KNOWLEDGE CO-PRODUCTION AND AGRICULTURAL FIELD DAYS:

A COMPARISON OF THREE MODELS

A Thesis in

Rural Sociology

by

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ABSTRACT

As elsewhere in the United States, agriculture in Pennsylvania includes diversity in farm operators and businesses, in terms of farmer demographics, levels of experience, and current and preferred management practices. Several different farming-related organizations now exist to meet the unique learning needs across this heterogeneous farmer base, and may, in this role, help shape farm-level decision-making. This study examines the Pennsylvania State University College of Agricultural Sciences and Cooperative Extension (PSU), the Pennsylvania Association for Sustainable Agriculture (PASA), and the Pennsylvania Women’s Agricultural Network (WAgN) to understand how three different Pennsylvania farming-related organizations, targeting different farmer populations, produce and disseminate agricultural knowledge. I apply contributions in the sociology of scientific knowledge from Ludwik Fleck and literature on farmer participation to clarify if and how knowledge within each organization is co-produced by farmers and experts. Qualitative field research methods centered on attending three agricultural field days (farmer education events held on farms or research stations to educate attendees on a specific topic) offered by each of the organizations in the study. I conducted interviews with organizers, presenters, and farmer participants (n=57) at these nine field days, and also engaged in participant observation of ongoing field day activities and interactions. The research found that agricultural knowledge was co-produced at all field days, regardless of which organization sponsored the event; however, the level of farmer participation was more pronounced at the PASA and WAgN field days than at the PSU field days. Because farmers attending the PSU field days noted that expert-driven knowledge effectively met their learning needs, I conclude that more farmer participation should not be assumed to be the best or desired outcome from the farmer perspective. I further suggest that field days can present unrecognized opportunities for
collaboration among the three farming-related organizations in this study, because their field day content sometimes overlapped, particularly in the area of sustainable agricultural production methods. This research contributes to scholarship on the sociology of scientific knowledge in agriculture by empirically analyzing dynamics of knowledge co-production when a mix of experts and non-experts, including farmers, scientists, industry representatives, and other field day participants, are involved.
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CHAPTER 1

Introduction

If the last 100 years of agriculture in the United States have demonstrated anything, it is that the farming sector is far from stable or uniform. In recent years, smaller farms that emphasize direct marketing their products to consumers have increased in number, and consumers at these venues show interest in supporting agriculture that is environmentally and socially beneficial (Martinez et al. 2010; NRC 2010). In addition, the number of women farmers in the United States has grown over the past 30 years (USDA NIFA 2009), with a 29 percent increase among principal women operators from 2002 to 2007 (NASS 2009e). Such changes in who farms and how they farm suggest that methods and rationales for educating farmers may require adaptation to match the interests and learning styles of a changing farmer base; knowledge institutions serve as both drivers of and constraints on agricultural change, from the national down to the individual level (NRC 2010). As a result, the historical source of farmer outreach and education, land grant colleges of agricultural science and cooperative extension services, have now been joined by newer organizations and programs that specifically target both sustainable agriculturalists and women farmers.

This study seeks to improve our understanding of how farmer education models differ among three farming outreach organizations— The Pennsylvania State University’s College of Agricultural Sciences, the Pennsylvania Association for Sustainable Agriculture, and the Pennsylvania Women’s Agricultural Network. Each group offers a diversity of programs and projects to meet the needs of their farmer constituents. One program model they all share is offering agricultural field days. Field days are typically day long or half-day long farmer
education events held on farms to educate attendees on a specific topic. I explore how agricultural knowledge is produced and disseminated differently among Penn State University (PSU), the Pennsylvania Association of Sustainable Agriculture (PASA), and the Pennsylvania Women’s Agricultural Network (WAgN) based on attending and analyzing a sample of each organization’s agricultural field days during the summer of 2009. This chapter establishes the context for the study by describing Pennsylvania agriculture in general and PSU, PASA, and WAgN more specifically. I then present my research questions and conclude with an overview of this thesis.

I. Agriculture in Pennsylvania

According to the 2007 Agricultural Census (NASS 2009c), Pennsylvania ranks 20th in agricultural sales nationwide. Dairy is the state’s largest agricultural sector in sales, ranking fourth nationally, and the state is also a significant producer of other commodities, ranking in the top 15 states in fruit, swine, aquaculture, and tobacco sales. The number of farms in Pennsylvania increased from 58,105 in 2002 to 63,163 in 2007, an increase of 9 percent. However, during the same period the average farm size decreased from 133 to 124 acres, suggesting that the state’s newer farms may also be smaller in size. These structural trends are consistent with those at the national level (NASS 2009b). However, in contrast to national trends, Pennsylvania experienced total farm operation increases at most income levels, not solely for the smallest and largest farm categories by agricultural sales. The number of large farms in Pennsylvania showed the largest increase, with those having sales above $500,000 increasing by 57 percent between 2002 and 2007. Thirty-four percent of all Pennsylvania farms have sales of $1000 or less and 52 percent less than $5000, indicating that a majority of Pennsylvania’s farms are small or very small operations.
As nationwide, the number of women farmers in Pennsylvania is increasing. Women are not only entering farming as an occupation at higher rates than in the past but are also doing so as the primary farmers of the business. Between 2002 and 2007, the total number of women farmers in Pennsylvania grew by 16 percent, and the number of women who were principal operators of a farm went up by 40 percent. Thirty-two percent of Pennsylvania’s women farmers in 2007 were primary operators, compared to 26 percent in 2002 (NASS 2009c).

It is more difficult to capture Pennsylvania’s profile as it relates to sustainable agriculture, since the Agricultural Census does not use clear metrics to assess this type of farming. Census data show that the percentage of Pennsylvania farms that spray chemicals for insect and weed control did not markedly change between 2002 and 2007 (NASS 2009c). However, according to the USDA’s first Organic Production Survey (NASS 2009a), Pennsylvania ranks third and sixth nationally in sales of organic products and total number of organic farms respectively. In addition, agricultural sales directly to humans for consumption, often seen as indicative of sustainable agriculture (NRC 2010; Feenstra 1997; Henderson 2000), increased from 10 to 12 percent between 2002 and 2007. Of the farms that direct market in Pennsylvania, almost half (46 percent) are on farms that are 50 acres or smaller (NASS 2009c).

Several agricultural organizations exist in Pennsylvania to meet the diverse needs of the state’s farmers. In the next three sections of this chapter, I describe the organizations studied in this project on knowledge production and dissemination at agricultural field days. It is important to note that several other food and agriculture organizations are active in Pennsylvania, but the three studied here are the primary groups offering agricultural field days.

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1 It is important to acknowledge that longitudinal comparisons of Census of Agriculture data may overlook definitional changes that affect what is and is not considered a working farm (NASS 2009d). Based on Census of Agriculture data, I assume that there is a real increase in women-farming operations, coupled with increases from measurement inconsistencies.
II. The Pennsylvania State University College of Agricultural Sciences

Penn State University (PSU) was founded in 1855, and in 1861, its College of Agriculture (now College of Agricultural Sciences [CAS]) awarded the nation’s first undergraduate degree in agriculture (Penn State CAS 2010a). As a land grant university, PSU is charged with teaching agriculture to both college students and farmers, as well as conducting agricultural research to support area farmers (Jordan et al. 1986). The CAS is the primary unit to fulfill this mission:

... today’s land-grant institutions provide accessible and affordable education for undergraduate and graduate students, a national system of agricultural research stations, and a national cooperative extension service that disseminates science-based knowledge into every community. The Penn State College of Agricultural Sciences carries on this successful land-grant mission and partnership in Pennsylvania with research stations and faculty researchers who seek practical solutions to scientific, economic, and social challenges affecting the Commonwealth. This new knowledge is distributed through Penn State’s twenty-four campuses and the sixty-seven cooperative extension offices throughout Pennsylvania (Penn State CAS 2010a).

As this statement notes, the CAS includes 67 cooperative extension offices in Pennsylvania, one in each of the Commonwealth’s counties. In addition, the CAS includes 12 academic units and four research stations.

The cooperative extension program is intended to be a link between university researchers and the public, “translating cutting-edge research university research into practical knowledge to help Pennsylvanians” (Penn State CAS 2010a). Historically, cooperative extension’s target audience has been the farming population and rural residents, but more recently extension services are being expanded to meet other needs (NRC 2010; McDowell 2004). PSU for example, engages in programs including community and economic development, land use planning, nutrition, and financial and tax assistance, along with agricultural training and support (Penn State CAS 2010b). As part of the CAS’s agricultural outreach efforts, extension
offers education-based programs for farmers including meetings, lectures, workshops, and field days. The latter are often held in collaboration with one of the CAS’s four agricultural research stations.

Capturing overview numbers of farmer participation in CAS programs is difficult for two reasons. First, since the CAS’s work with farmers tends to be decentralized and implemented via the 67 county extension offices, four research stations, and numerous program areas, data are difficult to aggregate. For example, the full range of PSU CAS extension and outreach events are not centrally managed, advertised, or reported on, and no county-level online event calendar includes all relevant information for the entire system. Second, unlike the other two organizations in this study, the CAS and its extension service are not membership organizations, and as a result they do not as specifically track their participants or gather specific data on their farm businesses and backgrounds.

III. The Pennsylvania Association for Sustainable Agriculture

The Pennsylvania Association for Sustainable Agriculture (PASA) was founded in 1992 by a group of farmers, university faculty, extension agents, and other environmental advocates who were dissatisfied with an apparent lack of institutional support for PA farmers interested in sustainable agriculture (Carnes and Karsten 2003). According to the organization’s website, their mission is “promoting profitable farms that produce healthy food for all people while respecting the natural environment” (PASA 2010d). They elaborate:

[We] work to bring farmers together to learn from each other, and to build relationships between those farmers and consumers looking for fresh, wholesome, locally and sustainably produced food . . . we seek to improve the economic viability, environmental soundness and social responsibility of food and farming systems in Pennsylvania and across the country. We place great value on efforts to build bridges between broadly diverse participants in the agricultural industry, from "farm to fork” (PASA 2010c).
PASA is the largest statewide sustainable agriculture organization in the United States (PASA 2010c), and as of August 2010, included 4878 members. Fifty-eight percent of total members are actively farming, and 47 percent are Pennsylvania farmers (Gauger 2010, personal communication). As these figures show, PASA’s membership includes many non-farmers who engage in agriculture and food systems in other ways, some as gardeners or consumers and others through professional employment (Carnes and Karsten 2003). Both total and PA farmer membership in PASA have increased more than threefold since 2001 (see Carnes and Karsten 2003 for 2001 membership data). PASA farmers have smaller operations than the state average but are comparable in their likelihood to have off-farm jobs, and over one-third have been farming less than 8 years (Carnes and Karsten 2003). Many PASA farmers engage in direct marketing of their products through farmers’ markets, community-supported agriculture, and sales directly from their farms.

PASA offers several programs aimed at fulfilling its mission. These include the annual “Farming for the Future” conference, which has grown in attendance from a few hundred attendees in 1992 to more than 2000 farmers and other participants in 2010. The conference includes a wide array of workshops including production, marketing and management topics, as well as keynote speeches and networking opportunities (PASA 2010b). PASA’s mission is further fulfilled through its educational outreach program. Emphasizing farm-based education, PASA offers field days and intensive learning opportunities on a diversity of topics through this program, typically held on host farms throughout Pennsylvania (PASA 2010a). This research project incorporates observations and interviews from three of these events. Other PASA program activities include coordinating the Pennsylvania “Buy Fresh Buy Local” campaign (a local food marketing campaign), offering food and agriculture networking events, and
advocating for regulations and policies that support the goals of sustainable agriculture (PASA 2010e).

IV. The Pennsylvania Women’s Agricultural Network

Similar to PASA, the Pennsylvania Women’s Agricultural Network (WAgN) was founded because a subset of farmers’ needs were not being met by the state’s extant agricultural institutions (Trauger 2009). WAgN began informally in 2003 through the efforts of a group of women farmers, agricultural professionals, Penn State University faculty, and other advocates of women’s agriculture. In 2005, it was formally organized with grant funding from the USDA. WAgN is currently a research and extension program of the Penn State College of Agricultural Sciences (CAS) and is based on Penn State’s main campus. WAgN supports women in agriculture by providing positive learning environments, networking, and empowerment. The primary purposes of PA-WAgN are to encourage and support women in agriculture; provide and strengthen networks for women in agriculture; provide educational and mentoring opportunities for women in agriculture; raise community awareness of agricultural related issues and concerns; and sustain farming livelihoods (Penn State CAS 2010c).

Nonetheless, WAgN’s programs and activities function mostly separately from the university, although WAgN has received some financial support through the CAS (WAgN staff, personal communication 2009). WAgN’s relative autonomy from other CAS programs, as well as the perceived inability of traditional agricultural extension and research programs to successfully serve women farmers (Trauger 2009), merits analyzing WAgN in comparison to, not as a part of, PSU’s field day programming. As discussed in chapter four, WAgN field days and other PSU field days differ from each other.

When WAgN was formally organized in 2005, it had 125 members. This number grew rapidly to more than 900 members by November 2007 (Trauger et al. 2010a) and to 1,300 by October 2010. WAgN members are mostly women farmers from Pennsylvania, but the
membership total also includes non-farmers in the agriculture sector, non-profit organizations, and governmental organizations, as well as agricultural educators, students, and “homesteaders.” (WAgN staff, direct communication). Compared to women farm operators in Pennsylvania in general, WAgN has a higher proportion of younger farmers, and 50 percent of its surveyed members have been farming for six years or less (Barbercheck et al. 2009). Most WAgN farmers are interested in sustainable or “civic” agriculture (Trauger et al. 2010a) and almost all, including those using conventional farming methods, sell their products directly to consumers in some way (WAgN staff, direct communication).

WAgN’s field days are a primary way that the organization fulfills its mission. These field days are held on farms throughout Pennsylvania and are intended to provide hands-on learning opportunities for farmer attendees, as well as encourage social interactions among WAgN constituents, especially women farmers. WAgN’s leadership structure includes regional steering committee members, and these volunteers frequently coordinate informal networking and mentoring activities including potluck meals and other events. In addition, WAgN launched an online farmer networking project in 2009. The Farmer-to-Farmer Information Sharing Network enables women farmers to meet virtually, discuss agricultural topics, plan events, and share resources (PA WAgN 2010).

