10)	Meets regularly, all reports available in NIMSS. Favorable AA review.	
		NC2172	The Complex Nature of Saving: Psychological and Economic Factors	J.E. Minton, KS (10)	Meets regularly, all reports available in NIMSS. No AA review conducted.	
17.22	**NCCC**					
		NCCC307	Biochemistry and Genetics of Plant-Fungal Interactions	G. Bollero, IL (10)	One report as of 10/5. AA review assigned 9/8. Reports need to be more complete, with accomplishments tied back to stated objectives. Based on the information available in NIMSS, it was difficult to access the technology transfer component other than the listing of their 105 peer-reviewed publications. However, with the very good attendance at the annual meeting and the highly structured format to the annual meeting, technology transfer would appear to be an important outcome of the annual meeting. Recommend continuation, but request more complete annual reports that follow the official Appendix D report format.	

		NCCC308	Nutrition and Management of Feedlot Cattle to Optimize Performance, Carcass Value and Environmental Compatibility (NCT192)	J. Lawrence, IA (08)	AA and NCAC reviews are favorable and the committee is active and making good progress with stated objectives. However, we are somewhat concerned with the chronic lateness of reports, but the AA is helpful and does not approve meetings until the previous year's report has been submitted. Recommend continuation. The NCRA hopes this committee will work towards submitting complete annual reports on-time going forward, within 60 days of a meeting.	
17.23	NCERA					
		NCERA210	Improving the management and effectiveness of cooperatively owned business organizations	D. Scholl, SD (14)	Active, well-functing committee. Meets regularly and submits reports to NIMSS as required. This committee appears to be working effectively towards stated goals. Great publication track record, too. No AA review available. Recommend continuation.	
17.50	NRSP **Proposals/Budgets: See NRSP Report**					

		NRSP1	National Information Management and Support System (NIMSS) (2014 - 2017)	J. Jacobsen, NCRA (14)	No reviews this year	
		NRSP3	The National Atmospheric Deposition Program (NADP) (2014 - 2019)	D. Buhler, MI (08)	No reviews this year	
		NRSP4	Facilitating Registration of Pest Management Technology for Specialty Crops and Specialty Uses (2015 - 2020)	D. Buhler, MI (05)	No reviews this year	
		NRSP6	The US Potato Genebank: Acquisition, Classification, Preservation, Evaluation and Distribution of Potato (Solanum) Germplasm (2015 - 2020)	R. Lindroth, WI (10)	No reviews this year	
		NRSP7	A National Agricultural Program for Minor Use Animal Drugs (2015 - 2016)	G. Smith, MI (14)	Expires 9/30/3016	
		NRSP8	National Animal Genome Research Program (2013 -	A. Clutter, NE (14)	Midterm review year	

			2018)			
		NRSP9	National Animal Nutrition Program (2015 - 2020)	D. Benfield, OH (10)	No reviews this year	
		NRSP10	Database Resources for Crop Genomics, Genetics and Breeding Research (2014 - 2019)	G. Smith, MI (15)	No reviews this year	
		NRSP_temp11	National Agricultural Research Data Network for Harmonized Data (2016-2021)	K. Plaut, IN (17)	Newly proposed NRSP	
17.40	**NC OTT-Funded Regional Trusts**					
17.41		**NC7**	Conservation, Management, Enhancement and Utilization of Plant Genetic Resources (2012 - 2017)	Wintersteen, IA	Annual budget/business plan review and approval needed in 2016. NC7 will submit a FY17 budget and business plan for approval during the August 2016 NCRA meeting.	
17.42		**NC1100**	Enhancing Rural Development Technology Assessment and Adoption Through Land Grant Partnerships (2015 - 2020)	Lovejoy, MI	No reviews this year, 5-year budget approved in 2015.	
17.50	Other **MRC Issues**					
17.51	Chose 2016 NC nominee for ESCOP National Multistate Research award: NC213 or NCERA3					

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NRSP 2016-2017

Requests for Off-the-Top Funding, NRSP 2016-2017

Project	Request FY2014	Authorized FY2014	Request FY2015	Approved FY2015	Request FY2016	Authorized FY2016	†Request FY2017	NRSP Review Committee Recommendation
NRSP1	75,000	75,000	300,000	300,000	183,500	183,500	183,500	
NRSP3	50,000	50,000	50,000	50,000	50,000	50,000	50,000	
NRSP4	481,182	481,182	481,182	481,182	481,182	481,182	481,182	
NRSP6	150,000	150,000	150,000	150,000	150,000	150,000	150,000	
NRSP7[1]	325,000	325,000	325,000	325,000	325,408	325,408	*Terminated*	
NRSP8	500,000	500,000	500,000	500,000	500,000	500,000	500,000	
NRSP9	175,000	175,000	175,000	175,000	225,000	225,000	225,000	
NRSP10[2]	-	-	-	-	398,631	398,631	370,165	
NRSP_TEMP11[3]	-	-	-	-	-	-	400,000	
TOTAL							**1,959,847**	

†Assuming an acceptable midterm review, all NRSP budgets were approved during 2012 Fall ESS Meeting for the duration of their current, five-year cycles.

[1]NRSP7 will terminate after FY2016 due to lack of matching support.

[2]Unlike other NRSPs, the NRSP10 MRF budget varies. The 5-year budget is as follows (please reference NIMSS for complete budget details):

	FY2016	FY2017	FY2018	FY2019	FY2020
MRF Funding	398,631	370,165	381,834	433,969	406,591

[3]NRSP_TEMP11 5-year Budget Summary.

	Year 1	Year 2	Year 3	Year 4	Year 5
MRF Funding	400,000	400,000	400,000	400,000	400,000
Other Funding	756,354	693,090	735,411	686,632	743,664
Total Project Budget	1,156,354	1,093,090	1,135,411	1,086,632	1,143,664

MRF Cap Comparison Table

	FY2017
All MRF Funding	1,959,847
1% of Hatch*	2,400,000
Difference	440,153

*During the 2015 Fall ESS meeting, an NRSP cap of 1% of the total Hatch budget was approved.

Summary of NRSPs

Project Number	Project Name	Project Period	Midterm Review Year
NRSP-1	National Information Management and Support System (NIMSS)	2014-2017	2016
NRSP-3	The National Atmospheric Deposition Program (NADP)	2014-2019	2017
NRSP-4	Enabling Pesticide Registrations for Specialty Crops and Minor Uses	2015-2020	2018
NRSP-6	The US Potato Genebank: Acquisition, Classification, Preservation, Evaluation and Distribution of Potato (Solanum) Germplasm	2015-2020	2018
NRSP-7	A National Agricultural Program for Minor Use Animal Drugs	2015-2016	-
NRSP-8	National Animal Genome Research Program	2013-2018	2016
NRSP-9	National Animal Nutrition Program	2015-2020	2018
NRSP10	Database Resources for Crop Genomics, Genetics and Breeding Research	2014-2019	2017
NRSP_TEMP11	National Agricultural Research Data Network for Harmonized Data	2016-2021	2019

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Item 16.0: ARS Report

Presenter: Robert Matteri

USDA Agricultural Research Service (ARS)
Report to NCRA State Agriculture Experiment Station Directors

April 2016

Area Leadership

Plains Area

Area Director: Larry Chandler
Associate Area Directors: Bryan Kaphammer; John McMurtry
Colorado, **Kansas**, Montana, **Nebraska,** New Mexico, **North Dakota,** Oklahoma, **South Dakota**, Texas, Wyoming

Midwest Area

Area Director: Robert Matteri
Associate Area Directors: Alberto Pantoja (joined 07/13/2015); J.L. Willett
Illinois, Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, Ohio, Wisconsin

Budget Information

FY 2016 Appropriations

- ARS Salaries and Expenses:
  - $1,143,825,000
  - Increase of $11 million over the FY 2015 spending level
- ARS Buildings and Facilities:
  - $212,101,000
- Certification of animal care policies and Institutional Animal Care and Use Committees (5% held pending certification; $57,192,000)

FY 2017 President's Budget for ARS

- Salaries and Expenses:
  - $1,161,340,000
  - Increase of $17.5 million from the FY 2016 appropriation
  - Increases
    - Pay Cost $11,203,000
    - Program Increases 66,312,000
      - ✓ Combating Antimicrobial Resistance 22,312,000
      - ✓ Climate Change 19,000,000
      - ✓ Safe and Abundant Water Supplies 15,000,000
      - ✓ Foreign Animal Diseases 7,000,000
      - ✓ Avian Influenza 3,000,000
  - Decreases (60,000,000)
    - Proposed Redirections (12,418,000)
    - Proposed Terminations (47,582,000)

- Buildings and Facilities: 94,500,000
    - Ft. Detrick, MD 64,300,000
    - Salinas, CA 30,200,000

New Leadership and Vacancies

Midwest Area

- Illinois
    - National Center for Agricultural Utilization Research (Peoria)
        - Bioenergy Research Unit (vacant; Terry Whitehead, Acting RL)
        - Plant Polymer Research Unit (Veera Boddu; new RL)

- Iowa
    - National Animal Disease Center (Ames)
        - Food Safety and Enteric Pathogens Research Unit (vacant; Shawn Bearson, Acting RL)

- Minnesota (St. Paul)
    - Plant Science Research Unit (Debby Samac; new RL)

- Ohio (Columbus)
    - Soil Drainage Research Unit (Kevin King, Acting RL)

- Wisconsin
    - Dairy Forage Research Center (Madison)
        - Dairy Forage Research Unit (Geoff Brink; new RL)

Plains Area

- Kansas
    - Center for Grain and Animal Health Research (Manhattan)
        - Center Director (vacant, Tom Herald, Acting CD)
        - Stored Product Insect Research Unit, (James Campbell, new RL).

- North Dakota
    - Red River Valley Agricultural Research Center (Fargo)
        - Center Director, Bill Kemp retired. (vacant, Michael Edwards Acting CD)
        - Insect Genetics and Biochemistry Research Unit, (vacant, Joseph Rinehart, Acting RL)
    - Grand Forks Human Nutrition Research Center
        - Center Director Gerald Combs retired (vacant Matthew Picklo Acting CD)
- Oklahoma
    - El Reno
        - Forage and Livestock Production Research Unit (New RL, Prasanna Gowda)
- Colorado
    - New Center for Agricultural Resources Research (CARR) in Fort Collins (Lee Panella, Acting CD)
        - Agricultural Systems Research Unit (ASRU) split between the Rangeland Resources Research Unit (RRRU) and the Water Management Research Unit (WMRU).

        - The combined RRRU and one project from ASRU is renamed the Rangeland Resources and Systems Research Unit (RRSRU) (Justin Derner, RL)
        - The combined WMRU and the remaining project from ASRU is renamed the Water Management and Systems Research Unit (WMSRU) (xxx, Acting RL)
        - The Soil, Plant Nutrition Research Unit and the Sugar Beet Research Unit are merged and the Unit is renamed the Soil Management and Sugar Beet Research Unit (SMSBRU)(Jorge Delgado, Acting RL)
- Texas
    - Bushland
        - Livestock Nutrient Management Research Unit Andy Cole retired (vacant, David Brauer Acting RL)

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Item 18: Nominations Committee Report
Presenter: Ernie Minton, Nominations Chair

AAs to replace Steve Slack:

- NCERA-137 Terry Niblack (OSU)
- NCAC-14 Rick Bennett (KY)
- NCERA-213 David Benfield (OSU)

Action Requested:

1. New AA to NCCC307
2. New MRC member needed
3. Review below FY2017 positions

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NORTH CENTRAL REGIONAL ASSOCIATION OF
STATE AGRICULTURAL EXPERIMENT STATION DIRECTORS
FY2017 Officers and Committee Members
(Fiscal Year 2017 begins **October 1, 2016**)
Last Updated: 4/8/2016

Officers:
A. Clutter, NE, NCRA Chair (aclutter2@unl.edu)
J. Colletti, IA, Chair-Elect (colletti@iastate.edu)

Executive Committee:
A. Clutter, NE, NCRA Chair (aclutter2@unl.edu)
J. Colletti, IA, Chair-Elect (colletti@iastate.edu)
D. Hamernik, NE, Past Chair (dhamernik2@unl.edu)
J. Jacobsen, NCRA, Exec. Vice Chair (Perm) (jjacobsn@msu.edu)

Multistate Research Committee (3-year term):
N. Merchen, IL, MRC Chair (17) (nmerchen@illinois.edu)
G. Cuomo, MN, (16-18) (cuomogj@umn.edu)
D. Scholl, SD, (17-19) (daniel.scholl@sdstate.edu)
G. Smith, MI, (17-20) (smithge7@anr.msu.edu)
J. Jacobsen, Ex-Officio (jjacobsn@msu.edu)

Resolutions Committee (3-year term):
M. Linit, MO, (15-18) (linit@missouri.edu)

Nominating Committee (2-year term):
E. Minton, KS (15-17) (eminton@ksu.edu)

Committee on Legislation and Policy
E. Minton, KS, (Alternate to Clarence Watson) (eminton@ksu.edu)
J. Jacobsen, Ex-Officio (jjacobsn@anr.msu.edu)

NRSP Review Committee Representative (4-year term):
D. Buhler, MI (14-18) (buhler@anr.msu.edu)

ESCOP (3-year term):
A. Clutter, NE, NCRA Chair (16-17) (aclutter2@unl.edu)
J. Colletti, IA, Chair-Elect (16-18) (colletti@iastate.edu)
D. Hamernik, NE, NCRA Past Chair (17) (dhamernik2@unl.edu)
J. Jacobsen, NCRA (Perm Alt) (jjacobsn@msu.edu)

ESCOP Executive Committee:
D. Hamernik, NE, NCRA Past Chair (17) (dhamernik2@unl.edu)
J.Jacobsen, NCRA (Perm Alt) (jjacobsn@msu.edu)

ESCOP Chair's Advisory Committee:
J. Jacobsen, NCRA (Perm Alt) (jjacobsn@msu.edu)

ESCOP Budget and Legislative Committee:
J. E. Minton, KS (eminton@ksu.edu)
K. Plaut, IN (kplaut@purdue.edu)

E**SCOP Communications and Marketing Committee:**
W. Wintersteen, IA (agdean@iastate.edu)
D. Scholl, SD, (daniel.scholl@sdstate.edu)

ESCOP Science and Technology Committee:
J. Colletti, IA, (colletti@iastate.edu)
D. Hamernik, NE, (dhamernik2@unl.edu)
J. Jacobsen, NCRA (Perm Alt; Exec Vice Chair) (jjacobsn@msu.edu)

ESCOP Science and Technology Committee Social Science Sub-Committee (3-year term):
Emily Buck, OH, (15) (buck.210@osu.edu) - Ag Communications
Mike Retallick, IA (13) (msr@iastate.edu) – Ag Education
Soyeon Shim, WI (13) (sshim7@wisc.edu) – Human Sciences
Linda Lobao, OH (14) (lobao.1@osu.edu)– Rural Sociology
Corinne Valdivia, MO, (16) (valdiviac@missouri.edu) – Ag Econ
Mark Skidmore, NCRCRD, (16) (mskidmor@anr.msu.edu)

ESCOP NIMSS Oversight Committee/NRSP1:
J. Jacobsen, NRSP1 Lead AA (jjacobsn@msu.edu)
C. Hamilton, co-NIMSS lead system admin (Christina.Hamilton@wisc.edu)

Other Appointments

North Central Rural Development Center Board (4-year term):
D. Buhler, MI (perm, MSU rep), (buhler@msu.edu)
N. Merchen, IL, (14-18) (nmerchen@illinois.edu)
CY Wang, SD, (14-18) (cy.wang@sdstate.edu)

North Central Bioeconomy Consortium
NCBEC Vice President, J. Colletti, IA (colletti@iastate.edu)

North Central Regional Aquaculture Center
NCRA Representative, E. Minton, KS (eminton@ksu.edu)

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LEAD21 Update

Presenter: David Benfield

For information only

LEAD 21 Board met in Washington, DC on February 26. There are currently 85 participants completing class 10 and enrollment for class 11 will be about 87. There were 110 applications this year, so the program remains popular with the LGUs. Tuition will increase by $250 for the next class and the second session will be held in Phoenix, AZ rather than Kansas City. Dan Rossi is stepping down as chair. Paul Patterson, Dean at Auburn will be the incoming Chair. The contract with UGA was finalized and should be accepted by UGA administration. Board will be working with UGA to set up mechanism for alumni and other interested persons to make tax-deductible contributions to the program.

