

ITHAKA S&R Research Support Services:

Prospectus for the Field of Agriculture

Oklahoma State University Library Local Report

Report Completion: December 1st, 2016

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Introduction

In 2016, the Oklahoma State University (OSU) Library was invited to participate in an ITHAKA S&R research project with 19 other academic libraries from institutions with strong academic agricultural programs. The focus of this project is to document the research practices and needs of faculty and researchers in the agricultural field of study. The following report reflects a summary of findings from 10 interviews with OSU faculty. Our goal in this local report is to inform the library's decisions for supporting research of the OSU's agricultural faculty. The OSU study was conducted by Hui-Fen Chang, Academic Liaison Librarian and Sarah Milligan, Head of the Oklahoma Oral History Research Program, both in the Oklahoma State University Library.

Division of Agricultural Sciences and Natural Resources at Oklahoma State University

Oklahoma State University's Division of Agricultural Sciences and Natural Resources (DASNR) is made up of three branches: College of Agricultural Sciences and Natural Resources (CASNR), the Oklahoma Agricultural Experiment Station (OAES) and the Oklahoma Cooperative Extension Service. CASNR is composed of 9 academic departments and 5 multi-disciplinary partnerships. Academic departments include:

- Agricultural Economics
- Agricultural Education, Communications & Leadership
- Animal Science
- Biochemistry and Molecular Biology
- Biosystems & Agricultural Engineering
- Entomology & Plant Pathology
- Horticulture & Landscape Architecture
- Natural Resource Ecology & Management
- Plant & Soil Sciences.

Building on its land-grant heritage and institutional mission, DASNR promotes advancing knowledge, stimulating economic growth and enriching quality of life through innovative teaching, research and extension programs. The CASNR academic programs highlight the importance of and impact of broad subject areas of water, energy, and efficient and sustainable food production systems on the future of Oklahoma agriculture and natural resources. OAES conducts research for the purpose of developing new knowledge, innovative technology, best economic and management practices in enhancing the efficiency and sustainability of Oklahoma's agricultural production system and natural resources. The Oklahoma Cooperative Extension Service aims to provide educational services and opportunities to educate local agricultural businesses and to promote leadership and management of agricultural resources.

Within the CASNR, the 9 academic departments and 5 multidisciplinary programs offer specialization for roughly 16 undergraduate degrees, 26 master's degrees, 2 graduate certificates, and 14 PhD degrees¹.

¹ Taken from the departmental website on November 3, 2016. <http://casnr.okstate.edu/academics/academic-departments>

Methodology

Our methodology was clearly laid out for us by ITHAKA S&R as standardized for all 19 institutions participating in this research project. A series of one-on-one, roughly 60 minute, semi-structured interviews were undertaken in the agricultural participants' primary work spaces on the OSU campus. These non-probability based sample of interviews were conducted with tenure-track faculty who regularly conduct research as a part of their work and whose work aligns with the project's definition of agriculture. The definition of agriculture provided by ITHAKA S&R for the basis of this project is explained as:

We recognize that the field of agriculture is broad and that researchers fall on a disciplinary spectrum that encompasses the sciences, social sciences, economics and business. These researchers explore a wide variety of topics such as but not limited to: agronomy, molecular biology, informatics, remediation of soils for production on earth, cellulosic research for biofuels, nutrient enhancements in food, and the human dimensions of working with youth, rural and urban populations

Agriculture is an important mission of many public universities and research in the field can be conducted in partnership with industry, NGOs and/or various levels of government.²

Our initial outreach for local participants was directed towards recommendations from the department heads for the 6 departments that most clearly fit within the research scope laid out by ITHAKA S&R. This included the academic departments of:

- Agricultural Education, Communication and Leadership (11 faculty members³)
- Biosystems and Agricultural Engineering (25 faculty members)
- Animal Science (29 faculty members)
- Entomology and Plant Pathology (25 faculty members)
- Horticulture and Landscape Architecture (19 faculty members)
- Agricultural Economics (25 faculty members)

We received recommendations for 3-5 faculty member from each department head, meeting the criteria of a) faculty who regularly conduct research as a part of their work b) tenured or tenure track. Out of the 28 names we received from the potential 134 faculty members in these 6 departments, 10 participants from 4 departments responded with a willingness to participate:

- Agricultural Economics (5)
- Biosystems and Agricultural Engineering (3)
- Animal Science (1)
- Horticulture and Landscape Architecture (1)

² ITHAKA S&R introductory webinar for project researchers at 19 participating institutions.

³ Number of faculty members for each department taken from the departmental website on November 3, 2016. <http://casnr.okstate.edu/academics/academic-departments>

We began contacting potential participants in April, 2016 and the interviews were conducted between May and July, 2016. In early June we contacted another 10 potential participants based on recommendations from various sources, but none chose to participate.

Out of the interviews we conducted, the participants' rank and duties break down between a combination of teaching, advising, research, and extension responsibilities. We interviewed 4 Professors, 4 Associate Professors, and 2 Assistant Professors, half of which have an extension appointment ranging from 25% - 50%.

The interviews were audio recorded, anonymized, then transcribed by student transcriptionists in the Oklahoma Oral History Research Program office in the OSU Library before being returned to the primary investigators for auditing review and thematic coding. Transcripts from 5 out of the 10 interviews were shared with the ITHAKA S&R analyst for use in the national report. Transcripts from the 10 interviews conducted in this project were used in the development of this report.

The semi-structured interviews focused on seven broad areas of research practice: Research Formation, Research Process, Research Methods, Research Outputs, Challenges to Research, Keeping Up with Trends, and Perspectives on the State of the Agriculture Field. In this local report, we focus on the themes and findings that we found most relevant to our institution and how this information might shape our research services both now and into the future.

Findings

This section gives a summary of the project's high-level findings. Each heading corresponds to a more detailed section in the body of the paper that describes the results of the research project in greater detail.