V. Research questions

As the descriptions of PSU, PASA, and WAgN suggest, the three organizations target different populations for their field days. Since each group employs the agricultural field day as a method to reach out to and educate farmers in Pennsylvania, these three organizations provide an instructive sample for a comparative case analysis of variations in knowledge production and
dissemination processes through agricultural field days. This research seeks to answer the following research questions:

1. How is knowledge produced and disseminated both similarly and differently at agricultural field days offered by Penn State University, the Pennsylvania Association for Sustainable Agriculture and the Pennsylvania Women’s Agricultural Network?
2. What role does farmer participation have at each organization’s agricultural field days?
3. What are the opportunities for cross-fertilization among these three agricultural field day organizations?

VI. Overview of the thesis

To address these research questions, I first present the conceptual framework that guides the research. My conceptual framework, presented in chapter two, applies theoretical contributions by Polish physicist (and early contributor to the sociology of science) Ludwik Fleck to processes of knowledge production and dissemination within the agricultural sciences. I begin by defining and describing the concept of knowledge co-production, arguing that each organization in this study can be viewed as a unique “thought collective,” or community of persons with a shared way of thinking. After reviewing literature that describes knowledge production and dissemination processes related to the three thought collectives in this study, I conclude the chapter by highlighting prior scholarship on conditions that influence agricultural knowledge co-production including farmer participation, research venue, models for knowledge production and dissemination, and variation in content among different agricultural institutions.

Chapter three presents the research methodology for this project. I attended three field days offered by each of the three organizations in the study, where I interviewed a mix of attendees, conducted participant observation, and gathered print materials, all of which comprise
the data for the study. Chapter four includes the results and analysis of the research. I describe differences among the three groups’ field days emphasizing variation on a number of themes including: profiles of field day participants, expert and non-expert roles, levels of participation of farmers, research and field day venues, field day content, and farmer-to-farmer networking. The chapter concludes by discussing evidence of cross-fertilization and collaborative capabilities among the field day sponsors.

Chapter five concludes with a discussion of the implications of this project. I describe several ways the study has furthered scholarship on agricultural knowledge production and dissemination, including empirical application of Fleck’s theories on thought collectives. The study shows that field days are venues for knowledge co-production regardless of who sponsors them, but levels of participation vary based on the sponsoring organization and structure of the field day. The thesis concludes with the practical implications of the findings as well as suggestions for future research.
CHAPTER 2

Conceptual Framework

This study examines knowledge production and dissemination occurring in the context of agricultural field days. Similarly to others who have investigated the dynamics of production of knowledge within agriculture including on-farm research trials (e.g. Henke 2000), organic agriculture in general (e.g. Aeberhard and Rist 2009), and field days specifically (e.g. Carolan 2008), I employ the term "knowledge co-production" to describe the knowledge production and dissemination process. In this context knowledge co-production refers to the process of scientists, researchers and/or specialists generating agricultural knowledge in collaboration with laypersons, in this case farmer practitioners. As a result, the role of expert is fluid in knowledge co-production, as farmers exhibit their own local knowledge and experiential expertise in conjunction with scientists who work in laboratories and at experiment stations. Knowledge co-production is a more specific iteration of knowledge production and dissemination, which more generally refers to knowledge creation and diffusion without addressing the specific roles of actors in such a process, as is the case with knowledge co-production. For example, one might generally assert that agricultural field days are a site for knowledge production and dissemination, as actors produce results on-farm and then share them with an audience, but more specifically, these are sites for knowledge co-production as both the expert (be it a scientist, farmer, or industry representative) and the field day attendees (typically farmers) interact in a multi-directional flow of information and experience which ultimately co-produces knowledge. However, as this research will show, the structure and content of knowledge co-production processes at field days differs based in part on the organization sponsoring the program.
This chapter presents a conceptual framework to guide examination of knowledge co-production in three different field day models— a) The Pennsylvania State University College of Agricultural Sciences (PSU), the Pennsylvania Association for Sustainable Agriculture (PASA), and the Pennsylvania Women in Agricultural Network (WAgN). First, I briefly review knowledge co-production processes within agricultural science research and practice. Next, drawing on prior research, I discuss the field day as a venue for knowledge co-production. I then present a selective review of comparative analyses of agricultural science within the land grant university system, sustainable agriculture organizations, and women's agriculture networks to demonstrate how these three types of farmer organizations or networks differ. I next describe the theoretical contribution of Ludwik Fleck in the sociology of scientific knowledge, drawing attention to three core principles in Fleck's framework: a) thought styles and thought collectives, b) inter-collective communication, and c) intra-collective communication. Cumulatively, Fleck's theories offer a heuristic device to demarcate different agricultural networks, a model for knowledge co-production, and insight into cross-fertilization across agricultural networks. Departing from Fleck, I describe the predominant knowledge production and dissemination models within contemporary agricultural science— the linear model and the participatory research approach— articulating how they differ regarding where agricultural research is conducted, what content each emphasizes, and the role of horizontal knowledge exchange in each.

I. Knowledge co-production in agricultural science and field days

Agricultural field days were developed in the 1930s (Rasmussen 1989, p. 91) as opportunities for farmers and agricultural scientists to come together on farms and discuss farm

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2 Rasmussen (1989, p. 91-92) uses the terms “result” and “method” demonstration, as opposed to agricultural field day. However, his description of these forms of demonstration matches the present day field day; result demonstration refers to farm
management topics, creating a context for knowledge co-production (Carolan 2008). Though Carolan does not define knowledge co-production specifically, he references field days as a venue where farmers can discuss their experiential expertise (i.e., what they’ve learned on their own farms) with agricultural scientists. Henke (2000, p. 506) comes to a similar conclusion in reference to on-farm research, in which extension educators and farmers “co-produce the form of research and the meaning of its results.” As opposed to scientists and users functioning separately, on-farm research creates opportunities for close interaction between groups. Aeberhard and Rist (2009) equate knowledge co-production with transdisciplinarity, suggesting that when scientists and non-scientists work together in multi-directional information exchanges, the research content is more representative of actors’ needs and its application more fluid. Their research shows that over time, separation between farmers and scientists has stunted innovation in Swiss organic agriculture.

These descriptions of knowledge co-production in agricultural research share several common understandings. First, knowledge co-production is intrinsically participatory; it involves multiple actors, not scientists alone, producing knowledge. More specifically, knowledge co-production in agriculture requires farmer participation, a topic I return to later in this chapter. Second, farmer participation in the co-production of knowledge is a positive trend, highlighted by productive cooperation between farmers and scientists, though these interactions are not void of conflict (Henke 2000). Finally, these examples of knowledge co-production occur on the micro-level scale of farmer-researcher interactions. Knowledge co-production in the sociology of science literature refers to the increasing interdependence of scientific and education hosted by a farmer, and method demonstration references agricultural education of new practices led by extension educators or other experts.

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3 On-farm research and field days are related but different phenomena. Field days can be occasions to observe on-farm research trials, but not all field days constitute formal on-farm research. As understood in this example from Henke (2000), on-farm research refers to research partnerships between commercial farmers and university agricultural scientists in which research is conducted on a grower’s farm, as opposed to at an experiment station.
practical knowledge at the societal level (Jasanoff 2004). These cited works by Carolan, Henke, and Aeberhard and Rist apply the knowledge co-production concept to specific contexts, and they provide a foundation to explore the micro-level dynamics, content, and norms of interaction between agricultural field day participants as a knowledge co-production process.

Few scholars have studied agricultural field days as venues for knowledge production and dissemination. Barao (1992) concludes that a three-year extension field day project involving a local farm as the host site was a more effective knowledge dissemination tool than lectures and handouts. Carolan’s (2008) Iowa study offers a comparative analysis of two different agricultural field day models, what he labels “conventional” and “sustainable” field days. He asserts that both field day models present evidence of knowledge co-production, yet there are qualitative differences between them, namely that sustainable agriculture field days more readily question background assumptions within agricultural knowledge production, while university (or conventional agriculture) field days leave these assumptions untouched. Farmers at conventional field days shared their practical knowledge, delimiting vertical, unidirectional knowledge exchange (but see also Carolan 2006), but participants at these field days did not question the legitimacy of conventional agriculture. Sustainable field days, on the other hand, showed an

4 According to other work by Carolan (2006), the boundaries between what constitutes conventional and sustainable agriculture are unclear. Nonetheless, I employ the following definition of conventional agriculture from Beus and Dunlap (1991, p. 433), citing Knorr and Watkins (1984): “Conventional agriculture refers to large-scale, industrialized agriculture that is capital intensive, highly mechanized, uses extensive amounts of synthetic fertilizers and pesticides, and involves highly concentrated and intense livestock production.” Implicitly this definition overlaps with a productionist approach in agriculture. Buttel (2005) describes productionism as the pursuit of increased yield and output through agricultural technology in a way that ignores the social costs of this agenda.

Although sustainable agriculture is an evolving and context-specific concept (Ervin et al. 2010; Pretty 1995:12; Röling and Wagemakers 1998), for the purpose of this study I will use the USDA’s version of the term, signed into law in 1990:

The term sustainable agriculture means an integrated system of plant and animal production practices having a site-specific application that will, over the long term: satisfy human food and fiber needs; enhance environmental quality and the natural resource base upon which the agricultural economy depends; make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls; sustain the economic viability of farm operations; and enhance the quality of life for farmers and society as a whole. (Gold 2009).

This definition is commonly reduced into lay terms signifying an agriculture that prioritizes “people, profit, and planet.”
even less hierarchical information exchange than the conventional ones and did include questioning of background assumptions in agriculture.

Carolan’s (2008) study is one of very few offering a comparative analysis of agricultural field day models. This study builds on and differs from his research. Carolan presents qualitative differences among sustainable and university field days, which I take as a starting point for understanding how knowledge co-production may vary according to the values, experiences and approaches of field day organizers and attendees. A central assertion of Carolan’s work is that knowledge co-production occurs at both types of field days; this study further explores this claim. Knowledge co-production is linked to farmer-scientist interactions, though Carolan notes that expert status was attributed differently at each field day type. Building on this observation, I investigate the roles of field day participants and attempt to model the knowledge co-production relationships, offering a more nuanced account of expert/non-expert roles. Carolan’s assertion that both conventional and sustainable field days exhibited farmer participation is helpful, but I extend this analysis by evaluating differences in the degree of participation between field day models. In sum, these extensions of Carolan’s work will offer a clearer picture of knowledge co-production processes at different types of agricultural field days.

One subtle, yet important distinction between Carolan’s research and my own is his conflation of university-led field days with conventional field days. I do not disagree that historically land grant universities have significant ties to conventional agriculture. For example, Hightower’s (1973) attack on land grant university agricultural research was an early attempt to draw attention to its links with agribusiness and the productionist leanings of conventional agriculture (Buttel 2005). Beus and Dunlap (1992) link scientists’ orientations to the conventional agriculture paradigm at one land grant university, though there is clear variation
between disciplines (see also Goldberger 2001). Busch and Lacy (1983, p. 233) show that land grant agricultural scientists’ foremost goal is increasing productivity, yielding research output oriented to larger farmers and agribusiness interests. Nonetheless, many land grant universities now undertake programs in sustainable agriculture (NRC 2010; Delate and Dewitt 2004; Schroeder et al. 2006; see Carolan 2006 and Francis et al. 1995 for partial overviews). For example, a survey of sustainable agriculture coordinators at land grant universities indicated increased education and programming in organic agriculture, in some cases including field days (Delate and DeWitt 2004). Based on these findings, instead of preordaining university field days as conventional, I investigate how and to what extent sustainability is discussed in different field day formats.

II. Comparative analyses of university, sustainable, and women’s agricultural knowledge

Carolan is not alone in his desire to illuminate the differences between conventional (i.e. university) and sustainable agricultural knowledge. Morgan and Murdoch (2000) posit that organic food chains encourage farmers to utilize their local (or context-dependent) knowledge, while conventional food chains are biased towards standardized (codified and regulated) knowledge, a distinction others similarly make when comparing sustainable and conventional agricultural knowledge (e.g. Kloppenburg 1991). The ability and desire of the university agricultural sciences to meet the agricultural learning needs of sustainable agriculture farmers has routinely come into question (e.g. Agunda 1995; Agunda and Igodan 2007; Conner and Kolodinsky 1997; Egri 1999; Rodriguez et al. 2008). Hassanein and Kloppenburg (1995, p. 732) note that the sustainable farmers in their study of Wisconsin rotational graziers sought agricultural knowledge sources outside of land grant university services “not necessarily because they believe that institutionalized agricultural science cannot help them, but simply because it
has not helped them” (emphasis original). In this way, sustainable agriculture organizations and networks have emerged as alternatives to the land grant university agricultural sciences, and their field day models are more likely to position farmers as experts in knowledge production contexts (Carolan 2008) and stress the value of horizontal information exchange between farmers (Hassanein 1999, p. 6).

In addition, this study incorporates a third case not included in Carolan’s work—a women’s agricultural network. Women-only agricultural environments create a learning environment for women farmers that differs from other venues (Hassanein 1997, Trauger 2010b). Women’s contributions to agriculture have historically been devalued (Feldman and Welsh 1995; Rosenfeld 1985, p. 4; Sachs 1996) despite increasing numbers of women entering farming in recent years (Barbercheck et al. 2009, citing USDA Economic Research Service 2002). Women farmers seek education on equipment maintenance and alternatives to large machinery, as well as more general instruction in basic farming principles, compared to men with farm backgrounds who have acquired this training previously (Trauger et al. 2008). As a result traditional agricultural organizations such as university cooperative extension have not been welcoming environments for women farmers (Trauger et al. 2010b). In addition, women who farm tend to have smaller farms and adhere to sustainable agriculture principles (Trauger 2004), but “[t]raditional gender roles are reinforced in the sustainable agriculture discourse” (Allen and Sachs 1993, p. 149). Feldman and Welsh (1995) suggest that while local knowledge is an important facet of knowledge creation in sustainable agriculture (Kloppenburg 1991; Kloppenburg and Hassanein 1995), gendered divisions of labor also affect knowledge production in the sustainable agriculture context. In response, women’s agricultural networks like WAgN
have emerged to create spaces where women’s unique agricultural and educational needs can be met.

Thus far, this chapter has presented the concept of knowledge co-production within agricultural science as a beneficial trend to produce practical knowledge. I have emphasized how field days are knowledge co-production sites in general, while also describing contrasts in knowledge production, dissemination, and learning processes between university, sustainable agriculture, and women’s agriculture paradigms. To better understand the contrasts in these organizations’ field day models, the work of Ludwik Fleck offers a theoretical framework for examining the social processes involved in knowledge co-production.

