

The Status of Agricultural Sustainability in the College of Agriculture and Life Sciences

CALS Sustainability Task Force Members

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Sustainability as an evolving term

Sustainability has deep roots in the Iowa State College of Agriculture and Life Sciences, even though the concept of agricultural sustainability had not yet been coined when the college was founded. Early proponents of the Iowa Agricultural College and Model Farm, created in 1858, were familiar with the environmental damage and depletion of natural resources resulting from traditional farming methods as settlers left the depleted soils of New England and flocked to newly-opened virgin prairies of the state. Progressive state leaders sought to advance a science-based agriculture as a means to maintain agricultural productivity without destroying the natural resources that was evident in much of New England and the South.

Just as the name of the college has evolved, from the Iowa Agricultural College and Model Farm to the College of Agriculture and Life Sciences, sustainability has evolved as an interdisciplinary scientific approach. By the mid-19th century it was widely recognized that traditional farming methods were exploitive of natural resources and more research and education was needed to ensure that the highly productive soils of the state were not abused. It is this recognition that gave rise to improved farming research and demonstration projects that are contained in the hundreds of research reports and extension bulletins since the earliest days of the Iowa Agricultural College and Model Farm.

For more than 150 years, CALS faculty and staff have focused on various dimensions of sustainability including improving plant and animal production efficiencies, reducing unintended consequences of farming on the environment and reducing food and feed waste. Early examples in sustainability research includes improving soil health and fertility through crop rotations and the incorporation of green crops and livestock manure into row-crop production, attention to balanced farming systems, terraces and other land modifications to reduce soil erosion, and improved crop and livestock genetics each contributed to improving yields and profits while reducing the impacts on the environment.

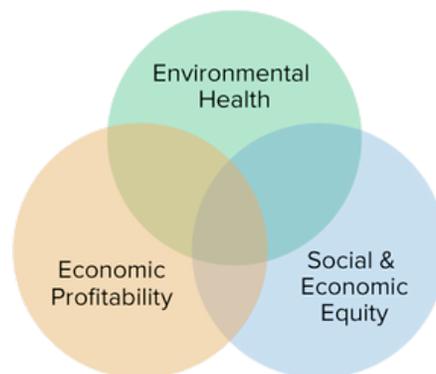
The historical record shows that sustainability is not a new direction in agricultural research, but builds upon and extends a large body of scholarship that recognizes the delicate balance between healthy soils and stewardship of natural resources contributes to stronger

communities and improved standards of living for farm families. What is new is the focus on interdisciplinary research, where subject matter specialists from many disciplines form teams to address common elements of sustainability.

Definition of sustainability

There are numerous definitions of sustainable agriculture, but the core elements captured by The National Research Council report (2011) are: "... to create and maintain conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations." The essence of this broad definition reflects John Ehrenfeld's observation that, "Sustainability is the possibility that humans and other life will flourish on the Earth forever." (*Sustainability By Design*, 2008)

There is general agreement that sustainable agriculture addresses three dimensions environmental health, economic profitability and providing socially desirable communities. Sustainability research lies at the intersection of these three dimensions. It is in the overlapping area of these three dimensions that makes sustainability research a unique scientific inquiry that attempts to find simultaneous solutions to each dimension. Rather than maximizing singular dimensions, sustainability recognizes the need to find optimal solutions for each.



Initiating a college-wide dialogue on sustainability

In the spring 2016, CALS Endowed Dean Wendy Wintersteen appointed a task force to initiate a college-wide dialogue on sustainability. The dialogue was to foster a comprehensive discussion on "how the college can focus and more fully engage in

sustainability across the research, education and extension and outreach missions of the college.” The intent of this dialogue was to better position the college in addressing critical economic, environmental and social/community issues facing agriculture.” (<https://www.sustainability.cals.iastate.edu/letter-dean-wendy-wintersteen-march-2016>)

Task Force’s focus of activities in 2016

The CALS Sustainability Task Force began its discussion on what the college has already accomplished, identification of additional opportunities to invest in research, teaching and extension and where the college can provide leadership to the national conversation on sustainable agriculture.