Research Formation

Research is a major component in the work of agriculturalists. One commonality in the research of the participants we interviewed is the applied-based approach to research, which aims to address real world issues and problems surrounding Oklahoma's agricultural production system and natural resources. As one of the agricultural economists put it,

Now, sometimes as we encounter problems for which we might have to extend the theory. That is not our primary focus. We are problem based. We see a problem, so then we apply. If we have a problem, like an agricultural pest or something - weeds, then want to attack the problem." (OSU2)

While this focus to share research with agricultural practitioners is shared by all of our study participants, the extension scholars are uniquely placed to develop their research ideas from this audience directly as well. This problem-based approach to research is particularly applicable to the 50% of our study participants who have an extension appointment. For these extension agents, they work

directly with famers, producers, regulatory and other government agencies to investigate the challenges of their constituency.

I mean really we're stakeholder driven, so we work very closely with producers, regulatory agencies, other government agencies, so we end up finding problems that these people have and we look to figure out how we can go through and solve those. (OSU7)

Another participant described their work priorities in these terms:

As we work for the experiment station, you know, we could spend our time trying to expend the efforts, or we could spend our time trying to solve problems that Oklahoma Citizens encounter. Since they are paying the bills, we probably, I think maybe we are better served if we do the later rather than the former. (OSU2)

One agricultural extension agent described research in agricultural as a relationship involving mutual or reciprocal action or obligation between the agriculturalist and the producers:

So a lot of the research that I do, it's very much a two-way street. We take things out to the producers and then their comments...or they implement them, or they come back with questions about things and we're like, oh, that would be a really good research question. We should examine that. (OSU4)

Part of the agricultural extension appointment focuses their research towards practical application and problem solving which strives to provide relevant and meaningful contributions to the agricultural stakeholders, making a difference in the life of the Oklahoma farmers and producers.

The interdisciplinary nature of research is another common characteristic of agricultural research. Almost all agriculture scholars we interviewed conduct interdisciplinary studies that integrate two or more bodies of specialized knowledge or disciplines. This leads to cross-departmental and cross-disciplinary collaboration between, for example, animal sciences, genetics, agronomy, entomology, applied math and applied economics. The results are cross-disciplinary publishing in journals and other publications that go beyond the primary discipline. Many of our participants expounded this point:

I kind of take a broad approach to my research. I like to try to make what I call disciplinary contributions. So publish research in economics journals, straight economics, and also things that are applied to food and agriculture. Try to do both sometimes. (OSU1)

We certainly do cross disciplines. I look to economics for a lot of my like seminal papers and different methodologies and things. When we're trying to look at questions that are important for producers I don't just go to ag-econ journals. I mean, I go there first and look typically at what applied research has done and then dig deeper back to econ for— or even business and marketing. (OSU4)

Like we have a project right now going on and it's what I call a truly multidisciplinary, so I'm working with someone from a computer science department. I know nothing about computer science and they know nothing about agriculture. (OSU6)

Most of the work that I do I partner with other folks. So like on our product traceability project we work with folks in computer science, we work with folks in agricultural economics, we work with people from food science. (OSU7)

Lastly, one research theme that surfaces from the interview with agricultural scholars is working towards a sustainable future. Whether the research is on harvesting a renewable energy source or on water management and conservation, or measuring the methane expulsion from cattle, the end goal of research is looking forward toward the predictable needs of agricultural producers and consumers. This point was also reflected in the way participants reflected the challenges to the field, many citing the dwindling natural resources and growing population as a primary challenge:

Agriculture is the largest user of freshwater resources in many parts of the world and U.S., so it's really important as we are facing climate change, growing population, growing demand for water, it's really important to be able to properly manage water resources for this sector. So that's the main focus. (OSU6)

The technology that I'm trying to develop the products, the strategies, training personnel, all of this will allow us to develop a platform to harvest renewable energy sources for sustainable future. That's going to also improve our efficiency, our fluid biological resource systems. One of the things that also this would allow us to have—see—there'll be big potential economic impact on Oklahoma as well as United States using certain of these type of technologies to convert waste material, agricultural waste, and agricultural products into useful quantity. (OSU10)

Agricultural scholars are motivated towards research topics from a variety of sources, but one of the most common variables expressed in our interviews is the drive to find a solution for real world based challenges.

Research Process

Research process, as a theme of this project, describes the steps involved in conducting research. After a potential research topic is identified, one important step is to research published literature for any related research. Researching and reviewing published literature help scholars understand if an area of research has been contributed to in the past and what relevant information is currently available in solving the problem in question. Apparent from our interviews, journal articles are the most highly consulted secondary resources for literature review. Given that the majority of research areas are interdisciplinary, journal articles pertaining the primary field and cross-disciplinary journals are sought by these agricultural scholars:

I look to economics for a lot of my like seminal papers and different methodologies and things. When we're trying to look at questions that are important for producers I don't just go to ag-econ journals. I mean, I go there first and look typically at what applied research has done and then dig deeper back to econ for— or even business and marketing. For me, if I'm looking at, for example, technology adoption, or practice adoption, and thinking, okay, how have people modeled this in the past? (OSU4)

Popular tools utilized to locate journal articles include Google Scholars, the university library's search engine and journal databases:

I start with Google Scholar. If I don't find what I'm looking for there, sometimes I go specifically to the library search page, but honestly I don't go directly to the library search page very often unless I know I'm looking for a thesis or dissertation here. (OSU4)

Yeah, so I use the databases through the library system generally. There is a couple of [databases], Web of Science and Agricola are good ones for me to kind of get started with. Then, I like to kind of find those papers and then I know it's generally tailored towards a certain area let's say like plant nutrition. I might also go to journal of plant nutrition, and might go to JSTOR and make sure I have pulled things. I try to get as much built as possible. Then I do a secondary search within those papers. I read through them and find ones, get those and so forth, and I think that is how I build my literature. (OSU5)

The other thing I'd say that I think has really changed a lot for me over the course of ten years that's made research a lot easier is Google Scholar, probably. So I used to use all the various searches that—EBSCO versions and other stuff that whatever subfields you wanted to search in. Now, Google does all that for you. (OSU1)

Aside from journal articles, working papers, manuals, blogs, professional society websites and personal contacts are mentioned by several scholars as useful information sources.