III. Ludwik Fleck’s sociology of scientific knowledge

In 1935, Polish physicist Ludwik Fleck published his monograph *Genesis and Development of a Scientific Fact* (GDSF; English translation 1979). Using the disease syphilis as a case study, Fleck articulated one of the first constructivist accounts of knowledge, asserting that scientific facts are socially produced, not by individuals but by collectivities of scientists and others in closed, constrained systems (Jacobs 2002). His monograph was largely ignored for almost thirty years until Thomas Kuhn (1962) noted Fleck as a forerunner in the sociology of knowledge production in the introduction to his seminal *Structure of Scientific Revolutions* (Cohen and Schnelle 1986; Hedfors 2006). Even with this nod from Kuhn, Fleck’s sociological theories of scientific knowledge languished until the late 1970’s, when his rediscovery sparked the first English version of GDSF, two conferences held in Europe, and a subsequent anthology including unpublished essays by Fleck and scholarly critiques of his primary assertions (Cohen and Schnelle 1986; Harwood 1986). More recently, Fleck has been the subject of a special journal issue (see Löwy 2004), and his theoretical framework has been applied not only to his
own substantive foci of medical science (e.g. Arksey 1994; Rochel de Camargo 2002) and physics (e.g. Forstner 2008) but also more broadly in ecology (e.g. Mayer 2006) and agricultural science (e.g. Aeberhard and Rist 2009).

For this project, I apply three inter-related concepts from Fleck’s discussion on the sociology of scientific knowledge production, which I describe below. First, I present Fleck’s concepts of “thought style” and “thought collective” as heuristic tools for distinguishing between each of the three organizations in this study. Second, I will present Fleck’s model for inter-collective communication in the sciences, namely his notion of esoteric and exoteric circles. Third, this section will include a brief description of intra-collective communication, including his idea of “the borderline of the field.” Together, these three concepts frame my study, and subsequently I will supplement this framework with additional concepts and research from the literature specific to agricultural knowledge production and dissemination. First, it is pertinent to further clarify Fleck’s contribution to this study, taking care to acknowledge shortcomings in his assertions.

I. Thought style and thought collectives

Fleck presents the concepts thought style and thought collective in his seminal 1935 book *Genesis and Development of a Scientific Fact*. This monograph was foundational for the sociology of science, as it presents scientific facts as social constructions, “not objectively given but collectively created” (Bonah 2002, p. 192). As a result, thought generation is conceptualized as “a supremely social activity which cannot by any means be completely localized within the confines of the individual” (Fleck 1979, p. 98). The social nature of thought and fact generation occurs in thought collectives, or “communit[ies] of persons mutually exchanging ideas or maintaining intellectual interaction” (Fleck 1979, p. 39). Fleck (1979, p. 41) adds: “Although
the thought collective consists of individuals, it is not simply the aggregate sum of them.”

Instead, the thought collective is unified by a shared *thought style*, which he defines as:

> a definite constraint on thought, and even more; it is the entirety of intellectual preparedness or readiness for one particular way of seeing and acting and no other (ibid., p. 64).

This “constraint on thought” emerges in large part as a consequence of the theoretical and professional training one receives, as well as her/his worldview, interests and motivations (Mayer 2006). One’s thought style is not a conscious choice, but a result of a socialization process occurring within the thought collective (Rochel de Camaro 2002). In other words: “The thought collective is the carrier of the thought style” (Aeberhard and Rist 2009, p. 1173), such that thought collectives emerge through a social construction of knowledge and fact that is determined by an agreed upon, albeit subconsciously (Fleck 1979, p. 41), thought style. Fleck’s definitions of thought collective and thought style are noticeably ambiguous (Löwy 1988), and scholars have described thought style alternatively as “closed systems of opinion” (Jacobs 2002, p. 160), shared assumptions resultant from educational training (Bonah 2002), “ways to think and see” (Jackson 1994, p. 430), and a shared “pool of knowledge and cultural traditions” (Forstner 2008, p. 216). In combination and in light of Fleck’s own definition, thought style defines the unique culture of a like-minded set of people, resulting from both social interactions and group norms, including their training, methods, and assumptions about the world.

Fleck’s definition and use of thought collective also presents noticeable ambiguity, suggesting that Fleck himself had not fully wrestled with the idea (Harwood 1986; Lowy 1988). He states that thought collectives emerge “wherever two or more people are actually exchanging thoughts” (Fleck 1979, p. 44), thereby describing knowledge production in all subjects and fields of thought, including sports, art, politics, fashion, and religion, as well as science (Fleck 1979, p. 44).
107). As Harwood (1986) points out, Fleck struggles to place thought collectives into a clear context, at times discussing modern science as its own thought collective (Fleck 1979, p. 103-105) and at others referring to scientific disciplines as their own thought collectives (Fleck 1979, p. 108). These inconsistencies suggest that an infinite number of thought collectives exist, only distinguishable by the thought styles unique to each, and as a result, it is difficult to practically capture who is and isn’t part of a thought collective. The inclusivity of Fleck’s theoretical framework challenges its applicability (Jacobs 2002).

In spite of this shortcoming, Fleck’s clear intention in *Genesis and Development of Scientific Fact* was to analyze thought collectives within the medical sciences, bacteriology and serology specifically, as he devotes his case study to these topics. Thought collectives serve as a useful heuristic device to define the “investigators, organizations, laboratories, channels of communication, etc. devoted to the specific disciplinary tasks” of a science (Toulmin 1986, p. 270). Mayer (2006) and Aeberhard and Rist (2009) broaden the application of Fleck beyond medical science to include understandings of biodiversity and the co-production of knowledge in organic agriculture respectively. Mayer (2006) posits that the organisms chosen for biodiversity study, the methods used to study them, and one’s approach to biodiversity conservation projects vary based on the thought styles of practitioners. Aeberhard and Rist (2009) show that the different thought collectives of farmers, scientists, and extension agents have influenced changes in organic agriculture, yielding a current thought style that is more focused on the economic growth of organic agriculture than the philosophical and environmental ethos of its origin. Unlike Aeberhard and Rist (2009), I identify the shared thought styles of actors within an agricultural network, as opposed to treating farmers, scientists, and other actors as separate thought collectives.
In this study, I present PSU, PASA, and WAgn each as separate thought collectives. These are groups of people who exchange ideas, both intellectually and practically with a shared set of assumptions about agriculture, which defines their thought styles. As the results and analysis chapter of this study will elucidate, the PSU thought collective maintains a production agriculture orientation and features university scientists and researchers as experts, producing and sharing knowledge at research stations. Farmers participate in this thought collective by making research suggestions and giving feedback to scientists. The PASA thought collective carries a thought style that maintains a whole systems approach to agricultural management, one that prioritizes the principles of sustainability. Farmers are more frequently granted expert status in PASA field days, and these field days are typically offered at the farms of PASA constituents. The PASA thought style is less oriented to research, emphasizing on-farm practical application of sustainable farming practices. WAgn is a thought collective defined by a thought style that opposes traditional cultural norms that depict women farmers as “wives,” and “helpers” who are not “authentic farmers” (Trauger et al. 2010b, p. 94). WAgn field days are frequently hosted on farms and present more introductory knowledge in their field day programming. Sustainable agriculture is important within WAgn, though the network prioritizes providing a welcoming learning environment for women farmers first and foremost. Women farmers have roles as experts, in conjunction with researchers and other leaders who help set organizational programming priorities.

As these brief descriptions show, the approaches, priorities, and assumptions about agriculture should differ across the three organizations in this study. In Fleck’s terms, these distinctions suggest that each group has its own thought style that shapes knowledge production within the group, or thought collective. It is next necessary to describe two other important
contributions to this study from Ludwik Fleck—intra- and inter-collective communication processes.

II. *Intra-collective Communication: Esoteric and Exoteric Circles*

Fleck sought to describe how scientific thought collectives produce knowledge. In this effort he presents a structural model of the thought collective which emerges through interactions within and between concentric circles, labeled as the “smaller esoteric circle” and the “larger exoteric circle, each consisting of members belonging to the thought collective” [(Fleck 1979, p. 105); see Figure 1]. The esoteric circle is comprised of experts who actually generate new knowledge, while the exoteric circle consists of a broader collection of “educated amateurs,” (Rochel de Camargo 2002, p. 829) who not only depend on but also influence the esoteric circle by legitimizing and conditioning their knowledge claims:

No direct relation exists between the exoteric circle and [the] creation of thought but only one mediated esoterically. Thus most of the members of the thought collective are related to the works produced by the thought style only through trusting the initiated. But the initiated are by no means independent. They are more or less dependent, whether consciously or subconsciously, . . . upon the opinion of the exoteric circle (Fleck 1979, p. 105).

As this quote suggests, knowledge is co-produced in Fleck’s model via an inter-dependent social process between scientific experts and non-experts. In his description of the esoteric circle, Fleck (1979, p. 111) distinguishes between “specialized” and “general” experts, noting that the former are the most informed scientists on a topic while the latter “work on related problems.” He offers further detail to describe the exoteric circle as well, such that it includes both educated amateurs or “general practitioners” and an outer band of the “generally educated” (Fleck 1979, p. 115), what can best be understood as the general public (Trenn and Merton 1979). As knowledge moves from the center of the esoteric circle out to the larger exoteric circle, it
becomes increasingly popularized and simplified. At the same time, this popular knowledge provides the background and basis for new knowledge pursuits among the esoteric experts:

Popular exoteric knowledge stems from specialized esoteric knowledge. Owing to simplification, vividness, and absolute certainty it appears secure, more rounded, and more firmly joined together. It shapes specific public opinion as well as the Weltanschauung [trans. worldview] and in this form reacts in turn upon the expert (Fleck 1979, p. 113).

In summary, Fleck’s model of intra-collective communication suggests that knowledge creation is not confined to the realm of expert scientists, instead defining a significant role for both general practitioners and the general public.

**Figure 1: Fleck’s Concentric Circles of Knowledge Generation**

Fleck’s intra-collective communication model has rarely received empirical attention, and few scholars have commented on its strengths and merits. Trenn and Merton (1979) point out that without feedback from the exoteric circle, an esoteric elite emerges that can exercise dominance over the general public. The power of the exoteric circle is to democratize science, ultimately determining “which innovative path is to be followed” (Trenn and Merton 1979, p. 24).
His model articulates that scientific knowledge is not uni-directionally discovered by experts and diffused to the masses, but instead that the general public plays a more significant role in knowledge production processes (Arksey 1994). Arksey (1994) presents one of the few empirical tests of Fleck’s concentric circles model, and her results present two contradictions to Fleck’s model. First, her analysis of Repetitive Strain Injury in the medical sciences offers little evidence that medical knowledge is circulated amongst each circle—the experts produce medical knowledge independently. Second, experts do not have to be specialized scientists, but can also be part of the exoteric circle. Fleck fails to recognize the potential for greater participation by the exoteric circle—the general practitioners and laity—to produce knowledge.

Arksey’s critique of Fleck suggests the need for greater exploration of his concentric circles model. How does this model differ in different scientific disciplines? How does it differ among different thought collectives within similar disciplines? Based on Arksey’s findings, it appears that the universality of Fleck’s model is questionable. The present research study will further explore application of this model to scientific knowledge production. First, however, there is one final point of Fleck’s theoretical framework to discuss.

**III. Borderlines of the field: inter-collective processes**

Fleck’s conceptions of esoteric and exoteric circles describe knowledge creation and dissemination within thought collectives, but he also pays attention to inter-collective processes between thought collectives. Whereas intra-collective communication entails a process of knowledge corroboration, inter-collective communication is one of modification. “Real communication” between thought collectives occurs when they “exhibit shared traits independent of the uniqueness of any particular collective, even though “the principles of the alien collective are, if noticed at all, felt to be arbitrary and their possible legitimacy as begging
"the question" (Fleck 1979, p. 109). As new ideas are introduced from outside, a range of possible alterations to the thought collective emerge, from minor adjustments in language to “an almost complete change of meaning” (Fleck 1979, p. 110). For Fleck, this is a hopeful process, one that fosters scientific discovery and leads to the generation of new facts.

Individuals belong to multiple thought collectives at any given time, and as a result, they are key actors in inter-collective communication (ibid.). It is most often the case that these collectives for a given individual are quite divergent and do not influence one another, such as Fleck’s (ibid.) example of a physicist who is also part of a religious thought collective. In this case, thought collectives can be isolated from each other with little conflict given the epistemological distance between them—these thought collectives ask very different questions and concern themselves with different domains. However, such clean separation of thought collectives is not always possible:

For individuals, when thought styles are closely related, their coexistence within the individual either yields lack of productivity or the creation of a special style on the borderline of the field (Fleck 1979, p. 110).

Fleck does not elaborate further on this notion of the borderline of the field, but if thought styles refer to a collective process of “intellectual preparedness or readiness for one particular way of seeing and acting and no other” (Fleck 1979, p. 64) then it is logical to assume that the borderline in the field is also a collective possibility, one that can produce a new thought collective and further scientific discovery. Unfortunately, neither Fleck nor scholars of his work wrestle with the idea of the borderline in the field. Wolneiwicz (1986) does suggest that in some cases there is no opportunity for discussion or agreement across thought collectives, but such a conclusion does not mean that collaboration across fields is impossible in all cases. What is clear is that when two thought collectives do collaborate the result is a new social arrangement and new style
of thought ranging from subtly to remarkably different from the original thought collectives involved in the communication (Fleck 1979, p. 110). For this project, I interpret these new social arrangements as the borderline of the field.

Ludwik Fleck presents a theoretical framework to suggest that scientific knowledge creation is a social and collective process. His notions of thought style and thought collective, while not perfect, provide a heuristic device to clarify fundamental and practical differences among scientific communities. I have applied these concepts to characterize PSU, PASA, and WAgN as three distinct thought collectives within agricultural science and practice. In addition, Fleck presents a structural framework for how knowledge is produced within the thought collective, as well as communication processes and potentials across thought collectives. Although these latter two conceptions have received little scholarly treatment, I will explore their applicability to scientific knowledge production and dissemination processes. Specific to the agricultural sciences, Fleck’s notions of intra-collective and inter-collective communication offer new theoretical insights about knowledge production processes within this field. In the next section I review selected models for knowledge production and dissemination within agriculture.

IV. The linear model vs. participatory approaches to agricultural knowledge creation

As Arksey (1994, p. 449) notes in her empirical analysis of Fleck’s theories, “A key implication of [his] perspective is that scientific knowledge is not ‘discovered’ by technical experts and then disseminated to a wider public, but that these audiences participate in verifying the specialized knowledge in the first place.” Though she does not name it as such, Arksey’s reference to unidirectional knowledge creation and exchange between experts and the public could reference the linear model of agricultural knowledge production, referred to variously as the transfer of technology model (Chambers 2008); diffusion of innovations (Rogers 2003),
diffusion model (Lacy 1996), or top-down approach (Black 2000). This model, historically associated with university agricultural research and extension (Rivera and Sulaiman 2009), generally involves a process of knowledge production and diffusion where scientists develop new technology in their research domains and university extension agents transfer this knowledge to farmer constituents (Black 2000; Lacy 1996; Rogers 2003, p. 165). Though this linear model has historically been the dominant approach in agricultural knowledge production, particularly within formal institutional settings, the model has been criticized on many fronts (Buttel et al. 1990, p. 61), several of which are pertinent to the present study of field day thought collectives.