The 17-member task force organized itself into four subcommittees or working groups:

1. Speakers Bureau Subcommittee, led by Cathy Kling
2. Inventory Subcommittee, led by Mark Rasmussen
3. Environmental Scanning Subcommittee, led by Kurt Rosentrater
4. Website Development Subcommittee, led Lois Wright Morton

Speakers Bureau Subcommittee

Cathy Kling, chair, along with Diane Birt, Tom Isenhardt and Kristina Craft

During the academic year 2016, five off-campus speakers presented their views on sustainability at college-wide events:

- Elena Irwin, Ohio State University
- Keith Paustian, Colorado State University
- Greg Miller, National Dairy Council
- Deborah Arcoleo, Hershey Company
- David Myrold, Oregon State University

The presentations are available at:

www.sustainability.cals.iastate.edu/cals-sustainability-lecture-series

Common elements of the presentations: The three academic speakers (Professors Irwin, Paustian and Myrold) discussed what their colleges are doing in research, extension and teaching in sustainability. Dr. Irwin (Ohio State) discussed that sustainability is

a major initiative across the university with \$50 million generated from privatizing its parking system. This initiative is consistent with the recent hiring blitz that is underway at Ohio State to hire new faculty in addressing agricultural sustainability.

Dr. Paustian (Colorado State) discussed with the task force the focus of sustainability surrounding water conservation given the demand for water driven by the needs for irrigation and to serve a growing population. A paramount concern in drought sensitive areas western states is climate change and how their dependency on irrigation water poses particular issues.

Dr. Myrold's (Oregon State) presentation focused on issues related to soil health and the need to better understand the relationships between soil microbial organisms and the nitrification processes.

The three academicians emphasized how sustainability is a major focus in their states and how their universities are implementing cross-disciplinary approaches in the teaching, research and extension missions.

The two industry representatives provided convincing evidence that food industries are heavily investing in sustainable practices to increase market shares and profits by better meeting consumer demands. Greg Miller (National Dairy Council) and Deb Arcoleo (consumer transparency division of Hershey Company) provided many examples of how the industry is becoming more attuned to consumer preferences, including the origins of their food, and how the implementation of digital technology facilitates tracking of ingredients from the source to the consumer. Some of this industry attention is driven by managing risk and improving profit margins by responding to consumer preferences. These industry representatives painted a picture that suggests that industry may be further along in incorporating sustainability than universities.

Take away messages from external speakers:

- Sustainability is a dominant theme throughout the agriculture production and processing sectors and is expected to grow over the next several years.
- Achieving sustainability will require substantial public and private sector financial resources.

- The continued development and refinement of digital electronics makes precision measurements of inputs used and sources of ingredients possible.
- Much of the pressure to change the food system is being driven by the market power of national food chains that can force compliance of producers and processors to achieve what consumers are demanding.

Inventory Subcommittee

Mark Rasmussen, chair, along with Gail Nonnecke, Steve Bradbury, Kan Wang and Bob Dodds

To gain a better understanding of what the college is already doing in sustainability, this subcommittee undertook a comprehensive review of the teaching, research and extension projects already underway. Currently there are 156 CRIS projects that were identified as addressing scientific questions about various dimensions of sustainability, and since 2011 there have been 520 research projects related to sustainability.