In addition to other researchers' published literature, published data sets are important resources for agricultural scholars' research. Government agencies, such as the United States Department of Agriculture (USDA), provide publicly open and accessible data sets that are frequently sought by agricultural scholars:

That's where I start, honestly. If I'm looking for data and I know it's something USDA's most likely to have, I go to USDA's page and search for it. (OSU4)

While data sets provided by federal agencies such as the USDA National Agricultural Statistics Service, the USDA's Economic Research Service (ERS) and the United States Bureau of Labor Statistics (BLS), there is an inherent tension between open data sets and commercial data sets, often a preference of one over the other is dictated by financial support or relationships available to the researcher.

Then the last thing I'd say is grocery store scanner data. That's expensive and so we know—just depends if we have a grant or sometimes the ERS, Economic Research Service, has some connections to Neilson or IRI those are two big providers of those that we can sometimes get access to, but has to be on a project you're working on through them. (OSU1)

ERS, USDA, National Ag Statistics, Bureau of Labor Statistics, so a lot of the secondary data sources. For many of the things I do, those will have some data, but sometimes we collect it. (OSU4)

Researchers who participated in this study reflected a pretty consistent pattern of tackling their initial survey of available research to them when initiating their own research. The limitations mentioned were often cited as being issues of discoverability of content or financial related barriers to articles or data sets. More can be seen on this in the *Challenges to Research* section of this report.

Research Methods

Data plays a crucial role in agricultural research. There are generally two kinds of data that agricultural scientists use for research: self-collected data, and data obtained from an outside source, including federal government agencies or private data producers. Self-collected data is produced by researchers through distributed surveys, data collected in the field, or data generated from laboratory experiments. This self-collected data is considered primary data in its un-aggregated form and requires data manipulation to process to make easier to read, organize, and analyze. The majority of the agriculture scholars interviewed conduct data collections on their own or through collaboration with scientists in other disciplines. Once data is collected, researchers analyze it, generate research findings, and report results to the stakeholders and/or produce publications.

We collect data temperature, pressures, gas composition, and then in a fermenter. We also collect data like concentrations of products at different time intervals, and then we will look at data, look at the profiles, and extract barometers from those data to estimate yields, efficiencies, productivities. Those parameters would allow us to design big reactors and plans for commercial production of the product of interest. (OSU6)

Agriculture scholars also heavily rely on published data from federal government agencies such as the USDA, BLS, and National Agriculture Statistics Service. These agencies offer important statistical data for agricultural research. The data is openly available and accessible through the government agency websites. Scholars also rely on data sets produced by private data producers. One example of such proprietary data used by agricultural economists is the grocery store scanner data from companies including Neilson or IRI (Information Research Inc.). This data offers desirable micro, individual level, data sets that are difficult and time-consuming to collect.

So I use aggregated data as well as the disaggregated, micro level data such as ACNielsen, and data from Information research inc. Ili, ILi data. . . Also, for example, census data. . . I typically use more secondary data because it doesn't cost me much and also because [that] data is already published, so I don't have to spend a lot of time collecting data. (OSU9)

Private data sets costs money to access, therefore, researchers mostly rely on grants or funding to purchase these data sets for research or on partnerships with other researchers or industry.

In other cases, we can partner with people and get some data. We're partnering with a private company right now and they will provide data and they're going to get a product and we will come back and say, "Alright, we want to publish this." And with their permission we can publish that. (OSU8)

Statistical software such as SPSS (Statistical Package for the Social Sciences), SAS (Statistical Analysis Software) and Microsoft Excel are commonly used by agricultural scholars for data manipulation and data analysis. Depending on the areas of research, software mentioned during the interview also include GAMS (General Algebraic Modeling system), MATLAB, and specialized econometric statistical software of EViews (Econometric Views) and LIMDEP. These commercial software packages allow researchers to process raw data into usable formats, perform data analysis, manage and store data files:

It's a spreadsheet basically from the survey and so then what we'll do is then use any number of different statistical programs to then read that in and analyze it. (OSU1)

In an example of what researchers we talked to do with this data, one researcher explained it in these terms:

We build models to try and represent a situation either at a regional level or a state level, or a farm level, and then we try to optimize the model, and determine the most economical production practices. We can determine what happens when you make changes in parameter values. (OSU2)

Whether a researcher is creating their own data sets or utilizing the sets of others, it is obvious that data is a series cornerstone of agricultural research. The systems and networks for how the data is managed and modeled varies by discipline and individual. Access to data sets makes or breaks a research hypothesis and will continue to be a real need for this area of research.

Research outputs

As faculty in a land-grant university, agricultural scholars are evaluated broadly on research, extension and other type of contributions. The research outputs produced by the agricultural scholars generally fall into three main categories: scholarly peer-reviewed journals, extension publications, and public presentations. These outputs are produced to serve the needs of different audiences.

Publishing in scholarly peer-reviewed journals is a common practice for tenure and tenure-track university faculty. The pressure to publish in high impact peer-reviewed journals are expressed among agricultural scholars we interviewed:

Typically peer reviewed articles. So as university professors, we have to do that for getting tenured, and getting promotions. (OSU10)

How many papers have you published, what journals were they in, what are the impact factors of those journals, how many grants have you brought in, where did you get those grants from? Those still remain a big—drivers. (OSU1)

Whereas publishing in high-impact-factor journals drives the publishing practices of agricultural scholars, several scholars express the importance of producing publications to serve the needs of stakeholders and the industry. One participant reflected on this tension:

But we submitted over there because it was a high-impact-factor journal. It gets published over there, our stakeholders are never going to find that stuff because they never go there to look, but yet it serves our promotion criteria. (OSU7)

Extension fact sheets and reports are hence produced by scholars primarily for the purpose of communicating to agricultural producers and to the agricultural industry.