Unlike Fleck’s model of concentric circles in which the outer band including general practitioners (in this case farmers) play an important role in knowledge production, the linear model denotes the researcher/scientist as the sole producer of knowledge. A key facet of the linear model is that researchers select, design, and conduct research in isolation from the farmers the new knowledge aims to help (Chambers 2008). This perspective has been criticized for neglecting the experiential knowledge farmers have about farming, commonly referred to as their “local knowledge” (Kloppenburg 1991). As a result, several scholars have called for an extension system that privileges farmer participation in agricultural knowledge production (Middendorf and Busch 1997), shifting cooperative extension’s role away from expert leadership and towards coordination and facilitation (NRC 2010). Like Fleck’s concentric circles model, farmer participation approaches view the knowledge production process as a collective one in which non-scientists play a significant role as experts in their own right. Dissimilar to Fleck’s model, the participatory approach does not so specifically label scientists as “experts” and general practitioners (i.e. farmers) as “non-experts” (see Arksey 1994), instead suggesting that
farmers are themselves experts, particularly in terms of their knowledge of their farms, their fields, and their communities (Chambers 2008). Though many specific participatory approaches and methodologies exist (see Black [2000] for one list), the general principles of “farmer first” captured by Chambers et al. (1989, p. xix) articulate participation as an alternative to the linear model:

Instead of starting with the knowledge, problems, analysis and priorities of scientists, it starts with the knowledge, problems, analysis and priorities of farmers and farm families. Instead of the research station as the main locus of action, it is now the farm. Instead of the scientist as the central experimenter, it is now the farmer, whether woman or man, and other members of the farm family . . . Together these elements can be described as ‘farmer-first.’

As this quote suggests, a participatory approach to agriculture represents a clear shift away from the linear model and toward one that prioritizes the needs of farmers first and foremost. Participatory approaches call upon scientists and researchers to better incorporate local farmer knowledge into their research agendas. Such a practice will result in knowledge that is co-produced between farmers and researchers in a two-way information exchange, yielding not only more practical research but also mutual learning opportunities for both farmers and scientists (Andrew 2003; Clark and Murdoch 1997; Cornwall 1996; Krasny et al. 2001; Nerbonne and Lentz 2003; Warner 2006).

V. Degrees of Participation

Though the linear model and farmer participation models are frequently contrasted as ideal types (as evident in Chambers et al.’s quote above), participation within agricultural science cannot be so clearly divided between these two models. First of all, the linear model commonly associated with university agricultural science is not always incompatible with the participatory model. For example, extension educators and farmers can collaborate on research, challenging the notion that the former are merely conduits of information for the latter (Carr and
Wilkinson 2005; e.g. Krasney et al. 2001; Nicholson et al. 2003; Warner 2008). In addition, Mahon et al. (2010) suggest that incorporating participatory strategies within the conventional linear framework can present a host of problems, particularly when the strategy is a top-down directive, not a response from a farmer initiative. Reconciling participatory approaches with policy goals is problematic because the goal of participation is local empowerment not a specific policy outcome (Bruges and Smith 2008). Furthermore, not all participation within agricultural research and knowledge exchange is created equal, such that there are “degrees of participation” to consider (Deshler and Grudens-Schuck 2000, p. 603). To this end, several scholars have constructed typologies to clarify the hierarchical levels of participation, empirically asserting that in most cases increased participation yields increased benefits for the farmers involved (e.g. Auburn and Baker 1992; Cornwall 1996; Deshler and Grudens-Schuck 2000; Pretty 2008; Rocheleau 1994). This study applies the model presented by Deshler and Grudens-Schuck (2000, p. 603) from the adult education literature which features four levels of participation:

- **Level 1: Extractive-** Learners consent to provide data to trained researchers through interviews, focus groups, observations, tests, or surveys. Researchers benefit by publishing the findings. Those who are researched are forgotten.
- **Level 2: Paternalistic-** Learners assist researchers and adult educators in collecting data. Researchers analyze data, interpret, and report research findings and interpretations back to subjects. The researchers encourage learners to confirm the validity or authenticity of the research. The researchers provide a report to participants.
- **Level 3: Partnership-** Learners collaborate with trained researchers and adult educators in determining the focus of the knowledge construction, engage together in data collection, analysis, interpretation, and use of the knowledge for personal or collective action.
- **Level 4: Emancipatory-** Learners decide the focus of their own knowledge construction and engage in data collection, analysis, and collective action.

This typology is a useful tool for organizing the different knowledge production and dissemination models of the three field day models. However, the hierarchical construction of the typology merits additional analysis, since the highest degree of participation according to
Deshler and Grudens-Schuck, does not articulate a clear role for researchers. In contrast, Eshuis and Stuiver (2005) note that a variety of knowledge sources, including both scientific and local ones, stimulate the learning process. It is also the case that farmer-led research requires a greater time commitment of farmer participants (Grudens-Schuck 2000), and farmers’ opportunity costs of extended participation are not always calculated (Hoffman et al. 2007). In an example from the international development literature, Mosse (2001) suggests that researchers can be “too participatory” in orientation, resulting in local community dissatisfaction, and Vanclay and Lawrence (1995, p. 125) add that certain problems may require knowledge sources beyond farmers’ own capacity:

Farmers may not, however, be necessarily aware of the environmental problems which they face either individually or as part of a catchment. Farmers themselves may not be aware of the extent of the environmental problems affecting their land, since many of these processes are invisible and insidious, and farmers may not have any knowledge about how to deal with these problems . . . in this system, reliance on farmers’ local knowledge to solve problems that are new to their experience, such as many environmental problems, is unlikely to be successful.

As a result of such circumstances, farmer preferences, while important, should not single-handedly drive research agendas (Lockeretz and Anderson 1990). This research project explores degrees of participation at three field day types to better understand the benefits of participation and how different degrees of participation affect the knowledge co-production process within agricultural science.

VI. Research settings: experiment stations and on-farm research

The assertion that farmers’ local knowledge is important for agricultural knowledge production has important implications for where agricultural research and education occur. Within the linear model, agricultural research and trials frequently occur in the controlled environs of a university research station (Walter et al. 1997). As a result, some criticize the
practical application relevance of such research, since farmers cannot recreate the controlled test environment, thus rendering experiment station research unrealistic (e.g. Gerber 1992; Walter et al. 1997). Farmers want to participate in research (Franzluebbers and Francis 1991) and assert that they are more apt to adopt innovations when they occur on farms similar to their own (Henke 2000) or they are directly involved in the research (Esthuis and Stuiver 2005; Nicholson et al. 2003). University agricultural scientists do occasionally conduct on-farm research, and these results are statistically comparable to research station trials with the added bonus of greater adoption since the trials occur under working farm conditions (Bezdicek and DePhelps 1994). Nonetheless, researcher-farmer collaboration in on-farm research is significantly challenged by divergent goals among the actors, as Henke (2000, p. 496) notes:

There are several different meanings for ‘control’ [in on-farm research], but two are especially relevant: the advisors [extension agents] typically control variables in their experiment; the growers and advisors want to control for pests of their crops. The difficulty of maintaining a field trial on a grower’s land lies in a potential conflict between these two kinds of control (emphasis original).

An additional barrier to effective on-farm research is the attitude that research cannot be effectively controlled; it is therefore invalid (Dlott et al. 1994). To overcome these challenges and create on-farm research options that are beneficial to both sets of actors, it may be helpful for university and farming organization leaders to collaborate to create formal plans for research on constituents’ farms, as occurs with the Practical Farmers of Iowa and Iowa State University (Rosmann 1994). Francis et al. (1990) suggest that some agricultural research questions are best answered at experiment stations, while demonstration of results is more conducive to farmer’ fields. Since the agricultural field days in this study were offered both at university research stations and at host farms, this project can address the importance of where agricultural knowledge is produced and disseminated.
VII. Different types of knowledge: add-on innovations and whole systems knowledge

The linear model of knowledge production and dissemination has historically emphasized add-on, production-oriented technologies requiring chemical, fuel, and intensive inputs (Lacy 1996). These innovations tend to emphasize single, commercial components that can be universally applied on all the farms which the technology targets (Vanclay and Lawrence 1994). According to Lacy (2001), such research emphasizes reductionist knowledge, diverting attention away from research at the whole-farm, whole-plant, and whole-animal level. With such a strong focus on add-on farm production innovations, the linear model of diffusion has been less successful in disseminating other types of innovations, particularly environmental and sustainable agriculture ones (Buttel et al. 1990, p. 61; NRC 2010; Pampel and van Es 1977 as cited in Buttel et al. 1990). Conservation innovations, such as soil conservation, are not easily implemented with add-on technology, instead requiring a more comprehensive “whole system” approach to farm management change (Walter et al. 1997, p. 65). Busch and Lacy (1983, p. 244) describe such an approach:

Thus farming systems research is concerned not with the optimization or maximization of production of a particular commodity, but rather with the optimization of the farming system as a whole. This tends to refocus the emphasis in agricultural research away from disciplinary and commodity concerns toward complex interactions among and between people, crops, soil, and livestock.

In this approach the farm unit as a whole emerges as the unit of analysis, as opposed to single components or enterprises within the farm business (Francis et al. 1990). Whole systems research and education are frequently linked with sustainable agriculture, which views production as one part of a broader biological and ecological system that does not require the chemical inputs associated with add-on technology (Röling and Jiggins 1994; Vanclay and Lawrence 1994). This train of thought suggests that the add-on approach is not useful and may
even be irrelevant for sustainable agriculture farmers who do not use chemical inputs (Hanson et al. 1995). However, disciplinary divisions within the agricultural sciences constrain holistic research agendas which require transdisciplinary teams (NRC 2010; Lacy 1993). Based on this line of research, the contrast between add-on and whole systems approaches to agricultural research and education also informs this comparative study of three field day models.

VIII. **Horizontal learning: Networks**

The linear model is defined by top-down transfer of technology and diffusion occurring from scientists and researchers through the conduit of extension, to farmers who adopt new these new practices in the local context of their farms. Such a definition overlooks the potential for horizontal knowledge exchange and interaction *between* farmers based on the expertise they have gained in applied practice of farming techniques. Participatory approaches, on the other hand, encourage interaction amongst farmer peers as well as dialogue between scientists and farmers (Nicholson et al. 2003). Horizontal knowledge exchange refers to a process of farmers sharing their local knowledge with other farmers. As Hassanein and Kloppenburg (1995) explain, although local knowledge is personal and context-dependent, it can still be applicable to other farmers, particularly those who share similar approaches to agriculture, or thought styles in Fleck’s terms. Within thought collectives such as Hassanein and Kloppenburg’s (1995) graziers network, this sharing of horizontal knowledge teaches farmers how to farm sustainably, increasing opportunities for new models of agricultural development. Others have also linked horizontal knowledge exchange with sustainable agriculture. Organic farmers in Ohio note that cooperative extension can be helpful knowledge providers, but the most common source for information is from other farmers, not extension educators (Agunda and Igodan 2007). However, horizontal knowledge exchange is not limited to sustainable agriculture alone.
Ranchers in Colorado cite their own experience (i.e., local knowledge) as their greatest source of farming knowledge, followed by informal networks of friends and family and then by cooperative extension (Knapp and Fernandez-Jimenez 2009). There is also evidence that regardless of the linear model’s “top-down” character, cooperative extension can play a valuable role in facilitating horizontal network opportunities, as in the case of organic farmers in New York who were seeking new sources of information (Kroma 2006). Since field days are venues that bring farmers together in knowledge co-production sites (Carolan 2008), this study analyzes patterns and meanings surrounding horizontal knowledge exchange at each of the three field day types.

**IX. Conclusion**

This chapter has presented a conceptual framework for analyzing knowledge co-production at agricultural field days. Prior research on knowledge co-production in this context refers to the ways researchers and farmers interact to generate research results and information. Knowledge co-production, therefore, can be linked to the idea of participatory approaches in agricultural research, those that highlight the value of farmers’ local knowledge for its practical, problem-solving capability. The linear model of agricultural knowledge production and dissemination, on the other hand, tends to view farmers as passive adopters of agricultural innovations that are developed in isolated research domains by scientists without input from the intended end users of the scientific output. This chapter has highlighted important differences between these two approaches to agricultural knowledge production, including where research takes place, what types of information the research emphasizes, and the opportunity for horizontal knowledge exchange within each model.
The theoretical contribution of Ludwik Fleck presents a helpful framework for analysis of knowledge co-production at agricultural field days. Since this study has identified three different organizations that conduct field days, it is important to articulate how these groups and their networks are distinguishable. Fleck’s notions of thought style and thought collective provide heuristic tools in this effort, clarifying that knowledge generation happens within these collectives and is constrained by the culturally and experientially-derived worldviews of the collectives’ members. Fleck’s esoteric and exoteric circles present a model for this process within scientific thought collectives, such as the agricultural sciences. Though he pre-dates the term, Fleck’s model is one of knowledge co-production, as both scientific experts and general practitioners have roles in the production of knowledge. Fleck also discusses interactions between thought collectives and their capacity to productively generate new knowledge, in spite of differences in the styles of thought that define them. These contributions from Fleck are valuable to this research study. First, it is helpful to think of each organization as its own thought collective, given their different approaches to agricultural knowledge, which I will elaborate in chapter four. Second, Fleck’s esoteric and exoteric circles present a model to compare the structure of knowledge co-production within each of the study’s thought collectives. By examining who is involved in each field day and the role s/he plays, the analysis will clarify differences in knowledge co-production processes at field days. Third, Fleck’s notion of the borderline in the field, a potential result from cross-fertilization among thought collectives presents a framework for understanding both the current inter-relationships between each of the thought collectives and future opportunities for collaboration, as I will describe in chapter five.