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Agenda Brief: Communications and Marketing Committee (CMC)
Date: March 7, 2016
Presenter: Richard Rhodes III/Daniel Rossi
Background Information:

1. Committee Membership:

Voting Members:	**First Name**	**Last Name**	**Region**	**Term**
Chair (ESS)	Richard	Rhodes III	Northeast	2014-2017
Incoming Chair (AHS)	Beverly	Durgan	North Central	2015-2018
Past Chair (CES)	Scott	Reed	West	2014-2016
AHS Representative	Nancy	Cox	South	2015-2017
CES Representative	Tony	Windham	South	2014-2016
ESS Representative	Daniel	Scholl	North Central	2014-2016
AHS Chair	Louis	Swanson	West	2015-2016
ECOP Chair	Michelle	Rodgers	Northeast	2015-2016
ESCOP Chair	Shirley	Hymon-Parker	1890	2015-2016
ACOP Representative	Cameron	Faustman	Northeast	2015-2017
ACE Representative	Faith	Peppers	South	2014-2016
CARET Representative	Connie	Pelton Kays	North Central	2014-2016
APLU CGA Representative	Dustin	Bryant	South	2015-2017
Nat'l Impacts Database Representative	Sarah	Lupis	West	2014-2016
Non-Voting Members:				
kglobal Liaison	Darren	Katz	N/A	N/A
Cornerstone Liaison	Hunt	Shipman	N/A	N/A
AHS ED/Admin. Rep	Ian	Maw	N/A	N/A
ECOP ED/Admin. Rep	Jane	Schuchardt	N/A	N/A
ESCOP ED/Admin. Rep	Daniel	Rossi	N/A	N/A

2. Meetings

- The Communications and Marketing Committee (CMC) met by conference call on January 28, 2016
- The CMC met on March 6, 2016 at the CARET/AHS meeting in Alexandria, VA.

3. Updates

- kglobal has released its fourth quarter report (http://nera.rutgers.edu/cmc/kglobalOct2015Report3rdQ.pdf). A separate Executive Summary (http://nera.rutgers.edu/cmc/kglobalQ3ExecSummary.pdf) is also available for those who just need a broader overview of activities.
- The CMC is focusing on implementing the 2016 Plan of Work (POW). Three working groups were appointed and led discussion at the March meeting on the following general areas of the POW:
    - Message Testing
    - Engaging Communicators
    - Communicating CMC Progress

  A series of specific action steps are being developed for each of the strategies associated with these areas as presented in the POW.
- The CMC is also working on a proposal to develop a strategy for reaching out to potential Congressional candidates to explain the value of the LGU's. The proposal will serve a proof of concept for such an effort for future presidential candidates.

Action Requested: For information only.

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ESCOP Diversity in Leadership Task Force

Presenters: Karen Plaut and Jeff Jacobsen
Action: For Information Only

Task Force Members

Karen Plaut (Chair) Purdue University
Charles Boyer, Montana State University
Jackie Burns, University of Florida
Ali Fares, Prairie View A&M University
Tim Phipps, West Virginia University
Soyeon Shim, University of Wisconsin-Madison
Cynda Clary, Oklahoma State University
Doze Butler, Southern University and A&M College
Shannon Archibeque-Engle, Colorado State University
Sarah Fox Dayton, Cornell University
Carolyn Brooks, ARD
Dan Rossi, NERA
Rubie Mize, NERA
Sarah Lupis, WAAESD
Chris Hamilton, NCRA
Jeff Jacobsen, NCRA

Background

The Diversity Task Force was created by ESCOP to explore the topic of diversity in research leadership across the Land-grant University System, to provide ideas and actions for consideration, and to supplement institutional, regional and national diversity and inclusion efforts. The focus should be primarily on enhancing diversity among the Experiment Station Directors, Research Directors, and their associates and assistants.

Summary of Activities

The 16-member Task Force has worked through teleconferences, literature readings and associated activities, and electronic communications. The group has refined the Task Force charge, created timelines and reached consensus on overall purpose, approaches and desired outcomes. To date we have generally discussed diversity and inclusion issues across the spectrum of LGUs programs – teaching, Extension and research with undergraduate and graduate students, staff, faculty and administrators. Members have reviewed and discussed some information and data associated with the university faculty diversity across all of the 1862 and 1890 institutions. In addition, prior information was collected across dean and department units just in 'Colleges of Agriculture" and their respective departmental units. Both data sources were grouped into the regional association groupings. Collectively, this information shows a consistent view of limited diversity with some regional variations.

Most recently, the Task Force has synthesized our discussions into nearly 25 Concepts. The Concepts were grouped to encompass multiple similar ideas for the purpose of forming working groups that could address a specific topic. Their purpose is to create specific actionable ideas applicable to strategic activities to improve ESS. At this point in time the Core Concepts were grouped into five areas: Recruitment and Mentoring, Training, Regular ESS

Activities, Integration and Best Practices. These will serve to frame our initial recommendations and will likely evolve as more information is presented and prioritized as key action items. Our next call is March 7, 2016.

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ESCOP Budget and Legislative Committee Agenda Brief
Presenters: Gary Thompson and Mike Harrington
For information only

The committee holds regular conference calls on the last Tuesday of each month. These calls have generally been well attended. The current B&L Committee membership is shown below.

Chair: Gary Thompson (NERA) **Delegates:** Moses Kairo (ARD) Carolyn Brooks (ED-ARD) Karen Plaut (NCRA) Ernie Minton NCRA Tim Phipps (NERA) Jon Wraith (NERA) Bill Brown (SAAESD) Saied Mostaghimi (SAAESD) Jim Moyer (WAAESD) Glenda Humiston (WAAESD) *****Chair elect **Executive Vice-Chair** Mike Harrington (WAAESD)	**Liaisons** Rick Klemme (ECOP Liaison) Bob Holland (NIFA) Paula Geiger (NIFA) Vacant (ARS) Glen Hoffsis (APLU Vet Med) Eddie Gouge (APLU) Ian Maw (APLU) Becky Walth (CARET) Cheryl Achterberg (APLU - BoHS) Jim Richards (Cornerstone) Hunt Shipman (Cornerstone) Vernie Hubert (Cornerstone) Jeremy Witte (Cornerstone)

The B&L Committee will be holding a breakfast meeting on March 7 with the ECOP BLC in conjunction with the AHS-CARET meetings. Discussions will focus on advocacy for both competitive and capacity funding, identifying and coordinating the roles of the respective B&L committees.; identifying and needed "work products" that haven't already been generated (pre-review documents); and Creating broad-based support of major initiatives in the context of the water security initiative.
Are we following up on our initiation strategy document for new initiatives?

ESCOP B&L Priorities Statement on the proposed NIFA FY 2017

We support the BAC long-standing policy of "do no harm" to existing efforts. Beyond that overarching goal, here are comments about the proposed budget and requests that relate to research programs. These positions do not detract from any priorities advanced by our Extension colleagues.

Crop Protection-Pest Management -- We support the $3M increase for Crop Protection and also support language that precludes charging indirect costs against Extension Implementation Program Area grant awards.

Efforts of 1890 and 1994 Institutions -- We support all proposed increased funding of 1890s and 1994 institutions.
SARE - We support proposed increases for Sustainable Agriculture Research and Education (SARE)
Capacity Funds - Our goal always is to seek an increase in Hatch; however, we support level funding as proposed. Level funding translates into a 3 - 5% annual reduction in available program funds due to increasing costs for salaries, supplies and operations. The Hatch program has been level funded for the past 3 years resulting in a minimum loss of 10% in capacity
AFRI -- We support growth in the AFRI discretionary funding from $350M (FY 2016) to $375M (FY 2017). We also support full funding of AFRI at its authorized level of $700 million through However, we understand that increased mandatory funding requires a reduction in spending elsewhere in the budget. Growth in AFRI must not be at the expense of existing programs or capacity funding.
BAC Priorities: The BAC met by conference call on Feb 16 to finalize the system's response to the President's FY 2017 Budget Proposal The BAC approved appropriations requests for the National Institute of Food and Agriculture (NIFA). These include support for AFRI at the full authorized level of $700 million, support for capacity funding increases for 1962, 1890 institutions and McIntire Stennis programs. With the withdrawal of the 1994s from APLU, the 1994 Research and Extension lines were removed as priorities. The BAC position is to endorse the President's Budget or our 2017 numbers whichever are higher.

All documents related the federal budgets are located at the land-grant.org.

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ESCOP Science and Technology Committee

Presentors: Marikis Alvarez and Jeff Jacobsen
Acton Requested: For Information Only

Committee Members	
Marikis Alvarez (Chair, ARD)	**Liaisons:**
Larry Curtis (WAAESD)	Terry Nelsen (ERS)
David Thompson (WAAESD)	tbd (OSTP)
Joe Colletti (NCRA)	Bob Matteri (ARS)
Deb Hamernik (NCRA)	Charles Allen (Pest Mgmt Subc)
Cameron Faustman (NERA)	Edwin Price (ICOP)
Adel Shirmohammadi (NERA)	Dwayne Cartmell (Social Sci Subc)
Nathan McKinney (SAAESD)	Parag Chitnis (NIFA)
Harald Scherm (SAAESD)	Denise Eblen (NIFA)
John Yang (ARD)	
Ed Buckner (ARD)	Jeff Jacobsen (Exec Vice-Chair, NCRA ED)

General – The Science and Technology Committee (S&T) has regular monthly calls on the third Monday of each month. All meeting agendas and minutes are posted at: http://escop.ncsu.edu/ViewCommittees.cfm?comid=5 . Membership to S&T is being updated, particularly with the Liaisons to the Committee (e.g. Bob Matteri, Charles Allen, Dwayne Cartmell). In addition, membership to its two subcommittees -- National Integrated Pest Management Coordinating Committee (NIPMCC) and Social Sciences Committee (SSSc) is being identified and will enable fully constituted groups to move forward and develop their agendas and S&T linkages.

SSSc Update – The Social Sciences Subcommittee of ESCOP S&T met on February 3-4, 2016 in Washington, DC. The core of the meeting and the primary discussion areas centered on Environmental Sustainability and Impact Measurements with invited presentations from NIFA, The Council on Food, Agricultural and Resource Economics, Rural Policy Research Institute and the Consortium of Social Science Associations. In an effort to set the stage to better connect and integrate with ESCOP, presentations and discussions were focused on the National Impact Database (Jack Elliot & Scott Cummings), Oregon State's Impact State Reporting training (Johanna Mitchell) and Creating Impact Stories (Faith Peppers). Topical updates were also provided by Dan Rossi on the Water Security white paper and Diversity Task Force. SSSc is interested in creating an active Executive Committee and to connect in meaningful conversations throughout the year to engage and lead efforts based upon their social sciences expertise and interest.

Report Discussions – Antibiotics are frequently labelled 'wonder' drugs for their profound impact on human and animal health. Over the past several decades, bacterial resistance to antimicrobial drugs

has increased. A significant number of discussions, actions and reports have and are being developed such as: The Centers for Disease Control and Prevention (CDC), World Health Organization and Presidential Executive Order "Combatting Antibiotic-Resistant Bacteria" followed by the "National Strategy for Combating Antibiotic-Resistant Bacteria. Many have elements that directly pertain to research and education activities. Most recently, a Task Force with APLU and the AAVMC members published a report "Addressing Antibiotic Resistance in Production Agriculture" that synthesized the issue and provides an active template for additional thought and action. S&T is actively digesting and will respond to this opportunity that spans teaching, training, Extension and research recommendations. The holistic concept of 'One Health' provides a framework for work across human, animal and environmental health and antibiotic resistance.

A National Summit Antimicrobial Stewardship: Policy, Education and Economics was held in Washington, DC January 20-21, 2016. In addition, a multistate research committee NCDC230 Antimicrobial Resistance has been recently been formed. All are indicative of the need and the substantial and complex challenge that this initiative reflects.

Award Recognitions – The call for the ESS Excellence in Leadership Awardees has been sent from all regional associations. Each regional association at their spring meeting will select their winner and compile summary materials to be submitted to the S&T Executive Vice-Chair. This information and pictures will be refined and submitted to APLU for inclusion in the official booklet ***A Community of Scholars Honoring Excellence*** and the National Awards Program. In addition, the S&T Committee will receive and evaluate the Excellence in Multistate Research Award regional nominees, individually rank and transmit its overall findings to ESCOP for concurrence. These Multistate Awardees will also be included in the official booklet and program. S&T will be responsible for working with APLU to ensure a high quality program for all of these outstanding contributions.

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Field Day Schedule

North Central Region Association of Agricultural Experiment Station Directors

Marriott Courtyard Hotel, Isla Verde Puerto Rico
Wednesday, April 6, 2016

6:45 AM	*Departure*	
8:20 AM	***University of Puerto Rico, College of Agricultural Sciences, Agricultural Experiment Station at Juana Diaz***	
8:20 AM	*Dr. Héctor L. Santiago* *Prof. Irma Cabrera*	*Welcome Remarks*
8:30 AM	*Dr. Raúl Macchiavelli* *Dean and Director*	*Overview of UPRM College Agricultural Sciences*
9:30 AM	*Dr. Esbal Jiménez* *Associate Dean*	*Overview of the UPRM Agricultural Experiment Station*
10:30 AM	*Dra. Consuelo Estevez* *Professor*	*Plant Disease Diagnostics Laboratory*
11:30 AM	*Depart*	
12:00 PM	*Lunch*	
12:30 PM	***Monsanto Puerto Rico – www.monsanto.pr*** ***Agro. Eric Torres*** ***General Manager***	

Monsanto Caribe LLC is part of the Puerto Rico seed breeding industry. Monsanto has operated in Puerto Rico since 1996, when it acquired Asgrow Seeds. Asgrow had been operating in Puerto Rico since 1983.

Monsanto's operations on the Island consist of agricultural biotechnology and plant breeding research to develop the best soybeans, cotton, corn and sorghum seeds for farmers. The seeds produced IN Puerto Rico are then sent to other

Monsanto sites for additional testing and for large-scale seed production.

Monsanto's operations in Puerto Rico consist of:

- ***Multi-Season Program*** *– The cultivation of corn for Hybrid Make-up as well as different soy projects. These are sent to different testing locations principally to the USA. The process is generally performed between the months of October and March.*
- ***Cotton and Soy Trait Integration*** *– The process of combining the best characteristics or genetic traits, in cotton and soy crops to improve the benefits in costs, and in the production for farmers.*
- ***Manufacturing*** *– The cultivation of soy, corn and sorghum grow-outs during three annual cycles. Soy generally grows from November to February (1st cycle) and February to May (2nd cycle). Sorghum and corn grow outs generally have a window from November to February.*

1:30 PM *Depart*

2:00 PM ***Gargiulo Farms***
Agro. Guillermo Fernández
Agronomist and General Manager

Gargiulo's farm is an 800-acre dedicated to the production of tomatoes, melons and pineapples located in Santa Isabel, PR. It employs around 700 employees and has $9.2 million in yearly revenue.

Gargiulo farm, produces an average of 1.5 million 25-pound boxes, or 37.5 million pounds of "beefsteak" and "homegrown" tomatoes. Their production satisfies a 100% of Puerto Rico's demand through island supermarkets and chains, as well as major restaurants. Gargiulo exports more than 1 million boxes to the U.S. east coast, as the tomatoes are preferred in that market for their taste and high quality.

3:00 PM *Depart*

3:30 PM ***Martex Farms – www.martexfarms.com***
Mr. Veny Martí
Vice President of Operations

Martex Farms is a family owned business established in 1989 and dedicated to the growing, processing, packing and shipping of tropical fruits and plants. The companies facilities operate on a 3,000-acre farm located in the Santa Isabel and Juana Díaz valleys, in the south coast of Puerto Rico.

Martex Farms are leaders in the ornamental sector and the tropical fruit industry under the main brands: *Veny, Tropi Mango, Mango Rico* and *Pango Mango*. The company caters mango to the European and US markets and offer the Puerto Rican and USVI market a variety of tropical fruits such as: mango, banana, avocado, star fruit, mamey sapote, sapodilla, sugar apple, spanish lime, citrics, among many others.

4:30 PM *Depart*

6:00 PM *Dinner at Los Olivos Restaurant, Caguas. Website: www.losolivospr.com*

8:00 PM *Depart to hotel*

Charles Valentine Riley Memorial Foundation

RMF Position Statement on Pursuing a Unifying Message

Elevating Food, Agricultural and Natural Resources Research as a National Priority

The United States is unprepared to meet this century's formidable challenges of hunger and malnutrition, climate change, environmental degradation and emerging plant and animal diseases. The enormity of these issues is unprecedented and can only be viewed in the global context of the inexorable addition of more than 2 billion people to the world's population over the next 40 years. As the clock is ticking, the pressures are mounting. A sustainable future for America and the world is in the balance.

A Deficit of Solutions? Public investment in research to meet looming food, agricultural and natural resources problems is woefully inadequate. For decades, support has been stagnant or in a state of decline. The United States is in danger of losing its leadership position in food, agricultural and natural resources research as other nations increase their investments. A deficit of public research funding translates into an innovation deficit and, ultimately, a deficit of solutions.

For the Public Good. Results of food, agricultural and natural resources research impact the lives of everyone on a daily basis — safe, nutritious and health-promoting food, clean drinking water, sustainable natural resources, renewable energy and a robust economy. Agriculture is not only a key national engine of economic growth, it is the foundation for national security. We depend on agriculture for a safe, plentiful food supply and the accessible, nutritionally sound and affordable diet necessary for the public health. Globally, food insecurity is found at the heart of conflict and political instability. Publicly funded food, agricultural, and natural resources research must lead in addressing challenges unlikely to be taken on by the private sector or that require the long view — a sustained focus and effort to achieve future success. Publicly funded research emphasizes returns to society and the rapid, widespread availability of new science-based knowledge. Steady, sustained support for public research lays the foundation for discovery that the private sector builds upon for highly valued products and technologies.