In terms of putting information out there. I mean we have done some fact sheets, in terms of extension fact sheets, even though I don't have an extension appointment. But that is one way of trying to share that information and trying to get it out there and doing actual extension talks

and other talks both in Oklahoma and around the country on regarding these issues of sustainability and that type of thing. (OSU3)

These extension publications are not the typical high-impact-factor publications written with an eye solely towards tenure and promotion; these publications provide timely and relevant information for the stakeholders. As one scholar put it, publishing extension fact sheets and reports are written directly towards consumers:

With an extension appointment I have expectations that I'm going to publish things that are going to be read by constituencies that are going to be relevant. (OSU8)

Other publications that extension specialists produce include videos, blogs and websites to communicate information to the agriculture stakeholders. Extension videos, for example, offer agricultural scientists a unique and essential tool to get scientific information in concise format of three to five minutes video out to the producers.

That was part of the extension portion of that. I have done a few [videos], like most of us do in DASNAR, do a few interviews with the Sunup TV program of course. That is another way to communicate information out there and get those videos on YouTube and whatever else. (OSU3)

All of the participants in this study articulated a value of publicly presenting their research either through conferences, invited talks, or in community forums. This phase of research output deeply ties into the value of networking that was shared in various areas of our interviews, fulfilling a cycle of research output and its ties to new research formation and methodology.

Beyond publishing findings, this study also looked at how raw research material is taken under consideration upon completion of the initial study. Making data sets publically available remains a concern with agricultural scientists we interviewed. Several agricultural scientists suggested their data becomes publically available as they publish their papers in journals, with the exception of data being restricted with confidentiality concerns:

In general, I'd say in our discipline that when you publish papers it's expected that data, unless let's say for example like scanner, that you've had to sign some confidentiality something. Other than those few exceptions, by and large, most – it's expected that your data is going to be publically available. (OSU1)

This published data usually is either put in the appendix section of the paper or upon the requests through contacting the author(s). Data with confidentiality issues will normally be published in a summary of the data, rather than publishing the data itself.

What we typically do is offer producers a place on the web where they can go look at the summary statistics, but we promise them confidentiality. So we're not publishing the data itself, we're publishing just a summary of the data. (OSU4)

There is some murkiness around open access to the raw data set and access to aggregated data. Some researchers feel that getting their results out there in any form is enough, others would like to share their data, but are unclear of a good system for this.

My goal is to publish. I run the research and publish. If I publish then I figure that that information is out there. (OSU5)

It's all there if somebody wants it. I will get calls from people or emails from people asking for a particular subset of that. . . What is not easily available online are the individual level data from the individual respondents. I would like that to be available too. What I'd really like, in an ideal world and hopefully I'll get there one day, is to have some little tool online where people can say, I like this month and these sets of...whatever, some little tool where they can download what they want and use it. (OSU1)

We have so much good data that's been collected, but it's only useful to the people who are authors. I can't go back in and use that. If I'm going to create a new model and if they wanted to use it against my data set they'd have to call me and have me run it or something like that. We've got into discussions of where do we create these databases. How do we lay them out? (OSU7)

When asked about depositing raw data in the open access repositories, the majority of the participants we interviewed have never deposited data in a repository system. One reason the participants we spoke to in agricultural are not making their data openly available is they don't see a mandate from funding agencies to make their data open.

The other things I've done where I've used collective primary data our funders have not yet asked us to make it public. (OSU4)

We have not had to deposit those data in any place yet because we were not asked to, based on the grants that I have. (OSU10)

While the majority of agricultural scientists we interviewed are aware of the existence of data repositories, there exist barriers to making research data openly available in repository system. These barriers include the concerns of confidentiality, intellectual property restrictions, and lack of understanding of the mechanism of repository systems:

That's one of the issues that I see in the future with data that has confidentiality or IP's, intellectual property, and how are they going to put this into the public? I don't exactly know what's their mechanism now in the public repository system. I think there should be ways to allow these data to be protected and the need for access only by request for assessment. I think that would make more sense because you are to protect technologies developed in certain institutions or certain purposes. (OSU10)

So I don't have data right now that I've collected under federal grants that I can share with anybody. So the data that I have possession of, a number of those data sets are confidential agreements. (OSU8)

We've thought about it a little bit, but I haven't looked into this in detail. My knowledge is so limited, basically near zero. The time is always running behind on different things. (OSU6)

As one participant commented, the issue of making data openly available is a dilemma that scientists face regarding data access:

It's a double-edge sword issue concerning making data openly available: on the one hand scholars desire to access freely available data, and at the same time being hesitant about making their own data openly available. (OSU1)

Another issue along the same lines of wanting access to other researcher's data:

I mean if you were not involved with the research, getting access to the raw data is nearly impossible. Unless you've got a good relationship with the individual that was there, but now one of the problems that we're having is some of the people that were doing that research are retiring. In fact, last week I went down the hall upstairs and the files from one of our individuals that I'm guessing is getting ready to retire, were sitting up by the recycling bin. (OSU7)

Finally, concerning data storage, the agricultural scholars we spoke to typically store their data in personal computers, computers provided by the university, and external hard drive setups. Storing data in local computers provides scholars convenient access to data for retrieval and for analysis. Students and research collaborators can have access to the data information. Scholars typically have their methods of managing their data files, as one scholar put it:

Mainly, in the computer, it's in folders. ... Kind of use it like a file cabinet. I might have a folder related to begonia on something, within that I have introductions, tables, and I got excel data sets. I have the SAS files for running the statistics. I got field plot maps, and then I got you know submissions for the journals or the edits. I kind of keep that and when that things get published, it gets into like the published files. (OSU5)

Not so surprisingly, when it comes to archiving research data, backing up data files remains as a common practice among scholars, but not much discussion about how this might be managed outside their personal systems.