In addition, this chapter has reviewed one previous comparative study of field days by Carolan (2008), which provides a useful foundation from which to build this research project.
He presents the field day as a knowledge co-production venue for both university and sustainable agriculture field days, followed by analysis to suggest differences between these two field day types. My research incorporates a third agricultural organization, a women’s agricultural network, which represents newer and potentially different grounds for analysis of knowledge co-production at agriculture field days. In the next chapter, I explain my research methodology for this study.
CHAPTER 3

Data and Methods

In this chapter, I describe my methods for gathering and analyzing data. First I briefly review the rationale for using qualitative methods in this project. Next, I describe the specific research design, including the rationale for my sample selection, as well as the specific methods I employed to collect data at agricultural field days. Then, I discuss the approach and specific techniques for data analysis. The chapter concludes by discussing how issues of researcher bias and reactivity were addressed.

Qualitative approaches to research problems allow the researcher to inductively explore new phenomena (Creswell 2007, p. 38-39) by developing descriptive accounts of people’s actions (Taylor and Bogdan 1998, p. 4) through observation in the “field” where the researcher can “explicate the ways people in particular settings come to understand, account for, take action, and otherwise manage their day-to-day situations” (Miles and Huberman 1994, p. 7). In this project, I explore the phenomena of agricultural knowledge production and dissemination by describing the experiences of farmers, scientists, educators, and agricultural organization leaders. I seek to understand how these actors “manage” knowledge co-production processes in the agricultural field day setting. Qualitative methods are useful for examining interactions between people and developing or expanding theories about specific populations (Creswell 2007, p. 40), which in this case involve field day participants at university, sustainable agriculture, and women’s agricultural field days. Although several quantitative methods, such as survey data collection, may have sufficiently described some aspects of this population, qualitative research was necessary to capture the nuances of agricultural knowledge co-production, which is a
dynamic, interactive process where complexities are best captured through the experiences of field day participants.

I. Research Design

This study utilizes the rationale of several techniques associated with case study research design, although unlike a full case study, the study does not document all aspects of the organization and implementation of agricultural field days, as related to knowledge co-production. Instead, this study draws on a sample of agricultural field days from three different sponsoring organizations: Penn State University College of Agricultural Sciences and Cooperative Extension (PSU), Pennsylvania Association for Sustainable Agriculture (PASA), and the Pennsylvania Women’s Agricultural Network (WAgN). I attended three field days sponsored by each organization (total = nine field days) to develop a comparative analysis of knowledge production and dissemination processes based on the differing approaches of the sponsoring organization. Whereas a case study design would have explored all facets of the three different field day models, including an in-depth description of each sponsoring organization, this analysis focuses primarily on the experiences of farmers, presenters, hosts, and organizational leaders at each field day, and especially on the ways knowledge is developed and shared in the field day setting. The emphasis of this research is not on the organizations themselves, but instead each organization’s dynamics and processes of knowledge co-production, as shaped by each sponsoring organization at its agricultural field days.

II. Sample Selection

PSU, PASA, and WAgN each offer a number of agricultural field days throughout the year. For example, PASA and WAgN hosted 27 and 12 field days respectively in 2009. It is more challenging to sum the total of PSU field days in 2009, since the university has a diffuse
network of county extension offices which do not list programs on a common calendar. PSU’s three agricultural research stations each usually offer one summer field day and one winter meeting, and county extension offices host evening pasture and field walks in the spring, summer, and fall, but a final number is hard to surmise. For this study, I attended field days from May 2009 through August 2009, selecting a representative sample of three field days offered by each sponsoring organization during these months, totaling nine field days. I targeted field days scheduled to run at least four hours (but no longer than eight), since shorter events such as PSU’s evening pasture walks would provide less time to gather data. Because each group offers a range of field days on numerous topics, I employed thematic selection criteria to ensure comparability across the three field day sponsoring organizations. I identified one field day offered by each of the three sponsoring organizations in the following three thematic categories: a) Agronomic, b) Animal/livestock, and c) Mechanical/technological. Although broad, these categories capture the general focus of almost all the field days offered by the three organizations during the sample period. In addition, use of the mechanical/technological category, which is not product-specific like the other two, created some overlap between categories, such that a field day could include both agronomic and mechanical/technological content for example. Since technology transfer has been a priority in agricultural science diffusion (see chapter two), I selected at least one field day by each organization that emphasized this type of knowledge exchange. The goal of this thematic field day selection process was to ensure attendance at field days reflecting key types offered by each sponsoring organization while also enabling cross-organizational comparisons. Table 1 presents summary descriptions

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5 PASA’s field day schedule did present a few exceptions outside of the three category instruction including an apiary field day, a cheesemaking field day, and two direct marketing field days. Since comparable programs were not available at WAgN and PSU field days, I did not attend PASA field days outside of the three categories described in this section.
of the nine field days studied in this research. The region listed for each field day corresponds to the PA Department of Agriculture’s seven region classification system.

Table 1: Description of Study Field Days, 2009

<table>
<thead>
<tr>
<th>Field Day Organizing Group</th>
<th>Field Day Title/Duration</th>
<th>Key Presenters/ Collaborators</th>
<th>Region (County)</th>
<th>Number of Interviews</th>
<th>Short Form label</th>
</tr>
</thead>
<tbody>
<tr>
<td>PASA</td>
<td>Diversified Livestock Farming (half day)</td>
<td>Farmer host, USDA Grazing Specialist</td>
<td>Northeast (Bradford)</td>
<td>7</td>
<td>P1</td>
</tr>
<tr>
<td></td>
<td>Hands-on Biodiesel Production (full day)</td>
<td>Piedmont Biofuels, National Center for Appropriate Technology</td>
<td>Southwest (Washington)</td>
<td>7</td>
<td>P2</td>
</tr>
<tr>
<td></td>
<td>Diversifying Your Farm with Small Grains (half day)</td>
<td>Farmer host, Northeast Organic Farming Association- New York</td>
<td>Northcentral (Columbia)</td>
<td>6</td>
<td>P3</td>
</tr>
<tr>
<td>PSU</td>
<td>PSU Fruit Research and Education Center Grower Field Day (full day)</td>
<td>Penn State ag sciences faculty and graduate students, USDA NRCS</td>
<td>Southcentral-East (Adams)</td>
<td>5</td>
<td>E1</td>
</tr>
<tr>
<td></td>
<td>PSU Small Fruit and Vegetable Field Day (half day)</td>
<td>Penn State extension educators and agricultural sciences faculty</td>
<td>Southcentral-East (Lancaster)</td>
<td>5</td>
<td>E2</td>
</tr>
<tr>
<td></td>
<td>Summer Cattle Feeder’s Workshop (half day)</td>
<td>PA Beef Council, Fort Dodge (animal health company), USDA Grading Service, PSU extension educators</td>
<td>Southcentral-East (Lancaster)</td>
<td>6</td>
<td>E3</td>
</tr>
<tr>
<td>WAgN</td>
<td>Sheep Production &amp; Marketing (half day)</td>
<td>Farmer host, Fiber Arts expert</td>
<td>Northeast (Wayne)</td>
<td>7</td>
<td>W1</td>
</tr>
<tr>
<td></td>
<td>Organic Certification &amp; Soil Building for Organic Production (half day)</td>
<td>Farmer host, USDA NRCS,</td>
<td>Northwest (Clarion)</td>
<td>6</td>
<td>W2</td>
</tr>
<tr>
<td></td>
<td>Tractor Maintenance Workshop (half day)</td>
<td>Farmer host, PSU equipment specialist</td>
<td>Northeast (Wayne)</td>
<td>8</td>
<td>W3</td>
</tr>
</tbody>
</table>
The agronomic PSU and WAgN field days both focused on fruit and vegetable production, which encouraged comparisons in thought style related to production of these crops. The PASA agronomic field day featured small grains but was still comparable to the others, since the emphasis of all the agronomic field days was on techniques to produce high quality crops for human consumption.

Each of the sponsoring organizations offered a field day focused on animal and livestock husbandry and production. Unlike the more-straightforward comparisons of the agronomy field days, the general animal category highlights differences in each thought collective by the specific field day topic alone. The PASA field day emphasized diversified livestock while the PSU and WAgN field days focused on a single species of animal, cattle and sheep respectively. Unlike the WAgN field day that featured both sheep husbandry and wool usage, the PSU field day centered on more specialized care of feed cattle specifically.

The intent of the mechanization/technological category construction was to attend field days offered by each group that emphasize new equipment, tools, and techniques. One targeted aspect of this field day type was to observe field days that encourage physical, “hands-on” participation among attendees. This was the case for both the PASA and WAgN field days, which encouraged attendees to participate by producing their own biodiesel (PASA) and maintaining provided farm equipment engines (WAgN). The PSU field day on fruit automation technology did not include a component for attendees to use equipment and tools, but the field day did include demonstrations of new technology and mechanical processes in fruit tree maintenance. As a result, difference in thought style and knowledge co-production related to equipment and technological change could be compared within this field day category.
III. Data Collection

The study field days took place throughout Pennsylvania and lasted from four to eight hours each. I gathered data at each field day using three methods: participant observation, collection of handouts and print materials, and field day participant interviews. Participant observation, unlike direct observation, gives the researcher an insider view of the phenomenon being studied by participating with the research group (Yin 2009, p. 111). Since this research project focuses on knowledge co-production and dissemination, I centered my observation on the content and style of field day presentations, as well as interactions between attendees and presenters. These interactions included question and answer exchanges during presentations, as well as more informal conversations between presenters and field day attendees. In addition to jotting down field notes during the field days, I occasionally recorded presentations for further analysis after the completion of the field days (Emerson et al. 1995, p. 79). By recording these presentations, I was able to focus my note taking on interactions between field day participants, while still gathering data on the content of the field day instruction.

In addition to cataloging presentations and dialogue between presenters and attendees, I observed communication among field day attendees. In most cases, the field days began with an introduction from the field day organizer and in some cases included introductions from each of the attendees, complete with a description of their own operations and/or reason for attending the field day. At field days with participant introductions, I informed the attendees of my role as a researcher as part of my personal introduction. When an introduction was not possible, I sought permission from field day sponsors to conduct participant observation and record presentations. In all but one case, I made prior contact with the field day leadership to inform them of my research plans and request permission to include the field day in my sample. At the PSU Fruit
Research field day, where prior contact was not made, I located one of the organizers and requested permission to conduct participant observation and interviews before the field day began.

The nine field days included different activities—classroom-style presentations, farmers’ field tours, observations of field trials, and “hands-on” activities. As a participant observer, I was able to experience the field days much like the other attendees, as well as conduct more focused observation of the attendees’ experiences at the field day (Yin 2009, p. 111). In addition, there were valuable opportunities to observe conversation and interaction between attendees.

At several of the field days, presenters and sponsoring organizations distributed handouts and other materials, ranging from background information about the sponsoring organization and/or presenters, an outline of one or more of the presentations, pertinent research results, extra information about topics not covered at the field day, and evaluation forms. In some cases, the sponsoring organizations gave each attendee a packet of information upon registering. I gathered these secondary printed materials as additional forms of data at the field day events.

The third source of data on the field days came from semi-structured, short interviews. The goal of these interviews was to learn more about the experiences of different participants at each field day (see Appendix for interview guide). Therefore, I conducted short interviews with a wide range of participants, including field day organizers, presenters, hosts, co-sponsors, and farmer and other attendees. Since organizers, presenters, hosts, and co-sponsors were routinely introduced and included formally in the field day agenda, it was possible to identify such participants for inclusion in my purposive sample. Farmer attendees, on the other hand, presented more of a challenge for interviewee selection. I employed an “opportunistic” sampling
strategy to identify farmer interviewees (Miles and Huberman 1994, p. 28; Creswell 2007, p. 127; Kemper et al. 2003). This sampling strategy is opportunistic in that it follows leads in the field as they present themselves to the researcher (Kemper et al. 2003, Miles and Huberman 1994: 28). By evaluating differences in farming tenure, gender, age, and interest among the participants during field day introductions, as well as divergent patterns of interactions throughout the field day, I could purposively select sample interviewees to increase the likelihood of obtaining diverse accounts of the field day experience. As the field day unfolded, I identified farmer attendees who both participated frequently in the field days’ activities and those who seemed less involved. These farmer attendee interviews, combined with interviews of field day organizers, hosts, presenters, and co-sponsors, fit a maximum variation sampling strategy by selecting interviews based on differentiating criteria (Creswell 2007, p. 126), in this case the role of the interviewee at the field day. I completed a total of 57 interviews at the nine field days (see Table 1). Interviews ranged from approximately five minutes in length to longer interviews with field day organizers (approximately 30-45 minutes). Twenty-five of the 57 field day interviews were conducted face-to-face at the field day site, either at the end of the day or during breaks in the agenda.

The remaining 32 interviews were conducted over the telephone the week following the field day, since there were noticeable limitations to conducting interviews at the field days. One significant challenge was not distracting the participants from the field day agenda. For example, I conducted some interviews during lunch breaks, but it became clear as I attended more field days that breaks were valuable opportunities for attendees to socialize and network with each other. In other cases, such as with hosts and organizers, their responsibilities in facilitating and leading the field days made it challenging for them to participate in an interview
on site. To reduce intrusiveness at the field day, I scheduled telephone interviews with some attendees to occur within the week following the field day. Thirty-two of the 57 total interviews took place by telephone. As Table 1 shows, more interviews were completed at the PASA and WAgN field days than the PSU ones. One reason for this disparity was the informal structure of PASA and WAgN field days, which typically included more “downtime” for the researcher to interact with attendees than the PSU field days. Also, PASA and WAgN field days were generally smaller events and included participant introductions, providing me an opportunity to describe the research project to all attendees. The larger PSU field days did not include participant introductions, and so it was more difficult to develop rapport with potential interviewees. All interviews, whether in-person or over the phone, were audio-recorded with the consent of the interviewee, consistent with procedural protocol required by The Pennsylvania State University’s Office of Research Protections. The interviews were subsequently transcribed verbatim.

IV. Data Analysis, Generalizability and Validity

The interviews, participant observation field notes, and secondary data from field day printed materials were coded using a two-step process. First, all data sources were open-coded to identify a large number of themes within the data set. When open coding, the researcher reads all transcripts line-by-line to identify a high number of possible formulations of the data from which more specific categories can be identified (Emerson et al. 1995, p. 143). The emphasis in this coding approach is to “entertain all analytic possibilities . . . without regard for how or whether ideas or categories will ultimately be used, whether other relevant observations have been made, or how they will fit together” (Emerson et al. 1995, p. 151). This process fits with the inductive intent of qualitative research by generating the coding categories from the observed
data, as opposed to pre-supposing provisional codes before the analysis begins (Miles and Huberman 1994, p. 58). In this study, the open coding process suggested many possible directions for understanding knowledge co-production and dissemination at agricultural field days.