Changing the Paradigm. To successfully advocate for the public resources to make food, agricultural and natural resources research a higher national priority, a paradigm shift must occur. The old model of many stakeholder voices pitted against each other, advocating for narrow and shrinking slices of federal resources, must be recast as a convergence of voices working together with a unified message in support of expanding total research funding in this critical area.

A Pivotal Moment. Since 2013, the Charles Valentine Riley Memorial Foundation and its partners have invited key stakeholders and interested parties to envision the opportunity for a convergence of efforts that result in development of a unified message — one that calls for public investment in food, agricultural and natural resources research as a higher national priority. A common thread of the dialogue has been exploring the formation of a broad coalition committed to develop the compelling case for enhanced investment in research. The times call for an inspiring vision, bold action and a

heightened sense of purpose. For our common future, funding this research must be given the priority it deserves.

The Riley Memorial Foundation Supports:

- Ongoing efforts to elevate public food, agricultural and natural resources research as a national priority.
- Participation in a broad coalition of stakeholders to develop and deliver a unified message on the need for strengthening the U.S. food, agricultural and natural resource research portfolio.
- Development of a unified message that makes clear the essential nature of this research and related education and technology transfer activities that contribute to the public good, including economic growth and jobs, and quality of life improvements.
- A commitment for increased investment in research throughout the federal agencies with significant roles in addressing critical priorities associated with food, agriculture, nutrition and health, natural resources and the environment.
- Growing each of the key components of the agricultural research funding portfolio that supports the national system delivering results for the public good:
    - **Competitive grants,** to take advantage of innovation at public and private universities, federal laboratories and other organizations with scientific and technical expertise — and the commitment to multi-partner, multidisciplinary collaboration — that contribute to beneficial results to society.
    - **Capacity funds**, for state (universities) and federal (such as USDA Agricultural Research Service and Forest Service) institutions to continue to provide a stable scientific workforce and research sites that conduct research requiring long-term commitment and potential high-risk/high-payoff solutions, while maintaining the capacity to rapidly deal with crisis situations.
    - **Public-private partnerships**, to support growing the number of efforts like the Foundation of Food and Agricultural Research, a nonprofit corporation that matches public funds with private funds to conduct research on problems of national and international significance.
- A national food and agricultural research, education and extension system that:
    - builds and maintains a critical mass of well-trained scientists, educators and extension personnel to ensure that the U.S. remains the leader in global agricultural production;
    - provides a safe, affordable and nutritious food supply;
    - increases economic opportunities for farmers, businesses, families and communities; and
    - conserves natural resources and protects the environment for a sustainable future.
- Ensuring that an effective, efficient transfer of science-based knowledge and technology for the benefit of food and agricultural producers and consumers remains a high priority in future budgets: a critical component to successfully meet the global challenge of feeding more than 9 billion people by the year 2050.

More information: Charles Valentine Riley Memorial Foundation

January 25, 2016

Charles Valentine Riley
Memorial Foundation

Pursuing a Unifying Message: Overview

The Charles Valentine Riley Memorial Foundation (RMF) has been leading a collaborative effort to pursue a unifying message in support of elevating food, agricultural and natural resources research as a national priority. This effort has been a launching pad — not to craft the message, but to inspire diverse stakeholders to come together, understand how important this goal is for society and realize the benefits of a shared approach and a compelling, common message to make this research the priority it must be for our common future. However, the ultimate goal is to craft a unifying message that will have broad support.

2013

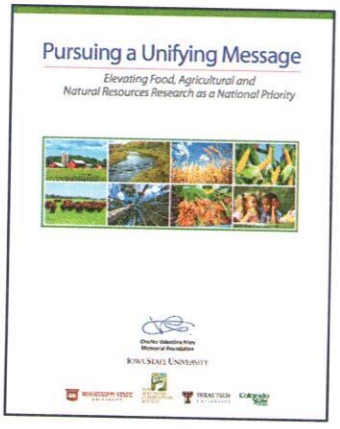
In June, discussion at the RMF and American Association for the Advancement of Science (AAAS) Riley Lecture Leadership Breakfast focused on concerns about the nation's future position internationally due to declining research investment and a decline in productivity. A key point: Federal priority for agricultural research wouldn't change unless the agricultural community could unite with a common message and goal.

In July, RMF released a briefing paper on international investments in agricultural research and productivity data from USDA-ERS. In August, a *Science* editorial written by Alan Leshner, then the CEO of AAAS, stated: *"Agriculture R&D provides a dramatic example of how neglect can undermine a scientific domain."*

In November, RMF organized a focus group of 17 participants hosted by AAAS to discuss advancing food, agricultural and natural resources research through development of a common message. A partnership was formed to explore pursuing a unifying message, led by RMF and Iowa State University and including Mississippi State University, Soil and Water Conservation Society, Texas Tech University and Colorado State University.

2014

Planning began in January for an RMF report making the case for pursuing a unifying message. In June, a unifying message was part of the panel discussion at the 2014 Riley Memorial Lecture at AAAS, and central to the keynote address by Dr. Duane Nellis, president of Texas Tech University, at the 2014 RMF/AAAS Riley Leadership Breakfast.

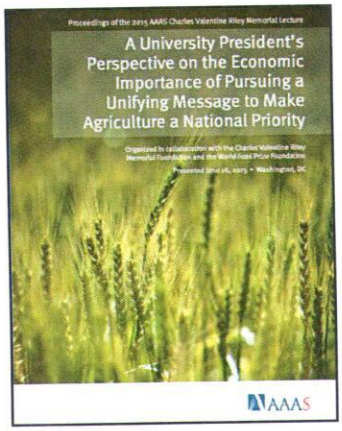


In December, the RMF report, *Pursuing a Unifying Message: Elevating Food, Agricultural and Natural Resources Research as a National Priority* was released at the National Press Club. ***The report is available online: rileymemorial.org/***. The report concluded that the nation's leadership and competiveness on a global scale are at stake. China and India are dramatically increasing investments in agricultural research compared to waning support in the US. Also, agricultural productivity rates in China and Brazil are increasing rapidly while the same rates are slowing in the U.S. Awareness is growing that U.S. agriculture is unprepared to meet looming challenges facing the nation and world and increased federal funding will be required to meet those challenges. Resulting research should impact the lives of everyone, resulting in safe and nutritious food, healthy families, quality environment, renewable energy and a growing economy.

2015

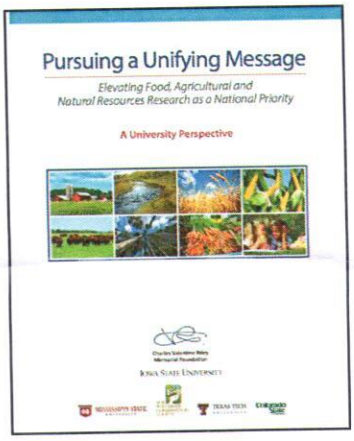
In April, RMF held a stakeholder event, hosted by AAAS, with 23 leaders of universities and university associations to discuss the unifying message.

In June, the 2015 AAAS Charles Valentine Riley Memorial Lecture was presented by Dr. Steven Leath, president of Iowa State University — *A University President's Perspective on the Economic Importance of Pursuing a Unifying Message to Make Agriculture a National Priority*. ***The lecture proceedings and video are available online: aaas.org/riley-lecture.***



Complementing the Riley Lecture's unifying message theme was the keynote address by Dr. Randy Woodson, president of North Carolina State University, at the 2015 RMF/AAAS Riley Leadership Breakfast.

At the same time, RMF released its second report summarizing the university stakeholder discussion, *Pursuing a Unifying Message: Elevating Food, Agricultural and Natural Resources Research as a National Priority. A University Perspective.* ***The report is available online: rileymemorial.org/***.



On December 9, 2015, RMF conducted another stakeholder event, hosted by AAAS, with leaders from 23 scientific societies and associations. A report on the event will be released in early 2016 as the third unifying message report.

By the end of 2015, endorsements in support of pursuing a unifying message were received from 6 university presidents, chairs of 2 key committees within the Board on Agriculture Assembly within the Association for Public and Land-grant Universities, the Non-land grant Agricultural and Natural Resources Universities, the Southwest Council for Agribusiness and a commodity organization.

2016

RMF plans under development for 2016 include:

- Holding a third stakeholder event on May 3 at AAAS for leaders in the food, nutrition and health research area. Other stakeholder events also are under consideration.
- Securing additional endorsements from key leaders and stakeholder organizations. (In early 2016, endorsements were received from the Delta Council and 4 farm or commodity organizations.)
- Looking forward to the 2016 AAAS Riley Memorial Lecture in June, which is expected to again address or highlight the pursuit of a unifying message.
- Working to develop plans for a final, integrated report on the unifying message, tentatively aimed at release in January 2017.

About the Charles Valentine Riley Memorial Foundation (rileymemorial.org/)

The theme of many RMF activities is "to promote a broader and more complete understanding of agriculture as the most basic human endeavor and to enhance agriculture through increased scientific knowledge." RMF builds upon Charles Valentine Riley's legacy as a "whole picture" person, recognizing that a vibrant and robust food, agricultural, forestry and environmental-resource system is essential for human progress and world peace.

February 17, 2016

The Protein Highway

A Whitepaper for Creating a Regional Approach to Enable Innovative Agricultural Technology Solutions from Plant Proteins

Prepared for:
Consulate General of Canada in Minneapolis

Prepared by:
Dr. David Gauthier (Saskatoon Regional Economic Development Authority) and
Dr. Larry Sernyk (Retired)

dgauthier@sreda.com
jlsernyk@att.net

February 12, 2016

Executive Summary

The Protein Highway is an initiative to enhance cross-border collaboration among entrepreneurs, researchers and investors across the Canadian Prairies and Upper Midwest/Great Plains region and stimulate economic growth and prosperity in innovative agricultural technology solutions to meet the ever-growing global demand for plant-derived protein.

Key activities of the Protein Highway include:

- Creating an innovation hub that facilitates collaboration among world class researchers to develop novel, value-added products from regional protein crops;
- Connecting ideas with entrepreneurs;
- Enabling companies for scale-up; and
- Showcasing regional opportunities to investors in agricultural innovation.

As the global population grows to 9 billion by 2040, the demand for protein will double. Although animal-based protein is often preferred by increasingly wealthy consumers, there will be a corresponding increase in demand for plant-derived protein to feed these animals. Changes in cultural, health and environmental factors are also anticipated to increase direct demand for whole format protein crops, novel plant-derived protein ingredients, meat replacements and specialty industrial ingredients.

The US-Midwest/Great Plains and Canadian Prairies region is well positioned to be a key player in the development of value-added plant proteins for domestic and global markets. The region possesses strong capabilities in producing and processing a number of crops that are ideal feedstocks for processing into value-added protein products for human consumption, pet foods and aquaculture. Technologies for economical extraction of value-added proteins have been scaled by companies in the region, which is also known for its high quality agricultural production, innovative human and capital resources and proximity to business, population, transportation and education centers.

Through collaborative promotion, research, business development and investment, the Protein Highway will become globally recognized as the region of choice for secure and sustainable production of high-quality plant proteins.

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The Consulate General of Canada in Minneapolis represents Canada in Iowa, Minnesota, Nebraska, North Dakota, and South Dakota. Canada enjoys close ties with all five of these Upper Midwest states – in fact, Canada is the largest export customer for all of them. Annual two-way goods trade between this region and Canada averages $36 billion, supporting 376,400 jobs per year. The Consulate General is part of a network of Canadian offices working to promote trade and investment links, to engage citizens and decision-makers on many matters of shared interest, and to assist Canadians living and traveling in the United States.

The Protein Highway Opportunity

Background

During the summer of 2015, the Consulate General of Canada in Minneapolis assembled a diverse working group representing Canadian and U.S. stakeholders from industry, academia, government and investor organizations to explore the concept of branding the Canadian Prairies and U.S. Upper Midwest/Great Plains region as a "Protein Highway." This bi-national region is a global powerhouse for crop production and value-added agriculture. Enhancing cross-border collaboration among entrepreneurs, researchers and investors in value-added agriculture holds enormous potential for stimulating economic growth and prosperity in innovative agricultural technology solutions to meet the ever-growing global demand for plant-derived protein.

The primary goal of the Protein Highway is to spur the creation of an innovation hub that facilitates collaboration among world class researchers at such institutions to develop novel, value-added products from the protein crops produced in the region; connects ideas with entrepreneurs and enabling companies for scale-up; and showcases regional opportunities to investors in agri-innovation. This whitepaper outlines the socioeconomic case for the initiative and will serve as a resource as the Protein Highway is launched in 2016—the International Year of Pulses.

The Case for Plant Proteins

Supply vs. Demand

Global population is on par to reach approximately 9 billion by 2040[1]--presenting tremendous challenges for meeting basic food requirements. As developing countries become wealthier, the demand for quantity and quality of food is not linear with population growth: higher wealth results in rapid increases in caloric intake and consumption of animal protein that eventually plateaus at 3000 calories per day and 50 grams of animal protein per day, respectively.[2] Recent estimates suggest that twice as much animal protein will be needed to feed 9 billion people than the current 7 billion on the planet.[3]

To meet the demand for additional dairy, poultry, beef, pork and other animal proteins, more agricultural land will have to be allocated to feed-based products and away from other crops for human consumption and bio-energy production. These challenges will be compounded by climate change, the decreasing availability of agricultural land per capita, and environmental degradation caused by free-

[1] *"World Population Clock". Worldometers. Retrieved 24 October 2011*

[2] Zulauf, C. "China, India, the Food Transition, and Future Demand Growth." *farmdoc daily* (5):122, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, July 2, 2015

[3] Boland, M. "Global Food Supply: the world's need for protein." Riddet Institute

grazing.[4] In the shorter term, opportunities exist to improve feed crops for enhanced palatability, protein content, digestibility, and feed conversion for animal uses. However, in the future, much more of the protein consumed by humans will likely have to come directly from crops and from more efficient animal sources, such as fish.

These converging forces are creating a pending protein crisis in developing economies—especially in India, Pakistan, Indonesia and Africa.[5] As an illustration, India passed the National Food Security Act in 2013 to ensure access to adequate food at affordable prices. The act allows two-thirds of its population access to five kg of rice, wheat or cereals per month at highly subsidized prices, but it has been suggested that pulse crops could create better nutrition outcomes for humans, while coarse cereals could be deployed to raise animals.[6] To meet these commitments, India is likely to actively pursue food supply agreements, similar to the case with its energy security strategy (e.g. India signed a five-year $350 M uranium deal with Canada in April 2015).

Health and Cultural Drivers

Numerous scientific studies have demonstrated significant health benefits of plant-based diets, including reductions in obesity, diabetes, heart disease, high blood pressure and mortality.[7] Health conscious consumers in wealthier nations are driving an opposite trend when compared to their developing economy counterparts: consumption of meat in the U.S. has decreased 7% since 2007,[8] approximately 4% of the population is vegetarian or vegan and 47% of consumers eat at least one vegetarian meal each week.[9] As consumers move away from meat products, there has been a corresponding rise in products advertised as "high in protein." These products primarily contain soy proteins, but other plant proteins are beginning to emerge.

To increase this trend further and more rapidly, innovation is required to improve the palatability, aroma, digestibility, and functionality of plant-derived proteins for direct human consumption. A wider variety of protein-rich crops is also needed to satisfy a health conscious consumer that desires tasty and varied food options. Consumers and food processors in North America could be educated on both the health benefits and positive taste profiles of plant-based food ingredients incorporated into popular items such as cereals, granola bars and other snack items. This represents a huge market opportunity for North American pulse growers that supply the majority of peas, lentils, beans, etc., to the developing world (particularly Asia) for whole-format consumption, but relatively little to consumers closer to home.

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[4] Churchouse, P. "Agricultural Investments—The New Big Thing, The Next Big Bubble?" The Churchouse Letter, Churchouse Publishing, July 2011

[5] Boland, M. "Global Food Supply: the world's need for protein." Riddet Institute

[6] Kishore, A., Joshi, P.K., and Hoddinott, J. "India's Right to Food Act: A Novel Approach to Food Security. http://www.ifpri.org/publication/india%E2%80%99s-right-food-act-novel-approach-food-security"

[7] Tuso et. al. "Nutritional Update for Physicians: Plant-Based Diets." The Permanente Journal, 2013 Spring; 17(2): 61-66

[8] NCC. 2014. Per capita consumption of poultry and livestock, 1965 to estimated 2014, in pounds. National Chicken Council, Washington, D.C.

[9] VRG. 2012. How often do Americans eat vegetarian meals? And how many adults in the U.S. are vegetarian? Press release, May 18. Vegetarian Resource Group, Baltimore, Md.

Cultural and religious factors also play a role in the amount of plant protein consumed compared to animal protein. Growth of animal protein consumption is lower in India than China, due to high vegetarian rates (25 to 30%) among Hindus.[10] Lentils, pigeon peas, mung beans, chickpeas, kidney beans and black-eyed peas are also traditional staples in India—attenuating demand for animal proteins to a degree.[11] As a result, the need for plant proteins for direct human consumption is likely to increase rapidly in India as wealth increases in addition to feeds for livestock.