Right now, it's physical backup and a RAID array. We have everything in the dropbox and keep it backed up weekly. We have a few different places obviously because bad things can happen. (OSU3)

I'm old-fashioned guy, so yes. We have our common drive too, yes. I don't store my data in there. I have my own computer, desktop.... Also, I have a backup drive. (OSU9)

The challenge with that is it's a massive amount of data. If I've got it all in—on my hard drive, what use is it to somebody developing models? (OSU7)

While the output of research may take many different directions, the most common considerations are discipline specific, academic publications, publicly geared publications, websites or multi-media material and public presentation to peers and constituents. It was apparent in our interviews that our participants may have taken time to consider their collected data as a source of research output, but for most it was not a priority or a perceived possible reality. There seems to be little incentive for providing public access to raw research data and in some instances a barrier to providing functional access to the data sets.

Challenges to Research

When agricultural scholars are asked about perceived challenges to their research, funding needed to support research and extension work tops as the number one challenge to agricultural research.

Funding was articulated as essential in moving research plans forward, one scholar explains it:

You can't do anything if you don't have dollars to go out there. In that project that became —it was fairly unique because we went out to the entire stakeholder, we built the advisory group, developed a plan, said, okay this is what we have, this is what we think the budget's going to be. We're stuck until we can get the money to do it. (OSU7)

Competing for grants is also considered a challenge for researchers. The amount of grants that researchers can bring to the university is an evaluative criterion for tenure and promotion, in addition to publishing and services. As one participant put it:

It used to be publish or perish, but I think it's more on finding money or perish. I mean it's heavy on the grant side of it now. More and more people are competing for this money all the time. (OSU6)

While often, but not exclusively tied to funding, access to quality data is another perceived challenge to agricultural scholars.

There is a big part of ag economics that is policy related issues such as dealing with farm policies, and food policies, and will probably always have an active role there. Being able to competently answer questions about that, again, is really heavily dependent on our access to data and good data. (OSU1)

We want to actually use more micro-level and disaggregate level data, so that we can capture the behaviors of economic agents more directly. To be able to do so, those are really costly so we need to spend a lot of money to have access to those data. (OSU9)

In one case, not just access to good data, but easily verifiable quality research was a main concern:

If a magic wand could make every article that I think would be useful there and accessible so that I can quickly scan it and see. Whether it's a detailed abstract, better cue words, better—so I don't have to read thirty pages to know this is not useful or that it is useful. That would be a huge help. Just the fact that if I see something that might be useful and I click on it and it's not there that's so frustrating. It's like, no, you can't get this one unless you pay me twenty-five dollars. I go looking for something else. I change my search and go looking for other things. (OSU4)

This frustration also blends in to the challenge of funding and cost structure for research. Running into pay walls for researchers was cited more than once as a barrier:

And the reason the *Journal of Cotton Science* was started originally was because there was a lot of people in the cotton industry that were complaining about all the expensive page charges. Then once, like with our professional society, I guess I'm even supposed to go in and pay eighty bucks if I want to download a copy of my own paper. (OSU7)

Another articulated challenge to producing quality research was echoed by several scholars regarding training and education of graduate students:

One of the challenge that we have, is that if I work with the production scientist, okay, they will use terms that are very specific sometimes to that production activity. Some of our students are not familiar with agriculture at all. That is one heck of a challenge. (OSU2)

As graduate students play a critical role in assisting agricultural scholars in research projects, proper training and current research level of student assistants can make a difference in the research process:

That's been one thing that's been a little bit difficult for me to educate students on. Most of the time we hire students and they need to start working on the project from the first day. Most of the time that first day is already late, so they have a lot of other things to do. We never have enough time to educate them on how to properly do a literature review. I sometimes give them some hints here and there, introduce them to sources that are available with the library, but then it's up to them to really go out there and explore those sources. (OSU6)

While issues of funding and grad student quality were also articulated as challenges to the field of agriculture in general or personally burdensome in other sections of this report, it is easy to see how all of these challenges are tied together. One participant ties all of these issues together:

If you invest in putting excellent resources for faculty and researchers, to allow them, enable them to translate the ideas into excellent proposals that reviewers would say excellent, very good, or outstanding, then that would bring out a lot of funding to the university. And also allow those researchers to develop some new technologies, bring new knowledge to the public. (OSU10)

From the researchers we talked to, it appears that more open access to raw data and greater training for their students in areas outside their own specific data analysis are major hurdles.

Keeping up with Trends in the Field

The majority of agricultural scholars we interviewed agreed with the importance of keeping up with trends in their disciplines. These scholars resort to a variety of resources. The ready response for many in this question was scholarly journal articles. Access to this material not only provides the agriculture scholars secondary sources for literature review, they are also indispensable resources to keeping up with trends in the field:

Most importantly I think, I need to read journal articles. To be able to read just those journal articles, I need to be engaged in the research that is kind of new, tools and new procedures, and maybe also new topics. Those are very important. Also, to have access to those things. (OSU9)

Typically if you don't read you're not going to know what's going on. So reading's very important. So looking at the literature, reading the literature continuously in terms of journal articles or theses or new books in the field. (OSU10)

Nevertheless, several scholars pointed out that publication lags with scholarly journal publishing can make information outdated. Common publication lags for top peer-reviewed journals in agricultural economics can take up a year to a year-and-a-half after initial submission, as pointed out by an agricultural economist we interviewed:

One thing that makes it a little difficult in the economics world is this is true of ag economics is our publication lags are crazy terrible. Especially in some of the top economics journals. If you submit a paper, let's say today, you're not going to get your first set of reviews sometimes until six months would not be atypical. Then there will be a whole set of revisions, which could take you six months to a year. In which case, it goes back to the reviewers for three, or five, or six months. Then the journal, if it eventually accepts it, you're talking now a year to a year-and-a-half since that first paper was submitted, and then it used to be there was a long line between that, and putting it in the publication cycle. By that time, you're seeing papers and journals they're three years old. (OSU1)

Therefore, working papers, as those published in NBER (National Bureau of Economic Research) which provide more timely information becomes a helpful resource for agricultural economists for keeping up with the trend:

In the economics, general economic world, there are some groups like NBER..., where they publish working papers. So working papers have had a big role in economics for a long time largely because of these lags in agricultural economics. (OSU1)

In addition to scholarly journals and working papers, other important resources for agricultural scholars to keep up with trends in the field include industry and government reports and trade magazines, as brought up by the agricultural scholars we interviewed.

Some had more creative solutions for sorting through what falls into their research interests:

I would suppose I probably subscribe to table of contents alerts to a bunch of journals. (OSU1)

Google Scholar has that nice little feature where it'll show you things, I don't know how it does it, but occasionally I notice it has a bunch of suggestions for me to look at. They're almost always relevant in some way or another. That's another way to sort of stay on top of things. (OSU1)

There's academia.edu that's now up and there's stuff there. Some of that's good, some of that's bad, some of its made me lazy because you can set it up to where it automatically sends you topics of papers. I find myself just reading the ones it sends me emails on. I don't go look for other ones like I used to, to be as thorough. (OSU7)

At the same time I have to be smart and how to read and sift through all this information which is very challenging. Once you basically the area then you quickly can scan the topics that you need and just read the information. That's basically one of the things I also teach my students, how to look into the data and how not just to look at everything, just focus on the topic and area of research. (OSU10)

Then also I've been in this field long enough that I know names. So I see if John Doe has published a paper. I'm like, oh okay, this is a good guy. He's done a lot of work so I want to read his paper. So that's how I prioritize the papers that I read given the very limited time. (OSU6)

Another method articulated of keeping current of developments in their field is in the form of networking. Attending national, regional, and state conferences, professional meetings and workshops seem to be critical:

Conferences would be a big one. It sort of gives you a preview of what people are working on. (OSU1)

National workshops. Those things I think have been very helpful, keep myself on track. (OSU9)

Attending conferences is very critical. Not one conference, multiple conferences, different—multidisciplinary conferences. Also, being active in organizing conferences and sessions. That's something that I do, so I know who's working in the field and I also search for articles and abstracts from colleagues around the world. I would know what they're doing and basically when I meet with people and be in that conference I will learn where everybody's at in that area. (OSU10)

The majority of agricultural scholars we interviewed actively participate in attending and/or organizing conferences and professional meetings for up-to-date information, but also for networking and research collaboration opportunities. While working through systems to create research interest alerts or just building time in to their schedule to read discipline journals, networking still seems to be one of the most valuable tools in staying up with trends in these participant's fields.

State of the Field

While the question of challenges and opportunity to the field of agriculture in general seems a step removed from issues in academic research for this field, in reality this question elicited some very telling, and fairly consistent answers from our participants. Some of these issues could easily influence the big picture view of how libraries assess their role working with academic agriculturalists.

A frequently articulated challenge to the field of agriculture lies in a perceived distancing of consumers to their food source. In many of the participants' perspectives, this issue is closely tied into a value sense of their own work and the work of the farmers and other agrarians they often see themselves working on behalf of. One participant observed a pretty simplified version of this issue:

You know, a hundred percent of people are actually eaters in this world, but less than two percent are actually involved in the production of food. I think there is a major disconnect between those two groups in terms of what actually happens on farms. (OSU3)

Another participant suggested this issue is already being exploited by the food industry in their ability to direct the consumer market through advertising.

I think our challenge is going to be consumer perception of what we do. I think we have consumers who are much farther removed from production ag than they have ever been before. That's going to only get to be a larger gap. I think they don't really understand how their food is produced, so they—because they don't, I think they're a little more susceptible to misinformation. (OSU4)

In another area of this interview, this participant further expounds on how this removal impacts consumers directly, saying:

If you've got two packages of chicken laying there and one's labeled hormone free, consumers might pay for them more, but they're both—I mean they're not hormone free because their meat, but they're produced without any added hormones. Both of them are because it's not even allowed in poultry. But consumers' perception is that it's everywhere.

This commonly sighted challenge and frustration, is also seen as an opportunity for the field. Many of the participants in this study discussed striving for balance in sharing the products of their work. There is an inherent tension, as discussed in the Research Output section of this paper, for the need to produce scholarly work to satisfy the university academic appraisal system and the need to reach consumer and non-academic audiences. While some of these concerns in simplified access to information is tied to an appeal to funding sources, much of that work is as closely tied to this concern of disconnect with the public in issues of agriculture overall. The same participant grappling with consumer's inability to relate industry regulation of hormones in poultry with marketing claims also sees this weakness as an area for growth:

So that idea of misinformation. I think we have to be proactive and I think there are going to be lots of opportunities where we need to be proactive rather than reactive. I think we just need to be transparent about how we do things and help consumers understand why. (OSU4)

Another clearly articulated and common challenge for the agricultural field is the tension between global population growth and a changing climate of natural resources. While issues like this might not directly inform the library's service direction, knowledge of this as a major research block could put the library in a natural nexus for connecting these common concerns with other fields grappling with similar research considerations. One participant articulated this challenge as:

So I think the main thing is these competing interests, but paradoxes that we face in terms of growing world population, increasing incomes, increasing demand for animal products, for food in general. Also constraints of environmental issues, like climate change, that decrease our ability to be as productive, but then we actually need to be more productive if we are going to meet demand and do it without using up all of our natural resources on planet earth, which is obviously a controversial topic, but a true challenge. (OSU3)

From this viewpoint, it is also valuable to assess the potential opportunities in this issue. One participant sums up this opportunity in this way:

Population growth I think we would expect to find more people, and so there needs to be more food. Why not produce that efficiently? And people as incomes improve, and the aggregate they get more concerned about the environment. We take that in the environmentally sustainable manner. We can't have a sustainable business that doesn't pay the bills. (OSU2)

How could the library provide space and services to help support this challenge of efficient production and issues of sustainability? By understanding this is a common concern, we could ask questions directed at this issue focused on needs for researchers that might involve flexible workspace, access to software or hardware or a collaborative environment for other research areas on campus grappling with this from different angles.

Not so surprising, and as mentioned previously tied into the concerns of the public's disconnect to their food source, is issues with funding. Most of the discussion by those participants who identified this as a specific challenge to the field address the issue of funding within the bounds of academia and many times in direct comparison to the non-academic agricultural research field. While the issue of access to funding itself is a pretty commonly cited stumbling block for academic research in any field, a sub-theme here is an interesting discussion point:

I think one of the biggest roadblocks is funding. When there's plenty of funding available and people aren't competing to get that funding there's a lot more cooperation. (OSU7)

This participant expounds this idea, saying:

There's a lot of people competing for those dollars. And when you have a lot of competition like that, especially in the research field, you end up going and looking out for yourself. There's not a whole lot of going out and looking to do what you ought to be doing for the greater good. I think we're losing a lot of that. (OSU7)

This idea that with tighter funding sources, there is less time for collaboration, doesn't mean that the interest isn't there. Another participant, when asked what they would wish for if they could magically make it happen, responded:

Interdisciplinary research. Multidisciplinary research and interdisciplinary research are two different things, right? This kind of—get rid of the walls between academic departments and funding for that.

The opposite side of this concept of suggesting that the ability of researchers to heavily specialize may be a thing of the past:

Funding is probably you know the biggest issue we are facing. It seems like we are, it's like a two for one system right now. Two people retire and one gets hired back. Like I said, maybe before, you can have people that specialize in certain areas, but personally I don't see it. I think you got to be a generalist and be able to handle a range of different issues that come at you anymore (OSU5)

Also related to funding is a common tension between not just dollars available to fund research projects, but also to attract and retain qualified researchers. This challenge to the field is also clearly articulated in participant's articulated challenges to research in general.

I had an undergrad that worked for me a couple of years ago. They got done with his bachelors and was making 80-something-thousand dollars a year straight out of... We've got PhD faculty members that were hired for eighty. I mean dollar-wise why would you go do it. (OSU7)

While participants weren't slow to mention funding as a challenge to the field of agriculture in general, this was a more common thread when offered the magic wand question. This gets down to the nugget of what they perceive as a root of their biggest stumbling block for efficient, effective, and profound work. What is particularly interesting in these answers tied to funding, and perhaps most relevant to this study is how this reveals a more consistently articulated issue behind the guise of money as the solution.

That includes the more investment in research. Not just for research projects but also investment in training graduate students. (OSU9)

A lot of the researcher's attribution to the efficiency and quality of work being produced is directly tied to funding available to attract personnel:

Increase resources definitely and sources in terms of resources for the PI's incentives and salary as well as the students. So students and post-docs. To attract excellent students, attract excellent researchers and post-docs, we have to have competitive salaries that we could offer them. (OSU10)

Another participant articulates this wish for funding to attract an advanced tier of graduate students in these terms:

I would probably try to create perfect students to help us with that. That's been one of the challenges that I see. The students that we get, they are really, really different in terms of the skills and knowledge they have. In terms of not just the technical knowledge, the English knowledge. A good student makes everything much easier. They run the project, they do the research, they take care of the publication. (OSU6)

This issue of funding and skillset of graduate students is also clearly tied into a desire for more time to devote to their own research or their own research output.

I think it all comes down to money. I mean literally, as far as if you are talking about research and publications, so publications come from doing research, so in order to do research, I mean it's time and money I guess. There is only so much time for me to set up experiments to collect data and to run it, but it takes money in order to do that. It's all based on time and money. To make it, for me to have more time, it's the money side to pay someone else, so I think technicians are a must. It's hard to do everyday tasks and stuff by yourself. You are supposed to be here and doing advising and meeting the students and committees. (OSU5)

Another perspective on the issue of not just funding, but the underlying issue of time management and the tension between the roll of adviser and researcher. This issues have come up in multiple areas of this research project, including an impact to research productivity, methodology and even reporting output.

My biggest problem, a little frustrating, is the edits and the writes, and the rewrites, and the rewrites, and we start out with an-- Many of our students have not, they are not in agriculture economics because of their ability to write. They, many of them are good, at having good critical thinking skills, whatever that is. They have better than average, skill in mathematics, but they have not had an opportunity to learn how to write. (OSU2)

Another participant drills down a bit more concisely into a solution for some of these issues:

Actually, that would be something that I was actually looking at that a year ago. I think we need a good technical writing class for graduate students. I think there is some of those resources that are available for non-native English speakers. But, to be fair, a lot of our students need help in terms of how to write concisely and in the scientific writing style. (OSU3)

Looking more deeply at the solid road blocks that create some of the challenges articulated in these interviews, there are many spaces in which the library can provide support. We already have partnerships on campus with the OSU Writing Center and the Department of communication Sciences

and Disorders to provide assistance with written or verbally communicated research output. There may be ways to market more targeted marketing of these services to DASNR faculty now that this need has been clearly identified. Are there ways to think creatively on issues of communication and public perception of the work being done in DASNR? Could the library have a roll in this? Out of the challenges articulated to the field of Agriculture by the participants in this study, there are several opportunities for the Library.