I used focused-coding, the second coding stage, to develop a more fine-grained account of the similarities and differences between the field days (Emerson et al. 1995, p. 143). The myriad categories generated in the open coding process were scaled down to the most salient themes, based on the frequency at which they recurred in the initial analysis and their connectedness to the emergent conceptual framework of this project, knowledge production and dissemination at agricultural field days. Focused coding is a process of elaborating and integrating prominent categories from the initial open coding process into major analytic themes (Emerson et al. 1995, p. 143). By revisiting my openly coded categories, I identified the presence of distinct thought styles as a central concept in the data, such that PSU, PASA, and WAgN each represent a different thought collective. In the subsequent focused coding process, I organized the thematic categories around the central theme of thought styles and thought collectives to describe variation in knowledge co-production at agricultural field days.

Since qualitative research methods rely on the researcher’s inferences of collected data, validity and generalizability of the research findings are often a concern (Yin 2009, p. 43, 61). According to Creswell (2007, p. 209), “rich thick description” empowers the researcher’s audience “to determine whether the findings can be transferred” to other settings beyond those in the study, which enhances the generalizability of the project. By providing the context and background of the organizations in this study and using rigorous research methods to describe knowledge co-production among the three sample groups, the findings may be potentially
applicable to or informative for other venues of agricultural knowledge exchange beyond the field day specifically. Nonetheless, the goal of this research was foremost to clarify knowledge production and dissemination processes at field days involving the three organizations in the study, and readers should not hastily attempt to generalize the findings to other contexts. This study applies principles of triangulation, defined by Stake (2005, p. 454) as “a process of using multiple perceptions to clarify meaning, verifying the repeatability of an observation or interpretation.” Triangulation utilizes “converging lines of inquiry” to support the validity of the study (Yin 2009, p. 114). In this project, the participant observation, secondary print materials, and field day interviews provided valuable sources of data in and of themselves and each also supported findings from the other sources of information.

V. Researcher Reflexivity

Regardless of a researcher’s chosen methodology, addressing the potential for personal bias is an important step to enhance the validity of the research study. According to Creswell (2007, p. 208):

Clarifying researcher bias from the outset of the study is important so the reader understands the researcher’s position and any biases or assumptions that impact the inquiry (Merriam, 1988). In this clarification, the researcher comments on past experiences, biases, prejudices, and orientations that have likely shaped the interpretation and approach to the study.

Prior to conducting this research project, I had had experiences with all three of the sponsoring organizations in the sample group. As a graduate student in the College of Agricultural Sciences at Penn State University, I have attended several Penn State University Cooperative Extension meetings, and this project was funded in part by the Dean of the College of Agricultural Sciences. Furthermore, as a Penn State graduate student in Rural Sociology, I was familiar with the activities and goals of the Pennsylvania Women’s Agricultural Network prior to the study, as
one of its founders is a faculty member in this department. I have also attended the Pennsylvania Association for Sustainable Agriculture’s annual conference, as well as one PASA field day prior to conducting this research project. This prior experience with each organization meant that at many field days, regardless of who hosted, I had often met some of the farmers in attendance prior to the field day. In the case of PASA and WAgN, I had a working relationship with the field day leaders prior to the commencement of this research, and as a result, I can conclude that they helped me attain “insider” status more so than at PSU field days.

My prior familiarity with each organization is symbolic of my approach to agricultural education in general, as I believe PSU, PASA, and WAgN can each offer valuable learning opportunities to willing participants. In other words, I did not come into this research project believing that one of these organizations is inherently “better” than the others. Instead, my prior interactions with each of these organizations have demonstrated that they often appeal to different subsets of Pennsylvania farmers who have different needs. Therefore, the research is not oriented to show that one group facilitates agricultural learning in a superior fashion to the others, but instead to illuminate differences in knowledge production and dissemination among these organizations. In some rare cases, I observed skepticism from interviewees at both PASA and PSU field days that I might be conducting my research with a preconceived agenda. This skepticism, or reactivity, appeared to stem from either my general affiliation with Penn State University or my specific role as a graduate student in Rural Sociology. Reactivity refers to the researcher’s influence on the research setting and participants, and it is crucial for qualitative researchers to understand “how you are influencing what the informant says, and how this affects the validity of the inferences you can draw from the interview” (Maxwell 2005, p. 109, emphasis original). In these cases, I assured the interviewee that my interest was solely in their field day
experiences and that there were no “right or wrong answers” to my questions, while also giving
them the opportunity to review their interview transcript or refrain from being interviewed
altogether. In all cases, the interviewees agreed to participate in the interview. Although I did
not incorporate formal member checking procedures (Miles and Hubermann 1994, p. 242;
Maxwell 2005, p. 111), I discussed emergent themes from the study with organizational leaders
throughout the information gathering process. In addition, I frequently asked follow-up
questions of interviewees to help ensure that my interpretation of their experience was accurate.
Ideally, these practices improve the credibility of the research findings; however, it is impossible
to ever entirely guarantee validity in qualitative research (Maxwell 2005, p. 109).

VI. Conclusion

In this chapter I have outlined my methods for conducting this comparative analysis of
agricultural field days. I chose to attend three field days offered by each of the organizations in
the study, to observe field days on a mix of agricultural topics. At each field day, I gathered data
using participant observation techniques, conducting five to seven semi-structured interviews
with a variety of field day participants, and gathering secondary materials such as print handouts.
This data was transcribed and coded, first to illuminate emergent themes from the field days,
followed by focused coding to organize the data around categories related to agricultural
knowledge production and dissemination. In the next chapter, I present these results,
highlighting differences in knowledge co-production processes and contexts among PSU, PASA,
and WAgN.
CHAPTER 4

Results and Analysis

The following chapter presents the findings from this research. As will become clear, the field days varied in noticeable ways based on which organization—PSU, PASA, or WAgN—sponsored the field day. To organize the results, the chapter addresses different aspects of field day programs in turn. I begin by describing the field day participants associated with the thought collectives in the study including farmer attendees, sponsors, collaborators, and presenters. Next, I analyze the structure of each thought collective to better understand how knowledge co-production occurs at agricultural field days. I subsequently examine participation at agricultural field days, suggesting that knowledge co-production occurs within each thought collective but with different levels of participation by farmers. Then, I briefly describe how field day locations and content differ across the field day organizations. The following section shifts to highlight one area of overlap among the three thought collectives: the importance of networking at agricultural field days. Continuing with the theme of overlap, the chapter concludes by describing instances of cross-fertilization between the sponsoring organizations in the study.

I. Field day participants: A description

As described in chapter two, thought collectives are delineated by the worldviews and predispositions of those in the collective. To better understand the unique qualities of the PSU, PASA, and WAgN thought collectives respectively, I will first discuss differences among their field day participants. This section describes who attends and participates in agricultural field days. Next, I consider the importance of gender identity as observed at field days, since women’s agricultural networks like WAgN are now providing alternatives to other agricultural knowledge channels. To consider other identity differences across the three field day
populations, I conclude this section by discussing how participants describe sustainable agriculture within each of the three thought collectives.

A. A range of farmer attendees

Agricultural field days, in most cases, are designed to attract farmer attendees who are interested in the specific topic of the field day. However, this general label of “farmer” does not do justice to the diverse interests, orientations, and backgrounds of the agricultural producers who attend field days. Observation and interviews from each field day type show that PSU, PASA, and WAgN attract contrasting groups of participants within their thought collectives. For example Harold⁶ who attended a PSU field day offers this description of his business:

We’re an all tree-fruit farm . . . We have 300 acres of apples and probably ten acres of peach and ten of pears. We have a roadside market that we do maybe 10 percent [of our sales] and then the other 90 percent, we ship to a major packer (farmer interview, E1).

In contrast to Harold’s operation that produces a limited range of products in a (relatively) large quantity, farmers at PASA field days tended to have smaller operations, a more diversified product mix, and to market their output directly to consumers, as Vern exemplifies:

[We] have a market garden, and [we] have animals. We raise cows and feed. It’s basically set up like a homestead, so whatever excess we have we sell. There’s an on-farm farmstand where [we] sell produce through. We do a farmers’ market, and we also have a 25-member CSA [Community-Supported Agriculture] (farmer interview, P3).

Like many of the PASA field day participants, WAgN attendees subscribe to direct marketing strategies similar to those described by Vern and maintain smaller operations than many PSU attendees. For example Dorothy describes her operation:

We grow organic produce, and we sell mostly at farmers markets . . . we’re at a point where we are switching over to more perennial type food crops, putting in berries. We might explore things like Jerusalem artichokes and asparagus and things like that for additional planting. So that’s where we are. We have 95.6 acres, and we’re actively growing a widely scattered, maybe, three acres (farmer interview, W2).

⁶ All proper names have been changed to conceal the identities of interviewees.
Though many PASA and WAgN farmer attendees share some of these characteristics, PASA and WAgN attendees also differed. Not only did WAgN attendees have small farms, in some instances they indicated having very small operations, such as Joan and Kimberly (field notes, W3) who have CSA markets of three and eight members respectively. Perhaps related to this smaller size, WAgN attendees frequently expressed an interest in expanding their businesses or increasing the scale of the farming that they do. After I asked Eve if she is a farmer, she responded

Well, I’m trying to move in that direction . . . I bought 20 acres about six years ago, and I am working towards putting that in farming. I have horses on it right now, and I’m down to one goat, an Angora. And chickens, and for now that’s about it. That’s about all I can handle working full-time [off the farm] (farmer interview, W1).

These descriptions suggest certain differences across those attending the three organizations’ field days. However, it is important to note that they are not universal—clearly, not all PSU attendees have large operations with a limited product mix nor do all PASA farmers have smaller, direct market enterprises nor do all WAgN participants have very small operations that they wish to scale up. Since it was beyond the scope of this project to survey attendees at each of the field days for a more complete account of farm size, product mix, age, and other demographic variables, my descriptive accounts can only highlight some differences among a sample of each of the field days’ farmer attendees.

B. Non-farmers at agricultural field days

In addition to farmers who attend agricultural field days, there is a group of other actors who play active roles in knowledge production and dissemination at field days. Field days must be formally organized by someone who determines the objectives, markets the event to relevant farmers, and recruits presenters not only to share their own knowledge, but in some cases to co-
produce new knowledge with participants. Depending on the field day sponsoring organization, these presenters can include researchers, government specialists, graduate students, leaders of organizations, industry representatives, and farmers themselves. I observed differences across the three thought collectives at their field days in terms of who participates along with farmers.

The PSU field days exhibited a decentralized organizational leadership with each of the three field days I attended being designed and implemented by a different organizer. The Cattlefeeder workshop field day was organized by a county livestock extension educator, while the other two field days featured either regional or state specialists trained in the topics of the programs who also conduct primary research at Penn State research sites. As a result, these specialists both organized and presented at their field days. Both the Small Fruit and Vegetable and Fruit Research field days incorporated presentations from other Penn State faculty as part of the program, although the latter also included presenters from other universities and government specialists from the USDA Natural Resources Conservation Service (NRCS) who either conduct research at the Fruit Research Center or in collaboration with faculty from the Center (interview, E1). The Cattlefeeder workshop had a different presenter format than the other two field days, collaborating with a private animal health company, the USDA Cattle Grading Service, certified cattle graders from Virginia, and the Pennsylvania Beef Council’s Beef Quality Assurance program. Though this field day was hosted on a farm, the farm operator was not a presenter.

In contrast, the PASA and WAgN field days both exhibited more centralized leadership, such that one organizer set-up all the field days on their organization’s schedules. These persons have programmatic positions in their respective organizations and do not present at their field days, outside of introducing other speakers and briefly describing their organizations. Unlike PSU, the PASA and WAgN field days did not incorporate university researchers as presenters.
Instead, in two PASA and two WAgN field days, farmers acted as primary presenters, hosting attendees at their farm operations and sharing information about their businesses. In these cases, supplemental presentations were offered by outside specialists from such organizations as the USDA NRCS, and the Northeast Organic Farming Association-New York for PASA and NRCS and the Ohio Ecological Food & Farming Association for WAgN. One study field day for each organization also involved no farmer presenters. In these cases representatives of outside organizations acted as sole presenters at the field day, which was held on a farm, with a limited role for the host farmer. WAgN field days also included WAgN steering committee members who were also affiliated with other agricultural organizations like cooperative extension and the USDA. Along with a research team, the steering committee creates programmatic objectives for WAgN. WAgN field days also included representatives who work at the regional level to organize field days in collaboration with the central WAgN leadership, mentor area farmers new to WAgN, and host networking events.

Several key differences among the three thought collectives emerge from this description of non-farmer participants. Notably, PSU field days feature university researchers and private industry personnel as primary presenters, whereas PASA and WAgN more typically have farmers fill this role. This distinction contributes to understanding of knowledge co-production within these thought collectives. Presenters share information at field days. They act as experts and maintain a high-status role in knowledge production processes. The ways experts and laypersons, in this case farmer attendees, interact shapes processes of knowledge co-production in these thought collectives. Below, I discuss the content of the field days I attended and further explore the role of experts. First, however, I examine sources of farmer identity within each thought collective, including both gender and sustainability.
C. Gender and knowledge production at agricultural field days

As elaborated in chapter two, women farmers have expressed that traditional information sources such as cooperative extension have not met their learning needs (Trauger et al. 2010b), and they often feel that they are not taken seriously as farm operators (Trauger et al. 2010a). As the name suggests, WAgN prioritizes the agricultural interests and needs of women farmers. When asked to summarize the impetus for creating a women’s agricultural network in Pennsylvania, WAgN’s director explains:

Well, many women have told our researchers that they feel isolated on farms, and they don’t feel like they can open up in conventional farming education venues like extension meetings, for example. Many of them don’t go there. Really, there are very few women who actually show up at extension programs where male farmers show up. So I think that’s the reason for needing the program (interview, W1).

My field day observations confirmed the director’s belief that many women do not attend university-related agricultural learning events. Among the approximately 400 total attendees at the three PSU field days studied here, only a small handful, approximately 5 percent were women, in spite of survey research indicating that 58 percent of extension educators in Pennsylvania agreed that women farmers’ needs were different from male farmers, and 68 percent said that it was either somewhat, moderately, or very important to market programs to women (Brazier et al. 2009). One PSU field day organizer noted that:

We try to always include women on our programs and in our planning committees when we plan these events (organizer interview, E3).

It is worth noting that he specifies women’s participation “on,” not “at” extension programs. This would suggest that there is some initiative to include women in program planning and as presenters and speakers, which occurred with some success at this field day. One portion of the program included a training session on the Beef Quality Assurance program that was presented by a woman representative, and towards the conclusion of the field day, Angela, a member of the
National Beef Ambassador Program (sponsored by the American National Cattlewomen Foundation) addressed the crowd about her national role on this team of youth who travel the country to promote the benefits of beef to consumers (field notes, E3). I made similar observations at the other two PSU field days in which few women farmers attended the field days, but some women did serve as presenters and facilitators.