In China, there has been a dramatic increase in caloric intake since market-oriented reforms were launched in 1978.[12] Protein intake has doubled over this same period—three-quarters of which is livestock-based. In contrast to India, the shift from traditional staples to a western diet does not appear to be mitigated by cultural or religious factors. The rapid increase in demand for meat has tripled the need for cereals as feed ingredients, making it more difficult for China to maintain food self-sufficiency targets, although it will not be as reliant on imports as India.

Value-Added and Specialty Products

Markets for both plant and animal proteins as ingredients in value-added products are growing.[13] The global market volume for animal-derived protein ingredients in 2012 was 2.3 M metric tons, compared to 1.7 M metric tons for plant-derived protein ingredients. The global market for protein ingredients is projected to reach almost $34 B by 2020.[14]

Plant-derived proteins can offset market share from animal-derived protein where they meet or exceed the functionality of animal-derived proteins and can be produced at competitive prices. There is limited consumer knowledge of plant-derived proteins other than soy, but new alternatives are gaining traction and popularity—including pea protein isolates and proteins from oats, rice, potato, canola, hemp, alfalfa, algae, fava bean, nuts, ancient grains, corn-based dried distillers grains and others.[15] Traditionally, North American consumers are not widely accustomed to eating whole-format plant proteins like pulses, creating an enormous short term market opportunity for new plant protein ingredients.

Approximately half of protein ingredients are used in non-food applications, such as personal care and cosmetics, pet foods and various industrial applications. Again, demonstration of equivalent, superior or novel functions and economics compared to existing alternatives is essential to their market success.

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[10] *Simoons, Frederick (1994).* Eat not this flesh: food avoidances from prehistory to the present. *Univ of Wisconsin Press. p. 6.* ISBN 978-0-299-14254-4.

[11] *Bruce F. Johnston (1958). The Staple Food Economies of Western Tropical Africa. Stanford University Press. p. 14. ISBN 978-0-8047-0537-0. Retrieved 2 June 2012*

[12] https://www.worldbank.org/content/dam/Worldbank/document/EAP/China/China_Economic_Update_June2014.pdf

[13] Frost and Sullivan. http://www.globalfoodforums.com/wp-content/uploads/2013PTT-Strategic-Insights-into-the-Global-Protein-Ingredient-Market-C.Shanahan.pdf

[14] http://globenewswire.com/news-release/2015/07/01/749005/10140356/en/Protein-Ingredients-Market-Analysis-By-Product-Plant-Proteins-Wheat-Soy-Protein-Concentrates-Soy-Protein-Isolates-Textured-Soy-Protein-Pea-Canola-Animal-Dairy-Proteins-By-Applicati.html

[15] http://www.grandviewresearch.com/industry-analysis/protein-ingredients-market

Sustainability

Food production requires an extraordinary amount of inputs and must be balanced with other demands for land, energy and water.[16] Despite impressive improvements in resources required to produce a kg of animal protein, the overall efficiency of feed conversion to produce animal protein remains low. To produce 1 kg of animal protein requires 10 kg of feed for beef, 5 kg of feed for pork, 3 kg of feed for poultry, 4 kg of feed for eggs and 5 kg of feed for milk.

Aquaculture presents a critical opportunity for food production as the need for feeding efficiencies begin to influence production economics. AquaBounty Technologies Inc. (Massachusetts and Prince Edward Island) claims a feeding efficiency of 1 kg per kg of animal gain for their transgenic Atlantic salmon. Specialized plant-derived protein feed products will be required to realize aquaculture opportunities.

Meat Consumption Impact by the Numbers

320
Number of miles driven saved for each burger you don't eat.

91 BILLION
Number of miles saved if everyone in the USA ate no meat or cheese one day a week for a year.

4
Eating vegan for four days a week is the carbon-savings equivalent of three months with no car for a family of four.

1,811
Increase in gallons of water needed to produce a pound of beef vs. a pound of veggies.

0.5
Amount by which you would cut your carbon footprint if you ate half the amount of meat the average American does.

Sources: Meatless Monday; The New York Times; TIME Magazine; Physicians Committee for Responsible Medicine; Nutrients; Nature; American Journal of Clinical Nutrition

Other sources of protein also have promise to meet increased protein demands. For example, Solazyme (California) is using algae to produce AlgaVia®, which makes reduced fat foods taste richer and vegan protein fortification simpler. Whey proteins from milk could also be an important market for the Protein Highway, due to the large number of dairy cattle present in parts of the region. Sapphire (California) is also using algae for feed, food and energy industries.

Increasing competition for water between industrial, domestic and food production uses will also influence food choices. The production of one kg of grain generally requires much less water than one kg of animal protein, although the magnitude of difference varies greatly depending on crop/animal type, local environment and production practices.[17] As the global demand for protein increases, the inefficiencies of the incremental step of converting plant proteins into animal proteins is not likely to be sustainable at the current pace.

Producers are continually looking for new, valuable crop alternatives that fit well within a robust rotation scheme. Climate change and continued advances in the development of new varieties/hybrids will allow producers in the target region to grow a wider variety of crops than before—as evidenced by the dramatic increase in soybean acres in

[16] Boland, M. "Global Food Supply: the world's need for protein." Riddet Institute
[17] http://unesdoc.unesco.org/images/0021/002154/215492e.pdf

Manitoba over the past few years. As the global demand for plant-derived protein increases, continuous cropping of only one or two crop species may become more economically attractive in the short-term—but also risks increased incidence of disease, herbicide-resistant weeds, poorer soil quality, and need for more fertilizers. Crop rotation and on-farm decisions will also be influenced by the environmental footprint of various crop alternatives over a 3 or 4 year rotation cycle. For example, anchoring a cropping system in a pulse crop/brassica combination could demonstrate increased carbon capture and reduced need for nitrogen fertilizers.

Development of new protein-rich crops and new processing technologies needs to occur now to generate solid agronomic data prior to potential protein shortages, which might incentivize continued reduction in cropping diversity in the region.

The US-Midwest/Great Plains and Canadian Prairies Advantage

The US-Midwest/Great Plains and Canadian Prairies region is well positioned to be a key player in the development of value-added plant proteins for domestic and global markets. The region has very strong capabilities in producing and processing a number of crops that are ideal feedstocks for processing into value-added protein products for human consumption, animal feed, pet foods and aquaculture.

Current capabilities of the US-Midwest/Great Plains and Canadian Prairies Region

To identify current capabilities in the region, the Manitoba Agri-Health Research Network facilitated a mapping of key assets in the Protein Highway region: Iowa, Minnesota, Montana, Nebraska, North Dakota and South Dakota in the US-Midwest/Great Plains and Manitoba and Saskatchewan in the Canadian Prairies (See Appendix).[18]

Protein Crops Produced in the Region

The region is well suited to producing a number of crops that yield high quality plant proteins including soybean, canola, peas, lentils, flax and edible dry beans as summarized in Table 1.

[18] Alberta to be include in the Protein Highway and asset mapping in the future.

Table 1: High Quality Plant Proteins Grown by State/Province

State/Province	Soybean Area Harvested / Production (2006-2015)	Canola Area Harvested / Production (2006-2015)	Peas[19] Area Harvested / Production (2006-2015)	Lentils Area Harvested / Production (2006-2015)	Flax Area Harvested / Production (2006-2015)	Edible Dry Beans[20] Area Harvested / Production (2006-2015)
Manitoba	0.68 MM acres 0.62 MM MT	3.1 MM acres 2.4 MM MT	0.073 MM acres 0.072 MM MT	-	0.19 MM acres 0.11 MM MT	0.12 MM acres 0.090 MM MT
Saskatchewan	0.23 MM acres 0.15 MM MT	9.0 MM acres 6.5 MM MT	2.5 MM acres 2.0 MM MT	2.4 MM acres 1.5 MM MT	1.0 MM acres 0.57 MM MT	0.18 MM acres 0.12 MM MT
Alberta	-	5.7 MM acres 4.7 MM MT	0.90 MM acres 0.90 MM MT	0.098 MM acres 0.074 MM MT	0.065 MM acres 0.049 MM MT	0.046 MM acres 0.049 MM MT
Minnesota	7.0 MM acres 8.2 MM MT	0.025 MM acres 0.017 MM MT	-	-	0.004 MM acres 0.0017 MM MT	0.15 MM acres 0.13 MM MT
North Dakota	4.4 MM acres 3.3 MM MT	1.2 MM acres 0.8 MM MT	0.37 MM acres 0.33 MM MT	0.14 MM acres 0.08 MM MT	0.33 MM acres 0.15 MM MT	0.60 MM acres 0.41 MM MT
Montana	-	0.034 MM acres 0.023 MM MT	0.30 MM acres 0.22 MM MT	0.16 MM acres 0.84 MM MT	0.017 MM acres 0.005 MM MT	0.023 MM acres 0.018 MM MT
South Dakota	4.3 MM acres 4.6 MM MT	-	-	-	0.008 MM acres 0.003 MM MT	0.012 MM acres 0.010 MM MT
Iowa	9.5 MM acres 12 MM MT	-	-	-	-	-
Nebraska	4.9 MM acres 6.8 MM MT	-	-	-	-	0.13 MM acres 0.13 MM MT

Sources: Stats Canada Crop Statistics (*http://www.statcan.gc.ca/agriculturestatistics*) and USDA NARS Quick Stats (*http://quickstats.nass.usda.gov/*)

Over the last decade, soybean production has continued to spread north in the region. In 2015 there were 33.5 MM acres of soybeans in the Northern US states, and in the Canadian Prairies, Manitoba had 1.4 MM acres and Saskatchewan (which first produced soybeans in 2013) had 0.26 MM acres. Canola area in the region has grown significantly over the past decade and has been steady over the last 4 years at about 20 MM acres in Western Canada and 1.5 MM acres in the Northern US states. In 2015, flax area in the region was close to 1.6 MM acres in Western Canada and 0.45 MM acres in the Northern US states, having come back from lower levels of production in preceding years. The area of pulse crops (peas, lentils and edible dry beans) in the region continues to expand. In 2015, western Canada produced nearly 8.5 million acres, with lentils alone comprising almost 3.5 million acres. Adding in the

[19] Includes green and yellow peas (for edible uses) and feed peas (for animal feed)
[20] Includes great northern, navy, pinto, small red, chickpeas (large and small), pink, dark red kidney beans

Northern U.S. states results in nearly 11 million acres of pulse crops. This growth in pulse crops parallels the historical growth that canola experienced in this region.

Soybean is the major protein crop in the region and is grown primarily to produce a protein meal for livestock rations with the oil making its way into food uses and biodiesel production. Soybean meal is highly desirable as an animal feed as it contains about 49-50% protein and only 3% crude fiber from de-hulled soybeans (44-46% protein and 6-7% crude fiber from hulled soybeans)[21]. Soybean is considered the reference standard protein source for livestock rations against which all other protein sources are compared when formulating diets.

Canola is a commodity crop grown in this region for the production of canola oil: a very healthy oil that is low in saturated fatty acids and high in the heart-healthy Omega-9 monounsaturated fatty acid oleic acid. The protein meal[22] remaining from canola after oil extraction is further used as animal feed, making it an efficient crop with multiple value-added opportunities. Canola meal is especially desirable for use in dairy rations where it has been shown to increase milk production—and it commands a premium for this market. The lower protein and higher fiber contents of canola meal relative to soybean meal limits its use in mono-gastric animals (poultry and swine) and results in a discounted price relative to soybean meal for these markets. Canada has established breeding efforts to increase the protein and reduce the fiber content of canola meal to improve its suitability in mono-gastric diets.

Flax[23] is a multi-purpose commodity crop produced in this region. Flaxseed (linseed) oil had originally been produced for industrial uses, as it's very high content of the Omega-3 fatty acid linolenic acid gave it unique properties for use in linoleum flooring, paints and other industrial products. Today, the high alpha-linolenic acid content and other components of flaxseed oil have been shown to decrease inflammation in humans; this is why flaxseed oil is thought to be useful for treating rheumatoid arthritis and other inflammatory (swelling) diseases. Flaxseed meal was also originally used for animal feed but is now making its way into human food uses. The fiber from flax straw is used in woven materials and paper.

Peas[24, 25] grown in the region are made up of several different types: green and yellow peas (for edible uses) and feed peas (for animal feed). About two thirds of the peas produced in the region are exported with the majority going to India, China and Bangladesh, where they are predominantly consumed in their whole format.

Lentils[26, 27] produced in the region include large green, small green, and red types, all for edible consumption. The majority of these lentils are exported, primarily to India, Turkey and the United Arab Emirates.

[21] http://www.feedipedia.org/node/674
[22] http://www.canolacouncil.org/oil-and-meal/canola-meal/
[23] http://flaxcouncil.ca/
[24] http://www.pulsecanada.com/
[25] http://www.pea-lentil.com/
[26] http://www.pulsecanada.com/

Edible dry beans[28] produced in the region consist of a number of different types including great northern, navy, pinto, small red, chickpeas (large and small), pink, and dark red kidney beans all produced for human consumption.

All these protein crops grown in the region have protein rich seeds or seed meals/flours which have the potential to be processed into value-added proteins for human consumption, pet foods and aquaculture. In addition, some non-protein crops produced in the region including corn[29] and barley[30] offer potential sources of value-added proteins.

Value-Added Protein Products

Of the protein crops produced in the region, the greatest amount of research and development of value-added protein products has been in soy.[31] The development and use of value-added soy products in the US and other industrialized countries dates back to the 1960s. By using large-scale, sophisticated processing techniques, methods have been developed for the economical extraction of proteins from defatted soybean meal and transforming them into a wide range of food products[32] that can be found today in nearly every grocery store aisle. The protein products from soy are: Soy Protein Concentrate, which is a white powder containing 65-90% protein (average 70%), plus most of the soybeans vitamins, minerals, and finely pulverized dietary fiber from the defatted meal; Soy Protein Isolate which is essentially soy protein concentrate minus almost all their dietary fiber making it a very bland, white powder containing at least 90% protein; and Textured Soy Protein Products, made by texturizing concentrates, isolates, or defatted soy flour. There are three main types of Textured Soy Protein Products: Textured Soy Flour (TSF) made by extrusion cooking soy flour, Spun Protein Fibers (SPF) made by spinning a thick soy protein isolate solution into slender monofilaments; and Textured Soy Concentrates (TSC) made by steam extrusion of soy protein concentrates to give small textured granules. By adding flavoring and coloring agents to these textured products, which already have much the same fibrous and chewy texture of meat, food technologists have been able to extend traditional meat and seafood products, and create new "meat analogs," in remarkably good imitation of chicken, bacon, ham, sausage, and beef. The soy protein industry has evolved over the years with a number of players being involved including DuPont/Bunge forming Solae[33], and Cargill Foods selling their soy protein line to Solae[34]. Today, DuPont/Danisco[35] and ADM[36] dominate the soy protein market[37].

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[27] http://www.pea-lentil.com/
[28] http://www.agr.gc.ca/eng/industry-markets-and-trade/statistics-and-market-information/by-product-sector/crops/pulses-and-special-crops-canadian-industry/dry-bean/
[29] http://cornandsoybeandigest.com/energy/high-protein-ddgs-provide-options-producers
[30] http://cerealchemistry.aaccnet.org/doi/abs/10.1094/CCHEM-06-10-0097?journalCode=cchem
[31] http://www.soyinfocenter.com/HSS/protein_concentrates.php
[32] http://www.soyconnection.com/soyfoods
[33] http://www.feednavigator.com/Suppliers/DuPont-Bunge-join-forces-in-soy-proteins
[34] http://www.foodnavigator-usa.com/Suppliers2/Solae-acquires-Cargill-s-soy-protein-line
[35] http://www.dupont.com/products-and-services/food-ingredients/soy-protein/brands/solae-soy-protein.html
[36] http://www.adm.com/en-US/products/food/proteins/Pages/default.aspx
[37] http://www.foodnavigator-usa.com/Markets/Cost-and-supply-benefits-are-icing-on-the-cake-for-soy-proteins

Canola meal contains two classes of proteins[38], napin and cruciferin, each of which has unique nutritional and functional properties. Napin is rich in sulfur amino acids and has cysteine levels two times that of whey protein. Cysteine is converted to glutathione in the body which is a powerful antioxidant. Napin is highly soluble at low pH and heat stable with no off flavors and has unique foaming properties; it is suitable for use in ready to drink beverages, powdered beverages, frozen desserts, aerated desserts, nutrition bars and other functional foods. Cruciferin is a good emulsifier and produces opaque heat-induced gels, making it suitable as an egg replacement in food. It also has potential for use as a meat extender, and in baked goods and snack bars. The development of such technologies for extraction of proteins from canola has been attempted most notably by MCN BioProducts[39], BioExx Specialty Proteins[40] and Burcon NutraScience Corporation[41]. Burcon NutraScience is the only company that has been successful to date in developing commercial edible protein products from canola utilizing a unique, patented aqueous extraction processes (***see side panel at right***). They have completed GRAS[42] notification for their two human use protein products and have made a substantial equivalence[43] claim for their animal feed protein product.