Other findings:

- 64 agricultural technologies licensed through the ISU Research Foundation
- Funding provided by major government and NGO agencies and foundations, as well as industry support
- 240 courses in CALS academic departments and curriculum addressing sustainability issues
- 135 clubs on campus have environment in their title or description
- 70 CALS clubs with conservation or environment in their title or description

Iowa State University Extension and Outreach plays a significant role in sustainable agriculture education and demonstration projects. Some examples of extension's sustainable agriculture contributions include:

1. 4-H programs and project areas for students 4th-12th grade:
 - a. Crop Production, 1,040 members enrolled in project area
 - b. Environment and Sustainability, 1,409 enrolled
 - c. Horticulture, 4,835 enrolled
 - d. Outdoor Adventures, 2,581 enrolled

e. Animal Production, 17,465 (rabbits, pets and dogs not included)

2. Extension Store:

a. A new drop down menu will be added to identify publications, videos, books and periodicals that provide research-based information on sustainable agriculture.

b. The store is searchable. This feature provides a means to identify resources that contain information on sustainable agriculture.

3. A listing of key programs and research projects will be added to the Sustainable Agriculture web page. This past year program specialists and regional directors identified local educational programs that have been offered across Iowa. In 2016-2017, it is estimated that more than 750 extension programs were offered in Iowa, which addressed sustainability. These programs were not specific to sustainability, however a key portion of the program addressed sustainability.

4. Iowa State has a number of internships offered to students which focus on sustainable agriculture. One example, offered through Extension and Outreach, is the "Rising Star" internship. The program is a partnership between the colleges of Agriculture, Design, Human Sciences, Vice President of Extension and County Extension Districts. This year the program was offered in 22 counties of Iowa with 15 Iowa State students participating.

5. The Iowa State Research and Demonstration Farms are a key partner of Extension and Outreach. More than 65 research projects, trials and demonstrations related to sustainable agriculture were carried out on the outlying research farms. In many of the research projects or demonstrations Extension and Outreach staff were involved. The research conducted on the farms leads to new extension programs. The data collected is shared through extension programs such as applicator training.

6. Volunteers have been a key part of implementing sustainable practices in communities across Iowa. The key volunteer programs have included Master Gardeners, Master Woodland Managers and Master Conservationists. In 2016, 2,046 Iowa Master Gardener volunteers provided more than 120,765 volunteer hours and 30,165 education hours across the state.

7. Key relationships developed by extension that promote sustainable agriculture include: SARE, Farm Services Agency, NRCS, Practical Farmers of Iowa, Leopold Center, Beginning Farmer Center, Sustainable Agriculture Graduate Program, Iowa Farm Bureau Federation, Iowa State Organic Agriculture Program, Iowa Learning Farm, Small Farm Sustainability Program and the Iowa Water Center.