In Regards to the Library

As a part of this interview series, several of our participants brought up, unprompted, their current relationship or general perception of the value of the Library at OSU. While this information is not specifically tied to the standardized semi-structured interview format for this project, it is still very closely tied to the goal of providing more informed and intentional service for our faculty and students mentioned in the introduction. Most of the mentions of the OSU library were directed towards the traditional or stereotypical role of the library, providing access to publications.

From the library's perspective, and I see this dealing with colleagues at other, sometimes, other universities. Having access to journal articles is really valuable. That's not true everywhere, so I think the library does a pretty decent job. Most of the time if I want something I can find it pretty easily online. Again, that's not always true for people everywhere. . . I'd say probably in a testament to how well the library does, it's kind of shocking when I find a journal article I want to read and I can't get access to it. It seems like an injustice, 'how is it possible we don't have access to this?' (OSU1)

Some participants demonstrated a commonly held nostalgic idea of the library vs. services they might actually utilize:

I have been amazed at how well, and I have nothing to compare, but with the ability to access information, and the way the Edmon Low has facilitated that, is a big help. It could be that other libraries are better, I don't know. I have been impressed with how they have been able to do that, that I assume is on a shoe string budget. I don't know. I still like to go over and go through the stacks sometimes. See the books, and there are not many new books but that is okay. (OSU2)

Don't tell my children that I don't go to the library very often. . . I still want them to think the library's important and it is, but I just do most of it here at the computer. (OSU4)

This fits in line with what many participants shared in regards to their research habits, suggesting that they do the majority of the literature research for secondary sources on their office computer and very rarely have a reason to physically come to the library. This also reveals there is still a perceived assumption that the Library providing research service from their own workstation might have a negative impact on the physical space.

I myself don't use a lot, myself don't go to the library a lot, physically... These days I can do all those things electronically.

Interviewer: So is online access to articles important to you then?

Participant: Super-duper important, yes. And in a broad swath of journals, because I tend to read pretty broadly and sometimes research a little broadly. Yeah, I mean there's probably a set of five or six journals that I go to, pretty important ones. But I'm members of those associations, I don't need the library for those. . . Yes, I'd say probably in a testament to how well the library does, it's kind of shocking when I find a journal article I want to read and I can't get access to it. It seems like an injustice, how is it possible we don't have access to this? . . But, that's super important and I think our library does a good job at that. Although, I hope there's still funding to make sure that happens in the future

Some participants were able to tie specific needs into a service they think the library could provide. There is some hedging on what services related to these needs might already be available. Unsurprising when looking at these suggestions after examining some of the challenges isolated in the previous section related to working with students on writing and research skills.

I know you guys have had that writing workshop. I ask all of my students to attend it. These things are kind of helping students develop some of these basic skills. It's something that we really don't have to and don't have the experience and knowledge to because it defers case by case. Anything like that, helping them learn about how to do a literature review, how to understand other studies, and how to take ideas...that's another thing that I tell my students. When you read a paper don't just look at it as another literature that you're going to cite. See how they did the research and learn from their approach and adapt some methods in applying to your project. Some of these basic skills. Again, it would help all of us a lot. Those students will go to other institutions, will become professors in the future a lot of them. So it really helps the society by improving those skills. I know you do a lot of it, I appreciate it. (OSU6)

Another participant echoed a similar need for information literacy assistance.

If there is anything library can help, particularly students, or even the faculty members, find some references. I remember vividly when I came to the United States. I am originally from Korea, came to the United States and tried to do some research. I got, as a beginner and a novice researcher, I got a lot of help from librarians, particularly, I had to research the subject, I need to know where to begin. So for finding references, I gave them the research subject that I had to actually work on. At that time, they actually found lots of references, and even some database that I could use for that particular research on the project. I don't know whether our library, OSU library has that kind of resources and assistance. (OSU9)

A possible way to look at facilitating the research needs of faculty is to help clear up some of their time that might be overextended towards basic tutoring and informational literacy needs to provide more time towards the heavier research oriented areas of their work. While these services at the Library are not new, maybe a change in the way we pitch them to faculty could be.

Conclusion

While this project, admittedly, has a small sample size in perspective of overall size of the departments we invited participation from, the answers we received across those departments was relatively consistent. The value in research is access to good raw material, whether self-generated or shared from

other sources, quality journal articles and ease of use when searching for material, and a strong support team of students and co-researchers to model and report research findings. Participants feel that these needs can be met with access to solid research funding, more time to fulfill all of their institutional responsibilities, and incentive through increased support, attraction, and retention of competitive graduate students and faculty. There is a lot in this report about access to research data, whether participants get it, want it, or may or may not want to share it. There is also a lot of discussion about the areas they felt were already in place that make their research jobs easier.

In the traditional role of a library, providing access to scholarly material, the participants seemed to feel that this function was being carried out effectively. In other areas where the library may be able to assist, such as depositing data sets in the institutional repository, literacy and presentation tutoring, or even conceptual spaces such as group modeling projects or even audio or video production for extension pieces, there was little to no connections made for these as functions of the library. There seems to be a possibility from our interaction with study participants, that some of these functions would be utilized by faculty in the agriculture school or their grad students. This also may be a strong group to tap for future thinking about collaborative space and technology acquisitions in the library future designs.

We hope that this information proves useful in supporting library direction for the future in regard to supporting the research needs of the agricultural faculty. It was an enlightening set of interviews. While the results may not have been surprising, they are useful data which often gets more at the “heart” of the problem within often cited suggested solutions. We appreciate ITHAKA S&R’s invitation to participate in this research project and are thankful for the opportunity and support through the OSU Library in ensuring the OSU agricultural research needs were included in this national study.