Canola and Pea Proteins from Burcon NutraScience

Burcon NutraScience has been successful in developing novel aqueous extraction processing technologies for the production of high quality edible proteins from canola and peas. Burcon's canola processing technology produces three protein streams: Supertein®, Puratein® and Nutratein®. Supertein is a napin protein isolate and Puratein is a cruciferin protein isolate and are targeted to human food uses. Nutratein contains mixture of both napin and cruciferin and is targeted to animal nutrition markets. Burcon has completed GRAS notification to the US Food and Drug Administration (FDA) for Supertein and Puratein and have made a substantial equivalence claim for Nutratein. Burcon's newest product for human food use is Peazazz® a protein isolate from peas. Burcon also produces CLARISOY™ soy protein isolate. Full details on Burcon's plant protein products can be found on their website: http://www.burcon.ca/.

High value protein products can also be produced from other protein crops grown in the region including peas, lentils, edible beans, and flax. The functionalities and thus the potential uses of proteins extracted from each these crops will depend on the physical properties of protein(s) produced by the crop. Pea protein isolate is the most advanced and Burcon NutraScience has developed a

[38] http://www.burcon.ca/health_and_wellness/canola_health.php
[39] http://www.marketwired.com/press-release/mcn-bioproducts-sells-technology-assets-to-bunge-1640992.htm
[40] http://www.soyatech.com/news_story.php?id=19688
[41] http://www.burcon.ca/products/canada_protein.php
[42] Generally recognized as safe (GRAS) is an American Food and Drug Administration (FDA) designation that a chemical or substance added to food is considered safe by experts, and so is exempted from the usual Federal Food, Drug, and Cosmetic Act (FFDCA) food additive tolerance requirements: http://www.fda.gov/Food/IngredientsPackagingLabeling/GRAS/ucm2006850.htm
[43] Submission of a Substantial Equivalence claim is the first step in the process for securing approval for a new food or feed product in the USA

proprietary technology to produce a commercial pea isolate which they have branded Peazazz®[44]. This product is highly water soluble and is well-suited for use in low pH and neutral pH beverages, dairy alternative products, meal replacements and a variety of other healthy and great tasting food and beverage product applications.

All crops have some level of protein in their seeds and as these proteins can have unique attributes, there could be additional opportunities for the development of value-added protein products from non-protein crops, either alone or in combination with other proteins. For example with buckwheat, the Manitoba Agri-Health Research Network[45] is leading a project looking at complimentary proteins from pulses and buckwheat, and Springfield Mills[46] is leading an interesting model that connects plant breeding for health attributes[47]. Other opportunities could be to develop value-added protein products from corn dried distillers grains with solubles (DDGS) and barley brewery solids.

Protein Extraction and Processing Technologies

The development of technologies that enable the economical extraction of value-added protein products from seeds and/or seed meals is critical to the success of the Protein Highway. Soy processing technology[48] is now well advanced and being utilized to produce soy protein isolate, concentrate and textured soy protein from soy meal. In addition, there is a readily available supply of protein meal at economic prices to use as protein feedstocks.

For canola, Burcon NutraScience has developed viable processing technology for producing protein isolates and concentrates from canola meal but it is critical that the protein meal feedstock is produced in a manner that retains the functionality of the proteins. The high temperatures in the typical DT (Desolventizer Toaster) processing of the meal stream employed at most canola crush plants denatures the proteins thus destroying the highly desirable properties of the proteins. In order to provide suitable feedstocks for processes like those employed by Burcon NutraScience, canola crush plants that utilize gentler processing of the seed/meal such as cold pressing or vacuum desolventization will be required.

Burcon NutraScience has extended their proprietary processing technology to developing novel protein ingredient from peas. Burcon's processing technologies could be further extended with some modifications to cover other protein crops according to Martin Schweizer, VP of Technical Development for Burcon NutraScience[49].

The development of value-added protein products from other protein crops grown in the region such as edible beans and lentils will require economical processing technologies and reliable supplies of protein feedstocks at an economical cost.

[44] http://www.burcon.ca/products/pea_protein.php
[45] http://mahrn.ca/
[46] http://www.springfieldmillsinc.com/buckwheat-varieties
[47] LeeAnn Murphy personal communication
[48] http://www.oilmachineworld.com/soybean-protein-isolate-technology.html
[49] Personal communication

Key Advantages of the Region

The Upper US-Midwest/Great Plains and Canadian Prairies region is ideally suited for the establishment of a Protein Highway that can offer secure production of high-quality, protein-rich crops and value-added protein products in an environmentally sustainable fashion.

Land, Natural Resources and Existing Ecosystem

The region has a large land base and temperate climate which is highly suitable for growing canola, peas, lentils, flax and dry beans in the northern part of the region and soybeans more so in the southern part although new soy varieties with earlier maturity are making soybean production possible in Manitoba and Saskatchewan. All of these crops are very suitable for use in crop rotations with spring cereals and corn, helping to control diseases and weeds. The use of nitrogen fixing legume crops such as soybean, peas, lentils and dry beans in the rotation also provides benefits for the crops that follow in the rotation.

Agriculture must move away from yearly crop acreage decisions to planned 3- to 4-year crop rotations in order to be sustainable[50]. Inclusion of pulse/Brassica crops in the cropping system will enhance the carbon capture of the system[51] and enhance the sustainability of cropping in the region.

It is projected that in the future mandates will require companies marketing agricultural products such as protein-based food products to show the environmental footprint of the products marketed, and the life cycle analysis of these food products will need to include the production system of the feedstocks[52].

High Quality Agricultural Production

The region is recognized for high quality agricultural production: it encompasses about 40% of the US soybean production and the majority of the canola and flax production in North America and produces very high quality oils and protein meals from these crops for both domestic and export markets. For peas and lentils, Saskatchewan is a major producer and exporter. In 2012, Saskatchewan was responsible for 37 per cent of the value of the world pea exports and 47 per cent of the value of world lentil exports.[53] The outputs of these crops also offer great potential for the production of novel protein products for human consumption, pet foods and aquaculture.

The quality of the plant proteins grown in the region is recognized throughout the world. One example is when India's Prime Minister Modi visited Canada in 2015 for the uranium agreement signing, he asked how India could secure a priority position to purchase plant proteins from Western Canada, highlighting the need for secure volume combined with high quality to achieve a solid nutrition foundation for the

[50] http://www.ucsusa.org/food_and_agriculture/solutions/advance-sustainable-agriculture/crop-diversity-and-rotation.html
[51] http://www.nrcresearchpress.com/doi/abs/10.4141/cjss2012-078
[52] John Oliver personal communication
[53] 2013 Specialty Crop Report, Saskatchewan Ministry of Agriculture, http://www.agriculture.gov.sk.ca/specialty_crop_report

human diet.[54] India's competitiveness with China rests on its ability to provide a daily diet of high nutrition for its citizens.

Innovation Hub and Human/Capital Resources

Another advantage of the US-Midwest/Great Plains and Canadian Prairies region is the extensive network of research institutions conducting world class public and corporate research on crop improvement and innovative approaches to crop utilization, along with governmental and commodity groups who support and help with crop development in the region. **Appendix A** summarizes the key institutions and organizations by province and state who are envisioned to be stakeholders in the Protein Highway. The goal of the Protein Highway is to help create an innovation hub to facilitate collaboration among such researchers at institutions and organizations to develop novel, value-added products from the protein crops produced in the region—and ultimately showcase these results to investors, entrepreneurs and multinationals that can move promising ideas to scale-up.

Proximity to Business, Population, Transportation, and Education Centers

Most of the businesses involved in agricultural crop production, processing and utilization as well as food processors have offices and/or plants in the region. The region is crisscrossed by East-West and North-South rail systems and roads that move feedstocks and finished products to domestic and international markets—although it will likely require capital investment in storage and rail cars to handle the segregation and transport of smaller quantities during product scale up. Each of the target crops also have crop production organizations (**Appendix A**) geared towards supporting the production and marketing of crops and value-added products.

The Protein Highway Solution

The creation of a Canada/US "Protein Highway" is proposed to exploit the many advantages of the Upper US-Midwest/Great Plains and Canadian Prairies region in plan proteins. The region encompasses the production crop areas of the three Canadian Prairie provinces of Manitoba, Saskatchewan and Alberta and the US-Midwest/Great Plains states Minnesota, North Dakota, Montana, Nebraska, South Dakota, and Iowa.

The Protein Highway region has all the components of a flourishing innovation hub, including the production of a number of diverse protein crops, processing facilities, proximity to large cities and links to other markets via truck and rail—an evident destination for plant protein research, production, processing and food ingredient manufacturing, as well as entrepreneurial and investment activity. The region also boasts an extensive network of research centers conducting topnotch public and corporate

[54] John P. Oliver, personal communication

research on crop improvement and innovative approaches to crop utilization. The region also has access to health and wellness resources which can be leveraged to studies that further evaluate the health benefits of plant proteins in human diets.

The Protein Highway stands poised to serve as a virtual incubator for connecting research and researchers on both sides of the US/Canada border to achieve greater synergies. Ultimately, it can facilitate follow-on regional and global access to technology and intellectual property that results in new, valuable markets for novel protein products.

The Protein Highway will focus on plant proteins for a number of reasons:

- There is very significant unrealized economic value from producing high value edible protein products from the more significant protein crops soybean, canola, peas, lentils, flax and edible dry beans already produced in the region.
- There could also be opportunities for protein production from other oilseed crops in the region such as sunflower and safflower and minor crops in the region such as buckwheat, hemp, camelina, chia and quinoa based on economic merit.
- High value edible proteins from the byproduct streams of corn ethanol facilities and barley brewery solids is another potential opportunity for the future.
- High value plant protein products and ingredients can make valuable meat analogs / replacements.
- Plant protein food products offer another approach to help feed the growing world population in a potentially more sustainable way.
- Plant proteins provide a more economical solution to providing protein for human consumption than passing protein through an animal.
- There is evidence that plant proteins can contain healthy amino acid components such as higher levels of cysteine which can have beneficial health effects.
- Reduction in animal protein consumption will also have the benefit of reducing saturated fat intake.

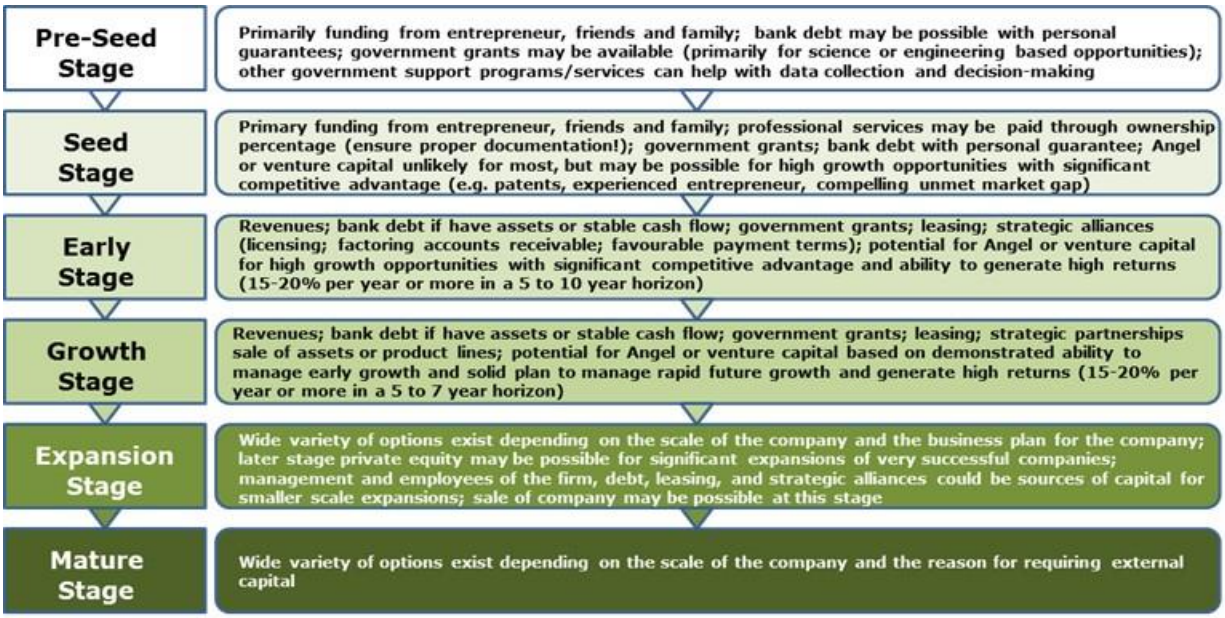
Through collaborative promotion, research, business development and investment, the Protein Highway will become globally recognized as the region of choice for secure and sustainable production of high-quality plant proteins.

The Case for Investment

Types of Investment

Similar to other sectors, successful development of a robust Protein Highway will require a diverse range of financial investment at all stages of commercialization. The options available to companies vary, depending on stage of development and activities of the business (See **Table 2** below).

Table 2: Types of Investment Available to Companies as they Grow



Source: Gauthier, D. 2012

Unfortunately, many areas are lacking in one or several types of investment at the local level. Angel networks are not mature in many places and large venture capital and private equity funds are becoming increasingly more concentrated in major financial centers. A regional approach that builds strong networks will enable a broader pool of investment options for companies, and a larger pool of investment opportunities for private capital.

Agricultural Technology and Food Investment Trends

Investment dollars are a good measure of the relative economic importance and potential of various industry sectors. Additionally, risk capital investment provides insight into investors' beliefs about future trends. Investments relevant to agriculture and food development are often lumped into other industry categories such as biotechnology, cleantech, or manufacturing, making it difficult to determine the actual share of investment dollars flowing to the sector. Nonetheless, it appears that agriculture and food investing is on the rise. By the end of 2014, there were 240 agriculture investment funds existing globally with $45 M in total assets, compared to just 33 funds in 2005.[55] In 2014 alone, 26 new

[55] http://www.responsability.com/investing/data/docs/en/15524/market-news-doc-valoral-03072015.pdf

food and agriculture specific funds were launched globally and seven of these were in the U.S.: AgTech Innovation Fund, Boulder Food Group LP, The Cascadia Foodshed Funding Project, Farmland LP REIT, Made in Rural America, RSF PRI Fund, and the Rural Infrastructure Opportunity Fund.[56]

It was reported by the Chicago Tribune that total dollars invested in agricultural technology and food deals across the U.S. has doubled to $1.4 B in 2015 compared to 2014—17 times more than the amount invested in 2011.[57] Investment deals in the Midwest U.S. have experienced more modest increases over the same periods. Chicago is home to Take Seed 2 Growth Ventures (a new $125 million fund) and Cultivian Sandbox, which just raised a $115 M second fund. Fargo, ND based Linn Grove Ventures is also focused on food industry investments in the Midwest U.S. and Canada. Mainstream venture firms have also demonstrated a willingness to invest in the sector. For example, Khosla Ventures has invested in Hampton Creek and Impossible Foods and agricultural investing is a major part of the Bill and Melinda Gates Foundation investments.

Other than government-related investment, focused private investment in agriculture is less developed in Canada. The overall pipeline of investment deals is much smaller than the U.S., creating a need for large investment funds to be more diversified. These funds often find ICT, oil and gas, real estate, mining and health-related investments more compelling than agri-food.

Organized Angel investment is beginning to fill some of the need for early stage investment, but inconsistent tax credit rules between different provinces put some areas (e.g. Saskatchewan) at a disadvantage to others. Crowd-funding—where an entrepreneur raises smaller amounts of loans or equity from a large number of small investors through an on-line portal—is also a growing trend. Amounts invested in 2011 were $1.5 B compared to estimated amounts of $5 B in 2013.[58] Agfunder (www.agfunder.com) is a specialized agriculture and food based crowd-funding portal.

Industry Investment in Plant-Derived Proteins

Big industry and investment funds are also validating the need for plant-derived proteins. Dupont, through its subsidiary Solae, produces soy protein isolates for a wide variety of foods.[59] Burcon Nutrascience has partnered with ADM to produce Clarisoy®—soy protein isolate that is clear, better tasting and acid soluble. Burcon is also developing canola and pea protein products, as previously discussed. Other entrepreneurs are attempting to replicate the taste, feel and experience of eating meat based on plant protein products.[60] Examples are:

[56] http://www.foodtechconnect.com/2015/01/15/21-food-agriculture-focused-funds-launch-in-2014/
[57] Chicago Tribune; November 6, 2015. "The big money of changing food and agriculture tech"
[58] http://www.crowdfundingstatistics.com/
[59] http://seekingalpha.com/article/738081-the-fight-is-on-for-plant-derived-protein
[60] http://www.ift.org/food-technology/past-issues/2014/december/features/a-new-crop-of-plant-protein-pioneers.aspx?page=viewall

- Beyond Meat of California is producing chicken free strips and beef-free crumbles to directly replace real meat alternatives.
- Impossible Foods of California, is developing a beef burger substitute based on legume proteins that actually bleeds in a way compared to the real thing.
- Ripple foods of California is producing a milk substitute using split yellow peas.
- Canadian-based Gardein provides a wide variety of substitutes for pork, beef, chicken and fish based on soy and bean products.
- Hampton Creek (California) is using proteins from yellow pea to replace egg proteins in foods.