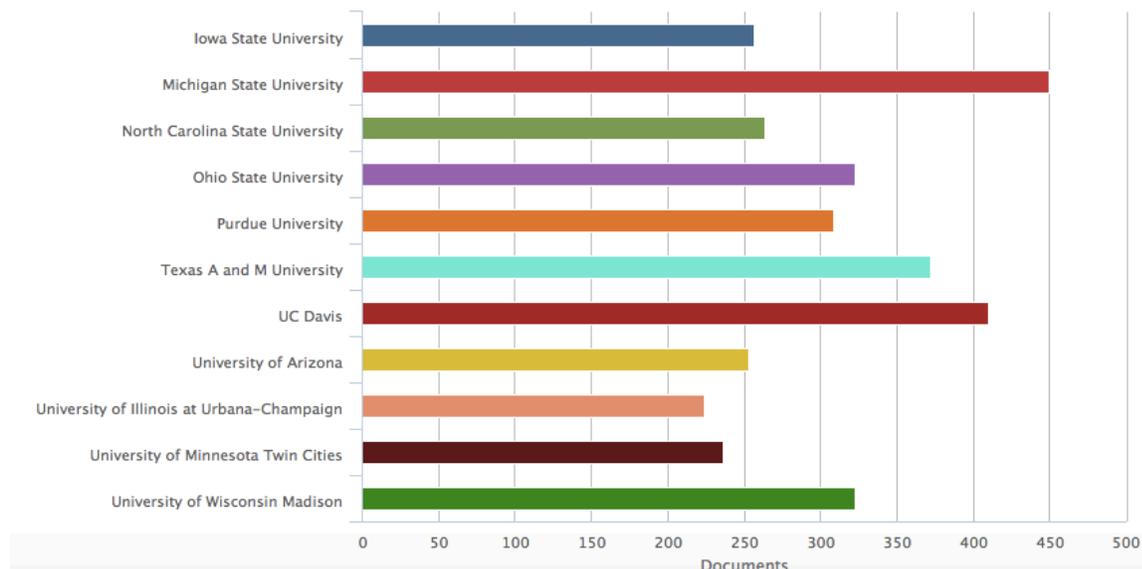
Environmental Scanning Subcommittee

Kurt Rosentrater, chair, along with Ivan Rudick, Matt O’Neal and Ajay Nair

To assess how well CALS is doing compared to its peer institutions, the subcommittee undertook an intensive comparative investigation of the volume of journal articles and conference proceeding written by our faculty and staff, along with theses and dissertations.

1. Journal articles and conference proceedings

Using keyword scans the subcommittee found that CALS ranks favorably with our peers. Searching with the term *sustainable*, ISU produced about 250 articles compared to 450 for Michigan State, the leader.



A similar pattern was observed when *sustainability*, *environment*, *biodiversity*, *climate change* and *stewardship* were used in the title word search. Among the 12 peer research-intensive universities, ISU is generally in the mid-range.

Key message:

- ISU could improve its relative ranking or position vis-à-vis peer institutions by encouraging researchers to include additional keywords in research papers
- ISU is a major contributor to sustainability science journal articles

2. Graduate theses and dissertations

An electronic digital search of more than 400,000 theses and dissertations written between 1983 and 2015 using keywords *environment* (#1), *green* (#2) and *conservation* (#3) found that ISU ranks comparatively quite high.

The top three universities among ISU peer institutions:

#1	#2	#3
Iowa State	Michigan State	Purdue
Michigan State	Iowa State	Purdue
Purdue	Iowa State	North Carolina
UCD	Wisconsin-Madison	Michigan State
UIUC	Michigan State	Minnesota
UCD	Michigan State	Arizona
UCD	Iowa State	Texas A&M
Arizona	Minnesota	North Carolina
UCD	Michigan State	Arizona
Michigan State	Iowa State	Purdue/UCD
Iowa State	UCD	Michigan State
Michigan State	Arizona	Wisconsin-Madison
UCD	Arizona	Purdue
North Carolina	Iowa State	UCD
Iowa State	North Carolina	UCD

Key message: ISU currently has a high position and visibility vis-à-vis peer institutions in terms of theses and dissertations that address dimensions of sustainability.

3. Student activities

- Many of our peer institutions have student-run farms (either organic or conventional).
- Michigan State University ranks 8th for the best student farm in the U.S.

Key message: ISU's student farm is competitive with peers, but more efforts could be implemented to raise awareness and involve more students in sustainable practices.

Take Away Message: ISU is a recognized leader in the production of sustainability-related science journals and graduate student theses and dissertations. The analysis suggests there is room to elevate our stature by encouraging authors to include key descriptor terms in the titles.

To remain competitive or to break into a leadership role will require additional human and financial resources dedicated to sustainability science across all disciplines or refocusing of existing resources.

Website Design Subcommittee

Lois Wright Morton, chair, along with Matt Liebman, Patrick Gunn, Brian Meyer, Ed Adcock and Trey Forsyth

The subcommittee created the Sustainability Task Force Website: <http://www.sustainability.cals.iastate.edu/>

The website introduces task force members with a two-minute video of their definition of sustainability and why they are serving.

This site is the electronic record of the dean's message establishing the task force and its goals, upcoming events, lectures and FAQ.

2016 CALS Sustainability Symposium

Planning Committee, Cathy Kling, chair

The culmination of the task force efforts was hosting a college-wide symposium on April 13.