WAgN’s director was not the only interviewee to note that some agricultural learning environments foster dynamics that limit women’s participation, particularly their willingness to ask questions and share opinions:

I’ve been to a lot of events, programs where it was pretty male-dominated. I think the industry is, farming is, it just kind of works out that way (farmer interview, W1).

We’ve noticed [at women-centered woodland owner programs] that women don’t answer questions when there are men in the room, especially their husbands. They let the men answer, and they don’t. (farmer interview, W1).

I find that even in my other profession, that when I do group things with women, they like to learn in groups. I think that [WAgN] is a very supportive environment, and if there were a bunch of men there and just one or two women, I think it wouldn’t have been easy to ask questions, or they might make you feel stupid or something (farmer interview, W3).

With these types of experiences in mind, WAgN has sought to foster an environment where women farmers can feel comfortable sharing their experiences and asking questions.

Women farmers must contend with the cultural stereotype that farming is not suited to their skills and interests, which is reinforced when they are not taken seriously by their male peers (Trauger et al. 2008). As a result, they can feel pressure in male-dominated farming arenas to project an image that counters this stereotype, such that they may hide their opinions and questions, further justifying WAgN’s role:

I think there are times when [women] get a little nervous speaking up about certain things, maybe certain things we don’t know. We don’t always feel silly asking other women, but if there are men there, we may be self-conscious about being farmers and not
knowing something we don’t know coming forth to further the stereotype that, “How could women know about farming?” But everyone has to learn sometime and somehow. (farmer interview, W2).

Alleviating the self-consciousness Dorothy describes is directly linked to the creation of a protected space for women to share their farm experiences. WAgN field days, particularly those that feature hands-on farm-related activity, are spaces that can empower women farmers as practical experiences that counter the cultural norm that farming is men’s work. Valerie, after the Tractor Maintenance field day, explains:

I think women think differently, in some ways, than men. I just think it’s so engrained in society that women can’t do these things or they shouldn’t be doing them. And so to do it, to do these things in a group of all women, to see that you can do it, and you can have it done is really empowering—to not have a guy pick up a wrench and loosen a bolt for you. You’ve got to think in different ways to do that, and that’s something that we would work out in that group together, of how to do it, because there wouldn’t be any men there (farmer interview, W3).

As empowering group spaces, WAgN field days also serve another purpose by mitigating the isolation women farmers often feel in a non-supportive, male-centered agricultural environment. Prior research on women’s agricultural networks suggests that women farmers seek to overcome this isolation by exchanging information in a way that also builds relationships (Trauger 2009; Hassanein 1997), as Lisa describes:

It’s very easy to feel alone in what we are trying to do, both in trying to raise organic produce, and being the principal operator of the farm as a woman. Sometimes it’s very easy to feel very isolated . . . So getting the chance to network with other women farmers and the relationships and friendships I’ve developed through WAgN are of tremendous value to me (farmer interview, W2).

Lisa points to the potential for a double isolation as both a sustainable agriculture and woman farmer, corresponding to prior research suggesting that such a combination may result in marginalization (Trauger et al. 2010a).
Women farmers are more likely to participate in sustainable agriculture than conventional agriculture, and they experience less discrimination and more comfort in the former case (Trauger 2009; 2004). My observations at PASA field days support Trauger’s findings, as these spaces were relatively mixed in comparison to the PSU field days attended predominantly by men and the WAgN field days which were almost exclusively women. Unsurprisingly, PASA’s more mixed-gender environment produced different types of interactions compared to the other two field day types.

Women interviewed at the PASA field days conveyed that they felt comfortable interacting with both presenters and other attendees, as Paula notes:

I had the feeling that I could always ask a question or go deeper in one direction if I wanted to. You know, I felt like the workshop was being catered to the people who were there in some ways (farmer interview, P2).

However, my observations provide evidence that women sometimes defer to men when addressing the group of attendees at PASA field days. For example, at the Diversified Livestock field day, four married couples attended, and during introductions only one of these women took the lead to describe the farm operation; in the case of two couples, husbands spoke and the women did not address the group at all. Previous research suggests that women’s roles at university and extension events tend to be circumscribed as “wives” and “helpers,” and not as farmers (Trauger et al. 2010b), a finding with some applicability to this PASA field day. The notion of farmwomen as helpers was also expressed by the hosts at this field day. As Jim, the host farmer introduced their farm, his wife Jackie interjected that:

He’s the farmer, and I’m the helper (field notes, P1).
A similar delineation of roles took place at the PASA Small Grains field day, where a married couple, Tom and Samantha, also acted as host farmers. As, Tom described their farm and management practices in the possessive “we” form, Samantha interrupted to say:

Not “we.” You! (field notes, P3).

In contrast, WAgN farmers clearly asserted themselves as farmers at field days, not as wives or helpers. Despite identifying with support roles, throughout the PASA field day both Jackie and Samantha demonstrated not only great breadth of knowledge about their farms but also shared information suggesting they have significant roles in management, production, and marketing for their business. In addition, following Jackie’s claim that she merely “helps” Jim, the husband of one of the farm couples introduced their farm by saying:

I’m Harris. She’s the farmer, and I’m the helper (field notes, P1).

Subsequently, his wife Cara described the farm business, an indication that in some cases, women field day attendees at PASA events are primary farm operators.

PASA field days involved women in leadership and presenting roles. All three PASA field days were organized by a woman staff member and supported by a female intern. Bonnie, a representative from the Northeast Organic Farming Association- New York, played a prominent role as a presenter at the Small Grains field day, and Samantha led one of the field day sessions on processing grain for value-added products. The Biodiesel field day included two presenters from a biofuel company in North Carolina, including Elena, who led two sessions and played an active role in the hands-on biodiesel production portion of the field day. In addition, PASA and WAgN have a history of collaborating on field days and presenting them together, merging dual goals of supporting sustainable agriculture and women’s agricultural needs. Several WAgN interviewees reported that they were PASA members as well.
In light of the mixed-gender character of PASA field days, men’s roles in WAgN programming also deserve attention. Although only three men in total attended the studied WAgN field days, men are increasingly coming to WAgN events (20 percent of all attendees in 2008), creating some tension among participants (organizer interview, W3). On one hand, men’s attendance can be viewed positively, especially when they attend with women they know, as noted by WAgN’s director:

I think it’s good that women feel comfortable to bring anyone with them that they want to, and that men feel comfortable in coming. We still have men that will sign up for an event and then say, “Whoops, sorry I’m not coming; I didn’t realize it was the Women’s Ag Network.” We tell them that they are welcomed to come, and sometimes they do . . . I don’t think it’s a concern; I think it is a positive sign (organizer interview, W2).

Dorothy adds that in her experience, men have not negatively affected WAgN events and can improve them:

I have not found that men have detracted from the conversation, from the days that I’ve been at when they’ve been there. Some, they have a lot to add. I’ve never been in a situation where I felt like they’ve taken over (farmer interview, W2).

On the other hand, men have detracted from the field day experience of some female WAgN attendees. As an example, Valerie describes another WAgN field day (not included in this study) where attendees built a “hoop house”:

There were men there, and that was [a field day] where men were almost being a little too involved in it. Like they would pick up tools when I felt like it should have been geared more towards women (farmer interview, W3).

Valerie, however, did describe her positive experience at the Tractor Maintenance field day, even though two men also attended:

It’s fine that men do attend them. But I think it should be spelled out in the beginning that this workshop is geared toward women and to make them feel that they can be involved and do these things that men typically do—and to feel comfortable doing that. And at the tractor one I felt that, at the end of the day, that did happen, and the guys did kind of take a little back seat (farmer interview, W3).
Here, Valerie has expressed her concern about the presence of men at WAgN field days. She says the field days should be explicitly focused on women, so when men come they know that women’s participation, not their own, is the priority. While this priority may not be “spelled out” to the attendees, WAgN’s director urges presenters, in this case Jerry at the Tractor Maintenance field day, to consciously encourage women’s involvement:

Well, I talked to Jerry about it beforehand . . . and I wanted him to be sure that the women who were attending were the ones who got to work with their hands. And he was conscious of that anyway . . . But I just alerted him to be sure that we didn’t allow any men participants to be the volunteers who did the hands-on things and so that women wouldn’t kind of just hang back (director, W3).

Therefore, even with more men attending WAgN events, field days are organized to retain a focus on the needs of women. If more men continue to attend these events, protecting the dynamics WAgN seeks to create, ones where women can feel open to talk about their farming needs and gain new practical experience, could become a greater challenge.

This section has described gender dynamics as observed at agricultural field days. WAgN arose to create a space where women farmers can exchange knowledge based on their specific needs as women in agriculture in a way that other organizations could not. Sustainable agriculture presents another source of farmer identity, and PASA’s formation presents a parallel to WAgN’s, as the former organization emerged because sustainable farmers’ needs were unmet by Pennsylvania’s agricultural institutions (Carnes and Karsten 2003). In the next section, I describe how the notion of sustainability is characterized differently within the PSU, PASA, and WAgN thought collectives.

**D. Sustainability: The only way, the best way, one way**

In this section I discuss how sustainability is conceptualized both by field day attendees and in field day content more generally. This exploration is important for several reasons. First,
since PASA defines itself with the term “sustainable,” it is valuable to examine how PASA differs from the other thought collectives in relation to sustainability. Second, university agriculture sciences have been harshly criticized for not prioritizing sustainable agriculture (Buttel 2005), and field days offer an opportunity to further examine these claims. Finally, sustainable agriculture is frequently linked to women in agriculture, and to WAgN in particular (see Trauger 2004).

Interviewees from all three thought collectives were asked to describe “good farming,” and in many cases they interpreted this question to mean “sustainability.” Respondents spoke of the environmental and economic aspects of “good farming” and sustainability in their assessments most frequently, and the social aspects received the least amount of attention, regardless of which field day the respondent had attended. As a result, few responses included all three aspects of sustainability. A cooperative extension agent who has been active as a leader and/or presenter with all three types of field days spoke directly to this effect:

So [with] that traditional three-legged stool definition [of sustainability] . . . people forget one or two of the legs and just focus on one. Or it’s a trade-off, “I can’t do all three.” A farmer I knew out in California said, “I can only afford to be good in one way at a time.” (interview, W3).

Despite similarity across the responses from participants at all field days, including frequent mentions of “land stewardship, “making a profit,” and “caring for animals,” it is less clear how respondents interpret these phrases and apply them. A PSU organizer noted:

There is not a definition of “good farming.” Good farming for different farmers will mean completely different things.

Later in the interview he elaborates:

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7 I concluded each interview by asking the interviewee to describe “good farming” or what a “good farmer” is. This deliberately ambiguous question was used in an attempt to understand how participants conceptualized farming success in their own terms, allowing room for them to insert their own definitions of “sustainability” as they saw fit.
I’m working with the growers who are two-acre fruit growers, and I’m working with the growers who are 2,000-acre fruit growers. And the good farming for them is, well, in the long-term, it’s the same—to maintain the sustainable farm that will support the family and provide income and stuff like that, but the details, how they’re going to do it, is different for each of them. In terms—because of scale (interview, E1).

This response suggests that while the goals of a good farming operation may be expressed similarly, the specific practices will vary based on the unique situation of the farmer, in this example, the scale of the operation. To clarify how sustainable agriculture is presented differently at each field day, I will focus on the content in each field day and insights from field day leadership.

Aspects of sustainable agriculture, particularly in terms of production and management practices, were included in each of the field days I attended. As PASA’s name indicates, sustainability is a key aspect of this organization’s work, as reflected in their field day organizer’s approach to educational outreach as a desire

. . . to find, to get, to make, to gather people together in an environment that is conducive to sharing and learning with the ultimate goals of spreading the sustainable word . . . not only hope that people farm in ways that are kind and sustainable in terms of non-toxic but also to help them have a business that can keep them in a lifestyle that is acceptable to them—to make enough money, have health insurance, that kind of stuff (organizer interview, P1).

PASA’s commitment to sustainable agriculture is evident in each of their field days. The diversified livestock field day featured a farmer with grass-fed cows and pastured poultry, hallmarks of sustainable meat operations. Biodiesel production is based on notions of re-using waste and limiting fossil fuel usage, important components of sustainability, and the small grains field day emphasized producing grain for human-consumption without chemical sprays. The centrality of sustainable agriculture within the PASA thought collective, particularly demonstrated at their field days, suggests that it is the organizing principle for PASA participants and essential to the organization’s work. In this way, sustainable agriculture for PASA is not just
one way, or even the best way, but it is the only way they educate farmers at field days they sponsor.

WAgN also shares a commitment to small-scale, sustainable agriculture, and the content of their field days overlaps with some of the principles exhibited by PASA. Indeed, PASA and WAgN co-host several field days every year (interviews, W1; W3; P1). Sustainable agriculture has been a part of WAgN’s programs from its inception, as their director notes:

Oh definitely. It has from the beginning. We were funded from the beginning by a SARE [Sustainable Agriculture, Research, and Education] grant for sustainable agriculture, so that definitely informed our programming from the start, and it has really stayed that way and grown. (organizer interview, W1).

As central as WAgN’s commitment to sustainable agriculture is, the foremost purpose of the organization is to support women in agriculture:

Women farmers are a diverse group and we want to involve as many people as we can (organizer interview, W1).

Later, she adds:

We do pull in conventional farmers, but almost everybody, I guess the common ground is that almost everybody who attends these events is interested in some kind of direct marketing (interview, W1).

Although direct marketing is frequently linked to sustainable agriculture (NRC 2010), WAgN’s field day approach and “draw” is centered on women’s agricultural needs first and foremost regardless of their farm management preferences. Nonetheless, sustainable agriculture is still clearly an important part of WAgN’s programming, as evident at the Soil Composition field day which was hosted on both an organic farm and a Certified Naturally Grown farm and included a presentation by an organic certifier (field notes, W2). In addition, the two other field days were hosted on small-scale, chemical-free farms. Sustainability for WAgN may not be the only way, but it is still the best way.
In contrast, the PSU thought collective considers sustainable agriculture (including organic farming methods) as one approach to agricultural production, but not necessarily the best approach and certainly not the only one. This was evident at the Fruit Research field day that included one session on organic apple production, although a majority of the knowledge exchange throughout the day focused on conventional growing methods. A similar observation was evident at the fruit and vegetable field day, in which both conventional and organic trials were discussed. An extension educator, Matthew, describes this approach:

The EPA trial was directly comparing conventional fungicides, conventional disease control materials, with organic, and then some of the newest that really wasn’t even recommended on the organic side yet. We were looking at some of the biological materials, and for efficacy, again hoping to be able to increase grower adoption of these materials . . . (educator interview, E2).