As these and other companies continue to grow, they will be looking for a wider variety of plant proteins for different functionality, tastes and sensory qualities to expand their product offerings. The Protein Highway region could be the primary supplier to these West-Coast companies and is also poised for additional growth of its own plant-derived protein ingredient companies. Alliance Grain Traders (Saskatchewan and North Dakota), Burcon Nutrascience (Manitoba), Embria Health Sciences (Iowa), Kellogg (Nebraska) and GTC Nutrition (Montana) are just a few examples of companies already located in the Protein Highway region (See **Appendix 1** for additional companies in the region).

Connecting Opportunities and Investors across the Canadian Prairies and Midwest U.S.

Trade, investment and collaboration is often difficult across provincial, state and national borders due to differences in regulations, trade rules, tax laws, foreign ownership rules, etc. Fortunately, there is growing recognition among some governments that protectionist policies can do more harm than good. In a recent speech in Saskatoon, North Dakota Lieutenant-Governor Drew Wrigley touted the benefits of removing obstacles that hamper trade between the Canada and the U.S. He was quoted as stating "Protectionism, at the end of the day, isn't really protectionism at all. It is harmful to the economy, local and otherwise."[61]

Examples of Canadian and U.S. attempts to act regionally are:

- The New West Partnership Trade Agreement (NWPTA) is attempting to create a single economic region encompassing British Columbia, Alberta and Saskatchewan (Manitoba has been invited, but has not yet joined). Some of the benefits of NWPTA will be labor mobility, common business registration, streamlined regulations, enhanced competitiveness and open procurement.[62]
- The Pacific Northwest Economic Region (PNWER) Foundation is a statutory nonprofit created by Alaska, Idaho, Oregon, Montana, Washington, British Columbia, Alberta, Saskatchewan, Yukon and Northwest Territories. The purpose of PNWER is to facilitate the economic well-being and

[61] http://thestarphoenix.com/authour/alex-macpherson-saskatoon-starphoenix
[62] http://www.newwestpartnershiptrade.ca/the_agreement_benefits.asp

quality of life for all citizens of the region, while maintaining and enhancing our natural environment.[63]

International collaboration between academic researchers is common, but restrictions of granting agencies regarding where monies are spent can limit the overall effectiveness of a research network. For some technologies, strict export control laws also restrict the type of information that can be exchanged in international collaborations. Private investment is easier to deploy across provincial and national borders, but foreign ownership rules may limit tax benefits in some cases. Additionally, it is more difficult for entrepreneurs to develop relationships with investors across large distances, particularly at earlier stages of investment when there are few resources for extensive travel.

In the Canadian prairies, non-profit organizations such as Ag-West Bio Inc., AVAC Ltd., the Manitoba Agri-Health Research Network and the Life Sciences Association of Manitoba can help with this networking and early stage financing in some cases. Other nodes of entrepreneurial activity, such as University Industry Partnering offices, accelerators, incubators and research institutions and economic development/trade agencies play important roles in ensuring that local activity is networked with other regions.

Measures of Success

There are a number of economic indicators that can and will be used to measure success of the Protein Highway including:

- Job creation at research institutions,
- Research MOUs,
- New or expanding companies in the plant protein area, and
- Private sector investment in R&D, processing and production facilities and new companies.

In the longer term, tremendous socio-economic benefits can be realized. In addition to meeting and enhancing basic global nutrition requirements and diets, increased plant protein consumption could dramatically reduce healthcare costs for diet-related illnesses. It has been estimated that obesity alone can be associated with individual healthcare costs in excess of $10,000.[64] The Protein Highway region is rich in medical institutions and research organizations that can contribute to clinical studies that evaluate the health benefits of existing and new plant proteins in human diets (see **Appendix A**.).

[63] http://www.pnwer.org/background--history.html
[64] http://www.ncbi.nlm.nih.gov/pubmed/10527295

Conclusions and Next Steps

Based on strong current and growing global demand for a wide variety of plant-based proteins, and the robust assets currently in place across the Canadian Prairies and U.S. Upper Midwest/Great Plains region, there is a tremendous opportunity for the region to become a plant-protein powerhouse. A regional Protein Highway that links researchers, companies and investors to advance value-added opportunities in plant-protein production and value-added products based on a wide variety of regional crops has tremendous potential for sustainable benefit for the economy and for the needs of a growing and increasingly wealthy global population.

The working group has identified the following steps to transforming their concept into action:

- Linking key universities with new agricultural technologies that are ready for investment and commercialization to promote collaboration and develop new curricula in association with industry leaders (Deadline August 2016)
- Promote investor engagement via outreach and marketing (Launch planned at ABIC 2016 in Fargo, North Dakota, September 2016)
- Additional promotion and outreach at various regional conferences, forums and meetings (ongoing)
- Connecting communities, such as Brookings, SD and Saskatoon, SK

Short term activities required to achieve these outcomes include:

- Continuation of Asset Mapping activities—visual maps; additional companies; market opportunity mapping—(MAHRN and others)
- Create a subcommittee for ABIC 2016 planning in Fargo (Consulate and AgWest Bio)
- Potential structured committee via regional ag experiment stations network and tap into various talent pools
- Develop branding and marketing tools
- Connect with and inform key political leaders
- Attract additional Advisory Committee participants—companies; Venture Capital-backed start-ups; commodity groups

Appendix A

Canadian Protein Highway Stakeholders by Province

Manitoba

Provincial Government	Applied Research Associations	Federal Government Research Labs	Specialty Organizations	Academic Research Institutions	Corporations
• Food Development Centre • MAFRD - Crop Diversification Centers • Manitoba, Agriculture and Rural Development	• Canadian International Grains Institute • Canadian Oilseed Processors Association • Canola Council of Canada • Flax Council of Canada • Manitoba Pulse and Soy Growers Association • Pulse Canada	• AAFC - Brandon • Agriculture and Agrifood Canada (AAFC) Research Centre – Morden	• MAHRN - Manitoba Agri-Health Research Network (Not for Profit) • PAMI - Innovative solutions for agriculture and beyond	• Canadian Centre for Agri-Food Research in Health and Medicine • Red River College - Applied Research • University of Manitoba • Animal Science • Food Science and Nutrition • George Weston Sensory and Food Research Lab • Plant Science • Richardson Centre for Functional Foods and Nutraceuticals • Technology Transfer Office	• Ag Quest Inc • Bayer • Best Cooking Pulses • Bestco Grain • Brett Young Seeds • Bunge Canada • Burcon NutraScience • Canadian Prairie Garden Puree • Canterra • Cargill • Central Grain Company • DL Seeds • Emerson Milling • Global Grain Canada Ltd • Gorp Energy Bars • H & W Seed Service • Hemp Oil Canada • Husky Energy • ICMS • Inland Seed Corp • Legumex Walker (Scoular Company) • MB Harvest Hemp Foods • Monsanto • Nutra-Pea • Nutri-Pea • Parland Industrial Hemp Growers • Pitura Seed Service Ltd. • Pizzey Ingredients • Prairie Flax Products Inc • Rawnata • Richardson Group • SeCan • Shape foods • Springfield Mills • Stone Milled • T & S Seeds • Viterra

Saskatchewan

Provincial Government	Applied Research Associations	Federal Government Research Labs	Specialty Organizations	Academic Research Institutions	Corporations

• Crop Development Centre (CDC) (Dept. of Plant Science U of S)
• Saskatchewan Department of Agriculture
	• Indian Head Agricultural Research Foundation
	• Irrigation Crop Diversification Corporation
	• Northeast Agriculture Research Foundation
	• Saskatchewan Pulse Growers
	• South East Research Farm
	• Western Applied Research Corporation
	• Wheatland Conservation Area
		• AAFC - Saskatoon
		• AAFC - Swift Current
		• Canadian Light Source Synchrotron
		• NRC - Plant Biotech
		• Plant Gene Resources of Canada
			• PAMI - Innovative solutions for agriculture and beyond
			• POS – Biosciences
			• SK Food industry Development Centre
				• Parkland College
				• University of Saskatchewan
				  • Bioprocessing Pilot Plant
				  • Breeder Seed Facility
				  • Canadian Feed Research Centre
				  • Controlled Environment Facility (Phytotron)
				  • Crop Development Centre
				  • Department of Food and Bioproduct Sciences
				  • Feeds Innovation Institute
				  • Industry Liaison Office
				  • KnowPulse
				  • Prairie Aquaculture Research Centre
					• ADM Canada
					• Avena Foods
					• Bunge
					• Canmar
					• Daybreak Mill
					• Diefenbaker Seed Processors Ltd
					• Globeways
					• LDC (Louis Dreyfus)
					• Legumex Walker
					• LewisMCarter
					• Monsanto Bio Ag
					• Naturally Nutritious Foods
					• Norquin
					• Northern Nutriceuticals Inc
					• P&H Milling
					• Parrheim Foods
					• Prairie Pulse
					• Richardson Pioneer
					• Simpson Seeds
					• TA Foods Ltd
					• Three Farmers
					• Viterra
					• Western Ag
					• Western Grain & Processing Division (wholly owned by Toepfer International)

Alberta – to be identified in the future

Provincial Government	Applied Research Associations	Federal Government Research Labs	Specialty Organizations	Academic Research Institutions	Corporations
•	•	•	•	•	•

US Protein Highway Stakeholders by State

Minnesota

State Government	Applied Research Associations	Federal Government Research Labs	Specialty Organizations	Academic Research Institutions	Corporations
•	• Agricultural Utilization Research Institute	•	• Dry Edible Bean Research & Promotion Council • Northarvest Bean Growers Assoc • Northstar Genetics	• University of Minnesota • Applied Plant Sciences • Center for International Food & Agricultural Policy • Food Industry Centre • Healthy foods, Healthy Lives Institute • Institute on the Environment • Minnesota Institute for Sustainable Agriculture • Office of Commercialization • Stakman-Borlaug Center for Sustainable Plant Health	• ADM • Ag Motion • Batory Foods • Burley Foods • Cargill • CHS • Dow AgroSciences / Mycogen Seeds • Fiberich • General Mills • Grain Millers Inc • Great River Milling • Homestead Mills • InHarvest • Innovative Food Products • Kraft Food Ingredients • Lea Bean & Seed Inc • Marathon Foods • Meadowland Soy • Natural Way Mills, Inc. • PGP International • Schafer Seed Co • Scoular Company • SK Food Specialty Processing • Slauson Trading Co • Summit Brewing Co • World Food Processing

North Dakota

State Government	Applied Research Associations	Federal Government Research Labs	Specialty Organizations	Academic Research Institutions	Corporations

• North Dakota Department of Agriculture	• Northern Pulse Growers Association (NGPA)	• USDA – ARS – Grand Forks Human Nutrition Research Center (GFHNRC)
		• USDA – ARS – Natural Resource Management Center
		• USDA – ARS – Red River Valley Agricultural Research Centre. Northern crop science lab
		• USDA-NRCS-PMC – Natural Resources Conservation Service, Plant Material Center)
			•	• North Dakota State University
				  • Animal Nutrition & Physiology Center
				  • Carrington Research Extension Center
				  • College of Agriculture, Food Systems, and Natural Resources"
				  • Dept. of Agriculture and BioSystems Engineering
				  • NCI Feed Mill
				  • North Dakota Agricultural Experiment Station (AES)
				  • Northern Crops Institute (NCI)
				  • Technology Transfer Office
				• University of North Dakota (UND)
					• ADM Edible Bean Specialities
					• AGT Food and Ingredients
					• AGT Foods
					• Archer Daniels Midland Co. (ADM)
					• Cargill
					• Central Valley Bean Cooperative
					• Centrol Ag Consulting
					• Dakota Dry Beans
					• Dakota Specialty Milling
					• Dupont
					• Great Northern Ag
					• Heartland Flax
					• Hurdsfield Grain, Inc.
					• J.R. Simplot Company
					• JM Grain
					• Johnstown Bean Company
					• Legume Logic
					• Legume Matrix, LLC
					• Mehl's Flour Company
					• Meridian Seeds
					• Northern Prairie Envirofuels LLC
					• Premium Gold Flax Products
					• Pulse USA
					• Red River Commodities (SunGold Foods)
					• Safflower Technologies International
					• Sanford Health
					• SB&B
					• SK Food International
					• Valent USA

Montana

State Government	Applied Research Associations	Federal Government Research Labs	Specialty Organizations	Academic Research Institutions	Corporations

• Beartooth RC&D Food & Agricultural Development Center
• Food & Ag Development Center Network
• Mission Mountain Food Enterprise Center
• Montana Dept of Agriculture
	•	• USDA – Agricultural Systems Research
		• USDA – Northern Plains Agricultural Research Laboratory
			•	• Montana State University
				  • Agriculture Experimental Research Centers (7)
				  • Barley & Plant Biotech Lab
				  • Dept. of Chemistry and Biochemistry
				  • Functional Genomics Core Facility
				  • Plant Growth Center
				  • Plant Science & Plant Pathology
				  • Proteomics and Biological Mass Spectrometer Facility
				  • Schutter Diagnostic Lab
				  • Technology Transfer Office
					• Columbia Grain
					• GTC Nutrition (A Division of Ingredion)
					• Montana Milling
					• Montana Specialty Mills
					• Timeless Foods

Nebraska

State Government	Applied Research Associations	Federal Government Research Labs	Specialty Organizations	Academic Research Institutions	Corporations
• Nebraska Department of Agriculture	•	• USDA - ARS	• Core for Applied Genomics and Ecology (CAGE) • FAARP - Food Allergy Research & Resource Program	• University of Nebraska • Agricultural Research Division • Center for Biotechnology • Center for Plant Science Innovation • Crop Watch • Dept of agronomy & Horticulture • Dept of Plant Pathology • Food Innovation Center • Industrial Agriculture Products Center • Institute of Agriculture & Natural Resources • Plant Sciences Program • Plant Transformation Core Research Facility • Technology Transfer Office	• ADM • Bunge • Cargill • Cargill • Columbian Grain • Con Agra • Con Agra • Crop Production Services • DuPont Pioneer • Farmers Cooperative • Frenchman Valley Farmers • International Nutrition • Kelley Bean Co • Kellogg • Koch Industries • Louis Dreyfus • Michael Foods • Monke Brothers • Nature's Variety, Inc • Sensory Effects Cereal systems • Syngenta Seeds

South Dakota

State Government	Applied Research Associations	Federal Government Research Labs	Specialty Organizations	Academic Research Institutions	Corporations

• South Dakota Department of Agriculture
• South Dakota Department of Game, fish and Parks
	•	• USDA - ARS - North Central Agricultural Research Lab
		• USGS EROS Data Center
			• SD Crop Improvement Association
			• SD Oilseeds Council
			• South Dakota Pulse Growers
			• South Dakota Soybean Association (SDSA)
			• South Dakota Soybean Processors, LLC
			• South Dakota Soybean Research and Promotion Council (SDSRPC)
				• South Dakota State University
				  • Agricultural Experiment Stations
				  • Dakota Lakes Research Station
				  • Northeast Research Station
				  • Southeast Experiment Station
				  • Extension Service
				  • igrow (a service of SDSU)
				  • Research Park
				  • Tech Transfer Office
				• University of South Dakota
					• Bel Brands
					• Dakota Mill & Grain
					• DuPont
					• Frontier Mills, Inc
					• Gabby´s roasted garbanzos (part of Dakota Valley products, Inc)
					• Glanbia Nutritionals Inc.
					• Heintzman Farms
					• Hesco
					• Hesco Dakota Organic products
					• Hubbard feeds
					• J&R Distributing, Inc
					• Mustang Seeds
					• POET. Dakota gold
					• Prairie AquaTech
					• Pride Grain
					• Purina Animal Nutrition LLC
					• Purity Seeds
					• Sanford Health
					• SD Innovation Partners
					• Sexauer Discount Farm Services, Inc.
					• SmartLic Supplements
					• South Dakota Pulse Processors

Iowa

State Government	Applied Research Associations	Federal Government Research Labs	Specialty Organizations	Academic Research Institutions	Corporations
• Iowa Department of Agriculture and land Stewardship	• Iowa Soybean Association • Soy Bean Meal Info Center	• USDA - National Laboratory for Agriculture and the Environment • USDA National Institute of Food and Agriculture • USDA-Agriculture Research Service	• North Central Soybean Research Program	• Iowa State University •Agriculture and Home Economics Expt Station •BioCentury Research Farm •BioSafety Institute for Genetically Modified Agricultural Products •Center for Agricultural and Rural Development •Center for Crops Utilization Research •Center for Designing Foods to Improve Nutrition •Center for Plant Responses to Environmental Stresses •Dept of Food Science and Human Nutrition •Experiment Research Stations (20) •Nutrition and Wellness Research Center •Raymond F. Baker Center for Plant Breeding •Seed Science Center •Tech Transfer Office •The Protein Facility of the Office of Biotechnology •WM Keck Metabolomics Research Laboratory • University of Iowa	• A to Z Drying • ADM • Ag Logic (Yield Igniter) • Algae Protein Powder • Beaver Creek R&D • Cardiostrong • Cargill • Devansoy • Diamond V • DuPont • DuPont Pioneer Johnston Innovation Center • Embria • Grain Processing Corporation • Harvest Innovations • Harvest Innovations • Horan Bio Production • John Deere Intelligent Solutions Group Development • Kemin Technologies • Kerry Ingredients • Metabolic Technologies • Monsanto • Naturally Recycled Protein • Nutriant - a Kerry Company • Proliant Inc • Roquette America, Inc • The Scoular Company