Agenda:



April 13, 2017, Scheman Center, Iowa State University, Ames, Iowa

		LOCATION
8:00-9:00 am:	CHECK-IN Poster setup and viewing	1 st floor
9:00-10:00 am:	INTRODUCTION Dean Wintersteen, <i>Views on the Role of Sustainability in CALS</i> PLENARY SESSION Catherine Woteki, <i>Sustainability from the Federal Level</i>	1 st floor Benton Auditorium
10:00-10:30 am:	BREAK	
10:30-noon	ACADEMIC PROGRAMS Teaching/Research Focus Kendall R. Lamkey, Joshua Rosenbloom, Sue Blodgett, Donald Beermann, and Matthew O'Neal <i>Moderator: Joe Colletti</i>	1 st floor Benton Auditorium
Noon-1:30 pm:	LUNCH & POSTER VIEWING <i>Poster Session: Existing research from CALS faculty and students that relates to sustainability</i>	2 nd floor
1:30-3:00 pm:	PANEL OF CENTER DIRECTORS AND EXTENSION/OUTREACH Mark A. Rasmussen, Jason W. Ross, Kevin M. Keener, Catherine Kling, and Patrick S. Schnable <i>Moderator: John Lawrence</i>	1 st floor Benton Auditorium
3:00-3:15 pm:	BREAK	
3:15-3:45 pm:	REPORT FROM SUSTAINABILITY TASK FORCE SUBCOMMITTEES Environmental Scanning <i>Presenter: Kurt Rosentrater</i> Inventory <i>Presenters: Mark Rasmussen and Gail Nonnecke</i>	1 st floor Benton Auditorium
3:45-4:30 pm:	MOVING FORWARD Dean Wintersteen, Joe Colletti, and John Lawrence What is needed to move sustainability up the CALS research, teaching and extension mission?	1 st floor Benton Auditorium

More than 200 CALS faculty and staff registered for the event. More than 80 posters were on display throughout the day highlighting current research, teaching and extension efforts of the college.

Future directions for the task force

The 2016 academic year focused on creating a website to facilitate a college-wide discussion on agricultural sustainability, assessing how the college compares to its peer institutions and conducting a preliminary assessment of ongoing efforts in research, teaching and extension/outreach. The initial effort was gaining a better understanding of “Where are we?”

While the initial work of the Task Force was to explore how CALS could become more engaged with sustainable agriculture efforts, highlighting what it has already accomplished and identifying additional opportunities it appears the next step should be to broaden the discussion with Iowans outside of the academy. Engaging external stakeholders in helping establish the college’s research, teaching and extension missions poses important questions about who should be invited, and how best to solicit their input.

The engagement of nonscientists in scientific endeavors is difficult especially when people hold radically different ideas or values. Unfortunately, many of the challenging questions of sustainability have become so politicized it is difficult to hold civil discussions. Take for example climate change, which is supported by majority of climatologists, but is challenged if not rejected by large numbers of opinion leaders who hold different beliefs or values. Similarly, there are disputes about the significance of hypoxia in the Gulf of Mexico, the effectiveness of conservation efforts to stem soil loss, or whether there are substantive differences in food nutrition based upon farming practices.

It is unlikely that much forward progress will be made in addressing agricultural sustainability until there is greater understanding of the unintended consequences of farming practices and more consensus on the need for change. It is difficult to imagine more public resources being allocated for sustainability research until there is more agreement on why sustainability is needed. Perhaps the next step for the task force is to explore ways that Iowans can better understand the need for change and how sustainability can address some of the shortcomings of the current system. When people hold strong beliefs about the success of the current system and deny or minimize unintended consequences, making change is difficult.

Bringing various stakeholders together to have civil discourse about making changes in the food system may be the first step in new funding for the science that is needed to meet the future food security issues of the growing demand for food.