Appendix B

Protein Highway Advisory Committee and Partner Organizations

ADVISORY COMMITTEE		
Stevyn Arnt	Strategic Lead, Agri-Food	Saskatchewan Ministry of the Economy
Barb Birr	Co-Founder	Step One Foods
Charles Boyer	VP Dean and Director of Ag	Montana State University
Doug Cameron	Co-President	First Green Partners
Gavin Conacher	Director of International Engagement	Saskatchewan Ministry of the Economy
Daryl Domitruk	Director Ag Innovation and Adaptation	Manitoba Ministry of Agriculture, Food, & Rural Development
Ken Grafton	VP Agricultural Affairs	North Dakota State University
Wallie Hardie	President & CEO	Leading Edge Fund
Dr. James House	Prof. & Dept. Head--Human Nutritional Sciences	University of Manitoba
Jeff Jacobsen	Executive Director	North Central Regional Association of Ag Experiment Stations
Ron Kehrig	VP of Operations-Canada	Nutriati
Wilf Keller	President and CEO	AgWest Bio
Kevin Kephart	Vice-President for Research and Development	South Dakota State University
Arlen Leholm	Former Executive Director	North Central Regional Association of Ag Experiment Stations
Paul McGarvey	President	Chadron Capital Markets LLS
Murray McLaughlin	Executive Director	Bioindustrial Innovation Canada
Ron Meeusen	Managing Partner	Cultivian
Dr. Mark Messina	Executive Director	Soy Nutrition Institute
Andrée-Lise Méthot	Founder and Managing Partner	Cycle Capital
Lee Anne Murphy	Executive Director	Manitoba Agri-Health Research Network
Mike Nickerson	Food Science Department	University of Saskatchewan
John Oliver	President	Maple Leaf Bio-Concepts

Jade Proulx	Food Scientist	Hampton Creek
Dr. Martin Scalon	Professor of Food Technology, Associate Dean (Research)	U of MB
Jen Wagner-Lahr	Executive Director	Agricultural Utilization Research Institute
Brent Willett	Executive Director	Iowa Cultivation Corridor
Dr. Bill Wilson	Distinguished Professor, Agribusiness and Applied Economics	North Dakota State University
Sara Wosje	Sr. Research Scientist	General Mills--GTECH
Sam Ziegler	Director, Project ABE	Greater Mankato Growth

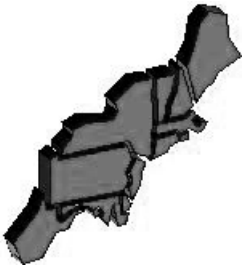
PARTNER ORGANIZATIONS	
INDUSTRY CANADA	
Janet Dorey	Regional Manager
Sylvie Verdon	Manager
Anna Mackay	Sector Analysis Officer, Manufacturing and Life Sciences Branch
PULSE CANADA	
Gordon Bacon	CEO
Julianne Curran	VP Food and Health
Tanya Der	Food Innovation and Marketing Manager
Chris Marinangeli	Director of Nutrition, Scientific and Regulatory Affairs
AGRICULTURE AND AGRI-FOOD CANADA	
Carla St. Croix	Director of Innovation and Growth Policy Division
Bob Nawolsky	Regional Director-Manitoba
Bruce Radburn	Senior Advisor, Innovation Policy-Strategic Policy Branch
Troy Hennigar	Chief Innovation Policy
Pam Ominski	Senior Analyst

US DEPARTMENT OF AGRICULTURE	
Mihai Lupescu	Ag Specialist, Foreign Ag Service-Ottawa

Northeastern Regional Association of
State Agricultural Experiment Station Directors

Cost Recovery Systems at Agricultural Experiment Station Research Facilities in the Northeast Region



June 23, 2015

Contents

1.0 Purpose and Scope

It is common for agricultural experiment stations to require research sponsors, faculty and staff, and external users to provide reimbursement for direct costs incurred for services provided in support of projects or activities at research facilities. While common, formal systems to recover costs based on fee schedules or reimbursement are not universal. Instituting these systems typically requires a significant commitment of staff time for development and substantial communication with faculty and other facility users to be successful. A challenge for research directors is that comprehensive information on system design and best practices is not available or easily accessible. The purpose of this document is to provide information on (1) direct cost recovery systems for four types of research facilities commonly used agricultural experiment stations in the Northeast and (2) best practices for system design, implementation, and administration. The intended audience includes research directors, facility managers, facility advisory committees, faculty, business office administrators, and institutional sponsored program administrators.

The types of research facilities included in this report are

- Crop farms
- Greenhouses
- Growth chambers
- Large animal/livestock facilities

Information for this document came from a 2013 survey of members of the Northeastern Regional Association of State Agricultural Experiment Station Directors (NERA) and policy and procedure documents for direct cost recovery systems at member institutions.

A list of policy documents and web-based information on direct cost recovery systems at NERA institutions is available in the appendix.

2.0 Introduction

Agricultural experiment stations typically maintain crop and livestock farms, greenhouses, and growth chamber facilities to support their research and outreach missions. And research farms and greenhouses are frequently used for extension education, and facilities on or near university campuses are often integral to undergraduate and graduate teaching programs.

The cost of maintaining research facilities and providing services is an on-going challenge. Aging infrastructure and increasingly expensive technology and equipment add to the challenge of funding routine operations. And research farms are typically

too small to achieve operating efficiencies close to norms in private industry. More importantly, the annual workload and operating costs for these facilities also can be greatly influenced by the number, size, and types of research projects or teaching and outreach activities requiring space and services.

Direct costs to facilities are those expenses that can be assigned to individual sponsored projects or activities, whether research, instructional, or outreach, with a reasonable degree of accuracy. These costs are in contrast to indirect costs for facility operations, which are incurred for common needs (e.g., infrastructure, utilities, and administration) and cannot be easily assigned to particular projects or activities. Depending on institutional policy, indirect cost funds from grants and contracts may be returned to colleges or units to help offset facility and administration expenses. In the absence of a formal system for recovery of direct project costs or when there is inadequate indirect cost return, it is not unusual for facility managers to employ ad hoc approaches to help cover facility expenses. Examples of ad hoc approaches include asking for voluntary contributions from principal investigators for equipment repairs, requiring reimbursement for certain types of supplies (e.g., growing medium) or use of staff, or requiring reimbursement for revenue lost as a result of research activities (e.g., reduction in crop or milk revenue). A formal direct cost recovery system uses a fee schedule to recover costs for defined services provided to projects or activities at facilities. A well-designed direct cost recovery system can provide an objective and more transparent approach to recover all or a portion of service costs associated with projects and activities and may yield other benefits.

The specific objectives of this document are to:

- Summarize the benefits and costs of direct cost recovery systems.
- Document present use of formal direct cost recovery systems at NERA institutions for the four facility types listed in Section 1.0.
- Describe the core elements of present systems for each facility type.
- Provide information on best practices for system design, implementation and administration.

3.0 Benefits and Costs of Direct Cost Recovery

Table 1: Potential benefits and costs of direct cost recovery systems at experiment station facilities.

Potential Benefits	Potential Costs
Provides revenue for facilities that is aligned with project-related expenses.	Increased stress for facility users and managers that comes with a cultural change in how users receive services from facilities.
Encourages facility users to seek extramural funds to support facility operations. Avoids the disparities that can develop when facility managers rely on appeals to the good will of project directors to cover one-time facility costs.	Reduction in numbers of research projects or activities because of service costs. Greatest impacts may be on pilot projects or activities with minimal funding support or projects were it is difficult to secure funding for service fees from research sponsors. Consequently, project directors may elect to work at other locations to avoid fees.
Encourages more efficient use of facility services by project directors. This also tends to reduce competition for space or access to facility resources.	Increased workload for business office staff for initial and annual financial analyses, billing, and account management.
When first implemented, these systems often force "long overdue" discussions with individual project directors, academic units, or external users about disproportionate use of facility resources. Financial analyses that underpin direct cost recovery systems add formal cost information to these discussions.	Increased workload for facility managers to track projects and activities and help assign costs.
Increases clarity about services that will be provided to facility users, a benefit to both facility managers and users.	
Financial analyses for establishing service fees for specific functions are helpful in understanding facility costs and improving financial management.	
Service fees facilitate assignment of facility resources as matching support in grant proposals.	
Customer service becomes more relevant to facility managers.	

4.0 Direct Cost Recovery Systems in the Northeast Region

All NERA member institutions (N = 14) reported information on direct cost recovery systems. Information for the Ithaca and Geneva units of the New York Agricultural Experiment Station (Cornell University) are reported jointly. Direct cost recovery systems are common at NERA institutions overall (station or college), but use varied substantially among facility types and institutions (Table 2). Cost recovery systems were relatively common for greenhouse facilities (N = 9), growth chambers (N = 7), and large animal facilities (N = 7), and less common for crop farms (N = 3). Rutgers University reported the most comprehensive use of direct cost recovery with systems in place for all four facility types. Three institutions (Cornell University, University of Maine, University

of Maryland) reported systems for at least three facility types. Several institutions noted intentions to develop direct cost recovery systems in the near future. While we have no comparable historical data, anecdotal information from the survey suggests that use of direct cost recovery systems is trending upward.

Table 2. Present use of formal direct cost recovery systems at research facilities of member institutions of the Northeastern Regional Association of State Agricultural Experiment Station Directors, 2013.

Institution	Crop farms	Greenhouses	Growth chambers	Large animal/ livestock facilities
Rutgers University	X	X	X	X
Cornell University - Ithaca & Geneva	X	X	X	
University of Maine	X	X		X
Pennsylvania State University		X		
University of Connecticut				X
University of Connecticut – New Haven				
University of Delaware				X
University of the District of Columbia				
University of Maryland		X	X	X
University of Massachusetts		X	X	
University of New Hampshire			X	X
University of Rhode Island		X		
University of Vermont		X	X	X
University of West Virginia		X	X	

5.0 System Elements

5.1. Terms and Definition

A difficulty in comparing direct cost recovery systems among institutions is that the terminology used for similar concepts is highly variable, i.e., system elements may be defined uniquely at each institution. For example, respondents to the NERA survey used the following diversity of terms for cost recovery: cost recovery, full cost recovery, recovery of true costs, recovery of defined services, full recovery of non-subsidized costs, and recharge. Similarly, there was a similar diversity of terms used in responses to a cost sharing question: fees set below full costs, fees set below defined costs, subsidized costs, and supplemental funds. For this document we strived to use the following terms and definitions as consistently as possible except we used given terms

when reporting on specific services and fees at individual institutions. In addition, for each term below we have discussed the range of usage and potential implications for comparing systems.

Indirect costs are costs incurred for common needs and therefore cannot be identified with a particular sponsored project, an instructional activity, or any other institutional activity. Examples of indirect costs are general facility and administrative costs, including utilities, infrastructure repairs and general maintenance, and administrative compensation.

Direct costs are costs that can be identified specifically with a particular sponsored project, an instructional activity, or other institutional activity and that can be assigned to such activities relatively easily with a high degree of accuracy. Examples of direct costs are the compensation of employees performing work directly in support of an activity, the cost of material consumed or expended, and costs to operate and maintain equipment. In some cases, utility costs directly attributable to a particular project and separately metered may be considered a direct cost.

Services are resources of a facility that are provided in support of a project or activity except those associated with indirect costs. It is common to provide different levels of services: 1) basic service, 2) a higher tier service, and 3) services unique to a particular project such that cost recovery is more appropriately handled with an individual project agreement rather than a standard fee. Services are generally defined as specific functions (e.g., plant care in greenhouses), but the resources provided are comprised of labor, materials and supplies, commercial services, equipment, and other direct costs.

A **unit** is defined as a logical unit of measure to which direct costs for services are applied. Units for costing may be acre or square foot (e.g., crop farms), bench (e.g., greenhouses), or animal (animal facilities).

The **unit cost** is the total direct cost for defined service divided by the number of units. Unit costs are established annually based on the actual direct costs that are incurred in providing basic or other services and are developed in compliance with generally accepted accounting principles.

The **service fee** is a per-unit billing rate set to recover all or a portion of the direct costs associated with providing services at a facility. A labor fee for commitment of facility staff to projects and activities also is sometimes established for recovery of direct costs when labor and non-labor service fees are billed separately or when unique projects are billed for itemized costs rather than using a standard fee. Service fees should be audited and revised annually as needed. Note that terms such as land use fees, plot fees, or space use fees are avoided in this document unless a specific term reported by an institution is being noted. The term "service fee" is a more comprehensive term, and some space-based terms (e.g., space use fee) may incorrectly signal potential conflicts with indirect cost accounting. Note that published fees often appear highly variable among institutions. There are a number of potential reasons. The defined set of

services being provided at a facility may vary among institutions. I.e., Institutions may choose to exclude certain types of costs when calculating the cost basis for service fees. Also fees are sometimes set at a rate lower than the calculated unit cost. This latter case is sometimes referred to by survey respondents as subsidized costs or subsidized fees. Lastly fees may simply be nominal charges and unlinked to a detailed cost analysis.

In this document, **cost sharing** of the service fee means the station or unit with budget responsibility for the facility pays a portion of the fee for a particular project or activity. Or in the case of unique projects where cost recovery is by direct reimbursement, the station or unit pays a portion of the total direct cost of the project.

This definition of cost sharing is relatively narrow. For example, other entities within the university might pay a portion of a service fee and this would be commonly referred to as cost sharing. However, this type of cost sharing is not relevant to the purpose of this document because it is functionally equivalent to a second project sponsor paying the required fee. Another complexity is that when some categories of direct costs are purposefully excluded from the cost basis of a service fee or when the fee is set below the actual cost then there is in effect an undeclared cost sharing of full direct costs for all users. In some cases survey respondents referred to this as a subsidy. One survey respondent used the term waiver in a response to a question about cost sharing. The waiving of an applicable fee (i.e., no entity pays the fee) for a facility user is technically not cost sharing. Waivers also are problematic because federal sponsors cannot be charged higher fees than those charged to other users.

5.2. Types of Costs Recovered

At the most basic level, the types of costs typically recovered for service to projects or activities at facilities are labor, materials and supplies, equipment operating costs, and services provided by external vendors (e.g., veterinarian care, equipment service contracts). Utility costs (e.g., electric, water) may be recovered in certain situations; however, it is often not possible to segregate direct (project-specific) and indirect (base facility operation) utility usage. There was no indication in survey responses or policy documents that equipment or infrastructure depreciation was included in the cost basis for fees. (Note: Utility and infrastructure costs may be more commonly incorporated into direct cost recovery systems for aquaculture research facilities because utility costs can be substantially influenced by research activity and restructuring of tank systems for individual projects is common.)

The specific types of costs recovered for each facility type are summarized below and in Table 3. There was considerable variation in the types of costs targeted for recovery at each institution. As noted earlier, this is a product of four factors. Institutional decisions on the package of services to be provided on a fee basis determine the types of facility costs targeted for recovery. Some categories of facility costs may be explicitly excluded from the cost basis in the fee setting process for local reasons. Facilities and institutions

differ in cost efficiency for local reasons. Lastly, fees may be set below calculated costs. In combination these factors produced high variation among institutions in fees for similar facility types. To illustrate, at a particular crop farm, labor and consumables for common field activities (e.g., tillage, planting, nutrient management, pest control) may be provided on a fee basis while other associated services (e.g., composting, rotational crops, irrigation, equipment depreciation, greenhouse support) may be unavailable or be provided to all facility users without charge. As examples, institutions reported excluding costs for salaries of staff paid on state funds, director's salaries, salaries of full time employees, production of marker stakes, and utility costs.

Crop Farms

At institutions with cost recovery systems for crop farms, it was common to charge basic service fees on a per acre basis to recover labor and supply costs for tillage, cultivation, lime and fertilization, and pest management (Table 3). Some institutions may include other services for the basic service fee. For example, the following were provided at some institutions and included in the cost basis for fees: irrigation when available, machine harvest, cover/rotation crops, mowing field margins, pruning perennial plants, safety training, and project support by the facility manager. At some institutions, certain activities were explicitly excluded, e.g., pruning of perennial plants. At one institution, weeding and harvesting was provided based on an hourly fee in addition to the basic service fee. Also at one institution, rates for farms differed to reflect differences in soil type, irrigation capability, and available infrastructure on farms (coolers, fencing, greenhouses, high tunnels, etc.)

Table 3. Summary of services provided on a fee basis in direct cost recovery systems for four types of research facilities at member institutions of the Northeastern Regional Association of State Agricultural Experiment Station Directors, 2013.

Facility Type	Services commonly provided for basic service fees[a]	Additional services sometimes provided for basic fees or at additional cost[a]
Crop farms	Tillage, lime and fertilizer application, cultivation, pesticide application, mechanical harvest, field border mowing, tree pruning, equipment costs.	Cover/rotation crops, irrigation, hand-weeding, safety training. Fees also may reflect the benefits of available coolers, high tunnels, and soil fertility.
Greenhouses	Watering, pest and disease control, environmental control, greenhouse maintenance, routine sanitation, fertilization, seasonal application of shade materials.	Propagation, biological pest control, transplanting, pruning, harvesting. Supplies: Potting mixes, pots, stakes, labels.
Growth chambers	Supplies and labor for maintenance and repair of chambers.	User supplies: potting media, lime, fertilizers, stakes, rooting hormones.
Large animal/ livestock facilities	Supply costs and labor for animal inputs (water, food, and bedding) and stall cleaning. Other consumable supplies and routine facility needs related to animals.	On-farm forage production, health care, waste management, regulatory and registry costs, site-specific training

[a]Not all institutions with direct cost recovery systems provide all services for the basic or higher-tier service fees.

There were at least three distinct approaches for structuring fee systems at crop farms. At least one institution (University of Maine) recovered costs for labor and other expense categories with a single standard fee/acre. At least one institution (Cornell University) segregated costs for labor and equipment from a general operating expense category and had separate fees for each. Labor and equipment fees were charged as general labor or labor plus equipment (hourly basis). Charging for labor independently was deemed more equitable for projects with staff that could perform their own field work. A third model (Rutgers University) used separate fees for different categories of service: land preparation, plot maintenance, and irrigation.

At some institutions, there were systems to recover costs (labor, supplies, and miscellaneous costs) for unique projects or activities where standardized fees were not easily applied. For example, hourly rates may apply for use of facility staff for usual project activities or off-farm research. Or full reimbursement may be required for infrastructure modifications or consumables to support unusual projects. Or reimbursement may be required to offset unusually high revenue losses from project activities.

Greenhouses

At institutions with cost recovery systems for greenhouses, it is common to charge standard service fees to recover labor and supply costs for basic plant care; management of lighting, irrigation and ventilation systems; general housekeeping; and pest management (Table 3). Fees are typically charged on a bench unit or square foot basis. Some institutions exclude all or some labor costs. Some institutions may include other services for the basic or higher-tier service fees.

One institution noted that greenhouse utility costs were excluded in the cost basis for fees whereas several noted that all operating costs were included. However, it was not clear how utility costs are handled in these cases.

Growth Chambers

Information on direct cost recovery systems for growth chambers from the survey and existing policy documents was limited. Fees appear to be generally based on recovery of costs for supplies, equipment, and labor; however, recovery of labor costs was implied but not explicitly described or noted in some cases (Table 3). Fee structures were based on chamber size. Plant care supplies were sometimes included in service. However, plant care was the responsibility of the user. Some survey respondents noted that chamber depreciation was not included in the cost basis of fees. This was consistent with other comments that chamber replacement was a challenge for maintaining growth chamber service on the long term.

Large Animal/Livestock Facilities

At institutions with cost recovery systems for large animal facilities, it is common to charge service fees to recover labor and supply costs for feed, bedding, other routine

animal or facility supplies, cleaning animal stalls, waste management, and preventative health care (Table 3). Fees are typically charged on an animal per diem basis. Notably some stations reported that labor costs were excluded. Some institutions may include other services in the cost basis for fees. For example, the following services were provided at some institutions:

- Food and bedding production costs
- Regulatory and registry costs
- Animal-related equipment maintenance
- Costs for raising replacement animals
- Safety training

5.2 Fees and Level of Cost Recovery

One goal of the survey was to better understand the degree that institutions were attempting to achieve full recovery of direct costs for projects and activities. Assessing the variation in cost recovery within facility types and across institutions was not possible based on the survey information and policy documents because of variation in the packages of services provided for service fees, the types of costs included or excluded in costing services, and the unknown degree to which reported fees recovered full calculated costs for services. It is also important to note that full cost recovery also depends on how it is defined. For example, most institutions charge a fee to cover costs for a defined set of services. In contrast, other services appeared to be provided without charge. These cases could be viewed as either full cost recovery for the defined services or less than full cost recovery for the full suite of services provided. Some institutions also excluded certain types of costs in costing services at crop farms and greenhouses. One institution also reported limiting cost recovery for a dairy facility to expenses for services above and beyond what was required to maintain the herd and operate the dairy. And finally it is generally unknown whether current fees at institutions were set at or below full costs for defined services. For example, one institution set its cost recovery goal for its crop farms at 10% of total annual operations and also capped the number of acres (i.e., 10 acres) per project per farm that required fee payment. This structural variability allows only a comparison of fees for each facility type and not an assessment of relative cost recovery. Available information on service fees for crop farms, greenhouses, and growth chambers are summarized in Table 4.

5.3 Processes for Determining Costs and Setting Fees

Survey respondents provided little information on processes for determining costs. Some institutions reported that costing analyses were done by college or station business offices using fiscal year expense data for facilities to estimate break even costs for defined services. Analyses must conform to rules for federal allowable costs. Some institutions reported that processes were dictated by their university division of financial affairs (e.g., Cornell University Policy 3.10, Recharge Operations and Service Facilities).

Table 4. Available information on fees for services[a] provided at three types of facilities at member institutions of the Northeastern Regional Association of State Agricultural Experiment Station Directors in 2014.

Member Institutions	Crop farms[b]	Greenhouses[b]	Growth chambers
Cornell University	Land use and infrastructure fee: $100–350/ac[c] Labor & equipment: $30/hr; General labor: $20/hr	**Facility level 1:** basic plant care ($0.31/ft/mo)[d] extended plant care ($0.37/ft/mo)[d] **Facility level 2:** basic plant care ($0.38/ft/mo)[d] extended plant care ($0.44/ft/mo)[d]	$21–72.60/chamber/mo[d] depending on chamber size
University of Maine	Annual crop farms: $950–1500/ac[d] Perennial crop farms: $2500–3700/ac[d] Labor for other services: $20/hr	$5.12 per bench (32 ft)/mo.	
Rutgers University	Land preparation: $160/ac[d] Plot maintenance: $170/ac[d] Irrigation: $170/ac[d]	**Department rental fees[e]** 40′x40′ greenhouse: $1782/yr 20′x20′ containment zone: $963/yr 10′x20′ containment zone: $650/yr	Small chamber: $22/week[d] Large chamber: $118/week[d]
Pennsylvania State University			Reach-in model: $2.00/day[d] Walk-in model: $4.00/day[d]
University of Vermont		$3.06–4.14/ft/mo[d]	

[a]Specific services provided vary among institutions within facility type.
[b]It is common for requests for less than a full acre or bench to be charged for a minimum unit area.
[c]Excludes labor costs. Labor costs are charged separately
[d]Includes labor costs.
[e]Greenhouse space is rented to university departments, which then allocate space to their faculty members.

One institution reported that a department committee determined rate schedules for greenhouses, but the specific process was not reported. Some but not all institutions noted that costs were audited annually. Generally, costing analysis requires working with facility managers and staff to segregate labor and operating costs by specific activities to estimates costs for defined services.

5.4 Application to Facility Users

Where direct cost recovery systems are in place, payment of fees appears to be uniformly required of all university faculty and staff requesting service in support of research and outreach activities. It was not clear from survey responses or policy documents to what extent academic programs were required to pay for service in support of teaching activities. One institution's policy indicated that service fees apply to academic courses and that graduate students or advisors are required to pay fees for service for graduate research projects. A second institution noted that academic units were charged for use of greenhouse space for teaching activities.

Survey responses were limited, but it appeared that users from private industries and organizations are generally required to pay fees. One institution reported applying a rate of twice the standard service fee for private companies that contract for service at one crop farm. At one institution, all work by external users required an institutional project leader and the work was billed at the standard rate. At other institutions, service fees may not apply if the facility did not provide resources in support of that activity.

5.5 Cost Sharing of Fees

Based on survey responses, payment of full fees (i.e., no cost sharing) was generally expected for research and outreach activities. Several institutions indicated that cost sharing was allowable, but not current practice. The following practices occurred at individual institutions: cost sharing only approved for plant breeding or variety evaluation work, cost sharing approval required prior to grant proposal submission for livestock work, cost sharing negotiated as part of startup packages for new faculty, and cost sharing requests were considered using a formal proposal process.

Given that the application of service fees to teaching activities was unclear in survey responses, there was little information on associated cost sharing. One institution noted that decisions on cost sharing for academic courses at facilities were made in consultation with academic chairs and directors as part of routine planning for academic programs. One institution established a separate limited fund to cost share a percentage of teaching activity costs in greenhouses. And it was also noted that some unique aspects of teaching programs (e.g., horticultural plant collection) may require special cost-sharing arrangements.

5.6 Fee Collection

It was common for facilities to use service request forms to initiate project or activity tracking and ultimately to provide quantitative data on services used by station or college business offices. It appeared common for business offices, in consultation with the facility manager, to compile and review activity records and subsequently bill project accounts. Service fees were billed as a direct expense to grant, contract, or other accounts through university accounting systems. Project accounts may be billed periodically or at the termination of the project depending on local needs. It was common for accounts to be billed at the end of growing seasons or quarterly. Greenhouses and growth chamber facilities sometimes were billed more frequently (e.g., monthly).

One institution reported using custom built software to facilitate completion of work records for transmittal to its business office. Another institution reported that it was in the process of developing a reservation and billing systems for its farm and greenhouse operations.

5.7 Revenue Use

Survey information on revenue use was limited. In the case of crop farms and greenhouse, two institutions reported that revenue was returned to the facility or responsible academic unit to offset expenses. At one institution, fees from multiple facilities were aggregated centrally and used for equipment and infrastructure replacement and to offset some expenses at individual facilities. In the case of large animal facilities, four institutions reported that revenue was returned to the facility operating budget. There was limited information for growth chamber facilities.

6.0 Implementation

Directors provided the following comments and recommendations related to implementation of direct cost recovery systems:

- Some facility users will resist establishment of formal direct cost recovery systems. Others will see benefits for the long term. Directors should recognize that instituting a system will result in a cultural change for a facility community. In mature systems, additional stress occurs when subsidies are reduced.
- It can be a challenge to coordinate or normalize fee structures on crop farms with different cultures and requirements. This is less of a challenge when facilities are managed centrally by the station or college.
- Project directors may struggle with assembling budgets for multi-institutional proposals because fees for similar types of facilities at different institutions may range widely.
- Posting of fees, policies, and guidance on fee descriptions for budget justifications will make proposal writing easier for project directors and minimize errors. The institutional office of sponsored programs should have access to this information.
- The initial costing analyses for facility operations will require an extended time line because it is an iterative process involving facility managers, business office staff, and other administrators. Anticipate this need in the implementation time line.
- Facility users may have activities where their project staff do all or part of the work provided as fee-for- service. There may be a number of these situations all with unique histories at the time of system implementation. There should be a general policy on allowable work by project staff and on how fees will be applied in these cases. Expect project directors to adjust their use of project staff over time in response to new policies and fees.
- Public groups that receive service or access at facilities may need special attention when rolling out a new cost recovery program.

- Accommodating existing teaching in a new direct cost recovery system can be a challenge if a facility has heavy use for student courses. Cost sharing strategies are one approach to managing service fees for teaching.

7.0 Best Practices and Recommendations

Directors recommend the following best practices:

- Work with your university office of sponsored programs during system planning. Talk to key folks in other institutions to learn about approaches for costing and administrative procedures and to become aware of pitfalls.
- Commit to a substantial and extended effort to explain the need for implementing a system and why it will be beneficial to facility users in the long run.
- Be conservative initially and avoid inclusion of any direct cost category that might suggest a conflict with indirect cost accounting.
- Strive toward consistency in practice across facilities.
- Centralize facility management at the station or college level as feasible or appropriate to facilitate the creation and administration of a common direct cost recovery system.
- Establish an advisory group(s) to assist in developing direct cost recovery systems and evaluating future policy adjustments. Be transparent by showing project directors and others facility cost information during system development.
- For simplicity, strive to charge similar fees at like facilities. And strive to limit annual fluctuations in service fees. One way to achieve uniformity and stability is to set fees below cost across facilities and at a level where annual fluctuations in facility costs will likely not require a fee increase at any unit in the near term.
- In communications with users, emphasize the concept of "fee for services" rather than using terms such as plot or land use or bench fees.
- Encourage entrepreneurial endeavors that serve to offset facility costs and reduce service fees.

Acknowledgments

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Appendix

Below is a list of policy and procedures documents and web-accessible information for direct cost recovery systems at member institutions of the Northeastern Regional Association of State Agricultural Experiment Station Directors.

Crop Farms

Documents

- Rutgers University: Snyder Operations Policy, http://snyderfarm.rutgers.edu/forms/Snyder-Farm-2013-SF-Policy.doc
- Cornell University: Fee and Rate Structure, http://cuaes.cornell.edu/cals/cuaes/ag-operations/campus-farms/loader.cfm?csModule=security/getfile&PageID=1051230
- University of Maine: Policies and Procedures on Direct Cost Recovery and Sharing at Crop, Greenhouse, and Livestock Facilities, http://umaine.edu/mafes/home/resources-for-staff/

Information on websites

- University of Maine: Farm and Greenhouses—Service Fees and Labor Rates at Farms, http://umaine.edu/mafes/home/service-fees-and-labor-rates/

Greenhouses

Documents

- Rutgers University: Greenhouses and Growth Chambers: Rental of Greenhouse and Growth Chamber Space, http://njaes.rutgers.edu/research-greenhouse/rental.asp
- Cornell University: Greenhouse Use Policy, http://oeh.cals.cornell.edu/GHUse2.html
- University of Maine: Policies and Procedures on Direct Cost Recovery and Sharing at Crop, Greenhouse, and Livestock Facilities, http://umaine.edu/mafes/home/resources-for-staff/
- Pennsylvania State University: Guide to Greenhouse and Growth Chamber Policy and Use – Greenhouse and growth chamber space rental policies, http://agsci.psu.edu/faculty-staff/services/greenhouses-and-plant-growth-facilities/information/guide-to-greenhouse-and-growth-chamber-policy-and-use

Information on websites

- University of Maine: Farm and Greenhouses—Service Fees and Labor Rates at Farms, http://umaine.edu/mafes/home/service-fees-and-labor-rates/

Growth Chambers

Documents

- Rutgers University, Greenhouses and Growth Chambers: Rental of Greenhouse and Growth Chamber Space, http://njaes.rutgers.edu/research-greenhouse/rental.asp
- Cornell University: Interim Growth Chamber Use Policy, http://cuaes.cornell.edu/cals/cuaes/ag-operations/greenhouses/loader.cfm?csModule=security/getfile&PageID=1075536
- Pennsylvania State University: Guide to Greenhouse and Growth Chamber Policy and Use—Greenhouse and growth chamber space rental policies, http://agsci.psu.edu/faculty-staff/services/greenhouses-and-plant-growth-facilities/information/guide-to-greenhouse-and-growth-chamber-policy-and-use

Information on websites

Large Animal/Livestock Facilities

Documents

- Rutgers University: Research and Farm Operating Policy, http://njaes.rutgers.edu/animalcare/perdiem.asp
- University of Maine: Policies and Procedures on Direct Cost Recovery and Sharing at Crop, Greenhouse, and Livestock Facilities, http://umaine.edu/mafes/home/resources-for-staff/

Information on websites:

- University of Maine: Farm and Greenhouses—Service Fees and Labor Rates at Farms, http://umaine.edu/mafes/home/service-fees-and-labor-rates/

Related Financial Policy Documents for Service Facilities

- Recharge Operations and Service Facilities, Policy 3.10. Cornell University Policy Library, http://www.dfa.cornell.edu/cms/treasurer/policyoffice/policies/volumes/finance/upload/vol3_10.pdf

RESOLUTION OF APPRECIATION

WHEREAS, the North Central Regional Association of State Agricultural Experiment Station Directors met at the Courtyard by Marriott Isla Verde Beach Resort in San Juan, PR on April 3 to 7, 2016, and

WHEREAS, Dr. Héctor Santiago, Assistant Dean and Assistant Director of the University of Nebraska-Lincoln's Institute of Agriculture and Natural Resources Agricultural Research Division was kind enough to offer to make local arrangements and plan the NCRA 2016 spring meeting in San Juan, Puerto Rico, and

WHEREAS, because of Dr. Santiago and his staff's leadership and support, meeting arrangements were implemented efficiency and smoothly, and

WHEREAS, those attending were educated and stimulated by the meetings, field day, receptions, and dinners, and

WHEREAS, the location for the meeting was outstanding and the accommodations in the beautiful tropical location were all compatible and conducive to effective interaction resulting in a successful meeting;

LET IT BE KNOWN, that the North Central Regional Association of State Agricultural Experiment Station Directors (NCRA) recognizes Dr. Santiago's invaluable contribution and service to the North Central region, and

THEREFORE, on this day of April 6, 2016, the NCRA resolves to extend their sincere gratitude for all his efforts arranging this fantastic spring meeting, and

BE IT FURTHER RESOLVED that an original of this resolution be provided to Dr. Héctor Santiago and that a copy be filed as part of the official minutes of this meeting.