Later in the interview, Matthew adds:

My conventional growers use almost all the same tools that organic growers use, and at the end of the line, they elect a different fertilizer (educator interview, E2).

These quotes suggest that PSU perspectives do not preclude organic management techniques, but rather view such practices as a possible approach for field day attendees and other PSU constituents to consider. Nonetheless, PSU field days certainly contained conventional agricultural practices aimed at pest control and maximizing yield. For example, the Cattle Feeder program included a session on hormone and antibiotic injections, and the other field days included many trials with chemical sprays. As a result, my observations at PSU field days suggest that in this thought collective sustainable agriculture is viewed as one approach, but not necessarily the best approach for farm management in all situations.

This portion of the analysis has shown that PSU field days are not entirely antagonistic to sustainable agriculture, even though the university sciences have often been criticized for not demonstrating stronger support for these management practices (Buttel 2005). As a result,
sustainable agriculture may present one possibility to further cross-fertilization among the three thought collectives, a topic I return to at the conclusion of this chapter.

Thus far in chapter four, I have described field day participants within the PSU, PASA, and WAgN thought collectives. I have focused specifically on notions of gender and sustainability within these agricultural networks, since they are important to understanding the identity of farmers within each network, and as a result, the thought collectives themselves. This descriptive account helps outline ways that each thought collective is different, and in the subsequent sections of this chapter, I provide further analysis to articulate the unique qualities of each network. Fleck (1979, p. 105) posited that scientific thought collectives, while maintaining unique thought styles, all maintain a common structure in which experts and lay participants co-produce knowledge through a process of social interaction. In the following section, I apply Fleck’s model to each of the three thought collectives to better understand the structure of their knowledge co-production processes and the roles of field day participants.

II. Identifying Experts and Amateurs: Concentric Circles and Thought Collectives

Experts play a key role in both knowledge production and dissemination. In the context of agricultural field days, they formulate much of the formal content that comprises the event, and they merit high status based on their research and application of their knowledge. They interact with field day attendees, “educated amateurs” in some senses (Rochel de Camargo 2002, p. 829), to further learning processes. As a result, knowing who both the experts and amateurs are can inform understanding of how knowledge is produced and shared.

In his distillation of thought collectives, Ludwik Fleck (1979, p. 105) describes two types of experts who comprise the inner esoteric circle of knowledge creation in a scientific field: specialized experts in the center and general experts surrounding them. The outer exoteric circle
includes educated amateurs who are further surrounded by the general public. In this way, we can actually conceive of four, not two circles, as shown in figure 1 (chapter two, p. 24). As elaborated in chapter two, Fleck posits that the esoteric and exoteric circles interact to co-produce scientific knowledge through social processes of trust and legitimacy. In this portion of the study, I will show that the structure of each of the three agricultural thought collectives varies based on different esoteric-exoteric roles and relationships among the specialized and general experts, educated amateurs, and the general public at the field days I studied.

The PSU thought collective positions faculty researchers at the center of the esoteric circle (Figure 2). These experts produce research science in laboratories and at field stations that is intended to serve the needs of farmer constituents. Cooperative extension plays the role of general expert, as these actors possess a broader, more general understanding of technical knowledge, but still enough to communicate this knowledge to the exoteric circle. Importantly, many research faculty at PSU field stations such as the Fruit Research and Education Center also maintain partial extension appointments. This arrangement suggests that these individual persons fulfill both specialized and general expert roles in the thought collective. In addition to researchers, numerous other actors comprise PSU’s specialized experts, identified by their roles as presenters at agricultural field days. They include industry representatives (E3) and NRCS and other USDA specialists (E1, E3). Industry representatives also appeared as general experts at the Small Fruit and Vegetable Field Day. In this case, the field day presenter, a PSU horticulturist, tested various pesticide (and one organic) inputs in his field trial. The representatives from the companies that provide these inputs were on hand during the field day, on one hand discussing use of the product with the horticulturist, and on the other answering questions and receiving feedback from the farmer attendees. This former function demonstrates
how specialized and general experts co-generate new knowledge, while the latter describes an example of intra-collective communication between the esoteric and exoteric circles.

PSU’s exoteric circle includes farmers as educated amateurs, Fleck’s (1979, p. 115) “general practitioners.” They seek out the knowledge of the experts at field days to apply on their own farms, but they also provide feedback to the experts to influence new research or refine current projects. Although PSU’s constituent farmers have a broad range of production-related interests (organizer interview, E1; organizer interview E2), they are all part of the educated amateur band—they both practice the science that the experts create and demand new knowledge products from the actors in the esoteric circle. The general public, given the specificity and targeted nature of agricultural field day, does not directly make an appearance at PSU field days (or PASA or WAgN ones for that matter). However, the general public indirectly communicates with the thought collective at field days as consumers of agricultural products. The Cattlefeeder workshop presents two examples:

Some lady from California isn’t gonna like to see that in her steak. (Presenter quote, field notes E3).
[Question: Why did you attend the field day?] I needed to be certified for the Beef Quality Assurance [BQA] program, so people know they are getting meat from someone who is properly trained. It’s a marketing advantage (Chad, farmer interview, E3).

This first quote was stated by an industry veterinarian during the necropsy of a calf. The piece of meat he cut off to show the crowd was hard and contained a black band through it, the result of poor placement in the application of a vaccine. The public, the “lady from California,” influence the knowledge prioritized by the field day. Because of her perceived consumer demands, that piece of meat is unacceptable, reinforcing the idea that farmers must be careful when injecting vaccines in their cows. In the second quote, Chad indicates that the BQA program exists to alleviate public food safety concerns. Both the creation of the knowledge in the BQA program (of which observing the necropsy was a required component) and Chad’s application of the knowledge, for “a marketing advantage,” were influenced by public opinion, though no one from “the public” was actually in attendance at the field day.

The PASA thought collective (Figure 3), does not include university researchers as specialized experts. Instead a mix of actors including outside speakers, collaborators, and in one case a PASA staff member function in this role. The biodiesel field day was led by a team of biodiesel experts from North Carolina who manage a community-based biodiesel operation. The Small Grains field day was partially organized and led by an agronomist from NOFA-NY, and the Diversified Livestock field day included a session on pasture management by an NRCS specialist. This latter field day was also attended by a PASA staff member who is a trained veterinarian. Though not a presenter, Sherry frequently addressed attendees directly (field notes, P1). Farmers were also presenters at PASA field days, although based on my observation, they more accurately fit the generalized expert role. For example, during their introductions, both host presenters Jim (P1) and Tom (P3) define their knowledge levels as follows:
There were a lot of things brought to my attention that I could try. I have no claim—claim to be any type of expert on anything in agriculture because, you know, I don’t think you can be because things change on a daily basis. And new things are always happening. And what works for me doesn’t work for you and vice-versa (Jim, host interview, P1).

We don’t want to be labeled as “the grain people.” We’re neophytes (Tom, field notes, P3).

In these quotes a resistance to being labeled an “expert” is apparent. Both individuals assert that they do not have the experience to be considered experts, and Jim notes that he has learned from the attendees at his field day. These host farmers can therefore be seen as generalized experts. In the context of a PASA field day, they share their experiential knowledge of their operations indicating expertise, but they acknowledge not being qualified to answer all questions related to the field day content as a specialized expert would be able to do. Attendees have gathered to learn from them even if they do not feel comfortable being labeled experts. Nonetheless, as Jim asserts, farmer attendees also educated him at the field day. In this way, they too are general experts, sharing their experiential knowledge with the entire group to co-generate knowledge both inward to the other experts and outward to the exoteric circle.

**Figure 3: PASA Field Day Thought Collective Concentric Circles**

![Diagram of Concentric Circles]

- Gray Circle = Exoteric Circle
- Light Pink Circle = Exoteric Circle
- Dark Pink Circle = Innermost Circle
- Black Lines = Interconnections

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The presence of general practitioners at the PASA field days is difficult to assess since the field day attendees who do “practice,” the farmers, fit well into the generalized expert category. My observations revealed that farmers can also be educated amateurs at PASA field days, particularly in cases where they are beginning farmers and new to the topic, as was the case at the Small Grains field day. John from Maine, who has only been farming for a year and a half, attended the field day specifically to learn about the topic since he works on a farm similar to Tom and Samantha’s but has no experience with grain:

There was a lot of things that you can read in books and stuff like that, and you know, you understand it, but until you actually see them using the cleaner and the combine and stuff like that. And just talking about how they store it and some of the diseases and stuff like that. For sure it was a lot of information that I’ll be able to bring back and keep in my mind and teach other people up in Maine (Farmer B, P3).

John is a PASA field day attendee who fits the educated amateur role. He has farm experience and understands some processes of grain farming through reading, but he asked more questions than he answered on grain-related topics at the field day. He also demonstrated the interactive nature of thought collectives, as he intended to take his new knowledge to share with other farmers.

Similar to PSU, the public is indirectly present at PASA field days in the form of the consumer. For example, Sherry, the PASA staff member and veterinarian, conveyed how the public shapes the PASA thought collective when she told the group that there is unmet market demand for grass-fed animal products, noting that farmers can get a good price by selling directly to consumers (PASA staff, P1). As with PSU, this emphasis on “the consumer” affects the knowledge that is created, since later in the day several conversations about marketing took place, with multiple attendees sharing their experiences. Unlike PSU, however, PASA’s
A hypothetical consumer has more specific demands, not only looking for safe products but also those that are grass-fed and sold at direct markets.

The WAgN thought collective (Figure 4) includes university researchers as specialized experts. However, unlike the PSU researchers, WAgN’s specialized experts have social goals in knowledge creation, namely addressing the needs of women farmers, as opposed to taking only a production-oriented approach. In addition, unlike PSU, WAgN’s researchers do not regularly attend field days and are not presenters at field days, although at one field day (W3), a member of the research team was on hand to observe. These specialized experts conduct needs assessments (e.g. Barbercheck et al. 2009) to clarify what knowledge women farmers in Pennsylvania demand. Working in tandem with WAgN’s steering committee (comprised of agricultural specialists such as a USDA scientist and cooperative extension educator), also part of the specialized expert center, their results are considered in WAgN’s programmatic pursuits including field days. Like PASA, WAgN utilizes a range of specialized experts to produce and disseminate knowledge at agricultural field days as presenters including outside specialists such as a farm equipment expert (W3), NRCS specialist (W2), and a board member of the National Finn Sheep Breeder’s Association (W1). Also similar to PASA, farmers fill roles as generalized experts at WAgN field days, particularly in the form of regional representatives. These leadership positions are described by one representative Ingrid, who hosted the Tractor Maintenance field day:

The responsibilities of a regional rep are to organize events, workshops, and field days within the region—to create more of a community in that region of women farmers . . . focusing on different things like how a CSA is handled. I’m going to be on that one . . . So, having those kinds of resources available and be able to help. That’s really I think the whole focus of regional reps, to create that network base so more women have resources available to them within their region, within fingers’ reach, so that it’s not such a huge thing to have to call extension or anything else (farmer interview, W3).
With these responsibilities, WAgN regional reps function as general experts. They are experts in their regions and have experiential expertise as both farmers and networkers. Their knowledge is crucial to WAgN’s success, as they create opportunities for the network to thrive, but they play a less vital role than specialized experts in the overall creation of knowledge within the thought collective.

Similar to PASA, some WAgN farmers can also be considered general experts, particularly those with more farm experience, while other attendees fulfill an educated amateur role, raising questions at field days and seeking new knowledge. Like PASA and PSU, the public interacts indirectly with the WAgN thought collective, at times as “the consumer.” However, the general public in WAgN’s thought collective has a quality different from these other two thought collectives. As a women’s organization, WAgN responds to cultural norms that challenge women’s identity as farmers, generated both in society in general and agricultural circles in particular. Because cooperative extension (Trauger et al. 2010b) and other farming organizations (Trauger 2009) do not always take women’s needs and interests seriously, WAgN
responds to this “public” by creating opportunities that privilege knowledge creation for women farmers.

The PSU, PASA, and WAgN thought collectives have different structures. Based on Fleck’s notion of esoteric and exoteric circles, my field day observation demonstrates that the roles participants fill—as specialized or general experts, educated amateurs, and, indirectly, the public—shape the form and character of each agricultural thought collective. As Arksey (1994) points out, Fleck’s assertion that expert roles are the domain of scientists does not withstand empirical tests in all thought collectives. Though Fleck (1979, p. 113) notes that intra-collective communication occurs co-directionally between the esoteric and exoteric circles, his analysis does not explore the specific ways this interaction occurs. How do these various actors in thought collectives participate? How does this participation affect the knowledge production experiences of the actors? To answer these questions, I explore farmer participation within the PSU, PASA, and WAgN thought collectives to better understand how knowledge is produced and shared in these contexts.

III. Degrees of participation in three agricultural science thought collectives

One shortcoming of Fleck’s concentric circles model is his limited interpretation of participation—scientists produce knowledge and practitioners both legitimize results through application and demand new knowledge. Fleck does not articulate the dynamic quality of participation in thought collectives, failing to account for the heterogeneity of participatory processes within science. By synthesizing Fleck’s position with Deshler and Grudens-Shuck’s (2000, p. 603) typology of “degrees of participation,” I will discuss both participant interactions at the field days and the process of knowledge development more broadly for each field day organization. This latter objective aims to understand how various actors produce the
agricultural knowledge that is then shared with attendees at the field days. As previously described in chapter two, a typology of four levels of participation helps to clarify researcher and learner roles within thought collectives, including extractive, paternalistic, partnership, and emancipatory levels of participation. In addition, I offer two additional categories to elaborate this typology.

A. **PSU: A paternal-partnership level of participation**

The traditional diffusion model of agricultural education, also called the transfer-of-technology model, has historically been employed by public land grant university agricultural sciences (for overview, see Buttel et al. 1990, pp. 46-63). It is important to note the structure of this model in which research faculty develop new technology independently in labs and research fields, then extension personnel transfer that new knowledge to farmers who adopt these innovations and apply them on their farms (Lacy 1996). My field research at three PSU field days suggests that this model may no longer prevail, as I observed evidence that farmers and researchers interact at various stages in knowledge creation. Farmers participate in the research process in several ways, resulting in a paternal-partnership level of participation according to the Deshler and Grudens-Schuck typology.

PSU farmers can participate by influencing the selection of topics chosen by expert researchers. When I asked Matthew, a Small Fruit and Vegetable field day organizer, “To what extent would you say that the trials you do are direct responses or indirect responses to what your clients are saying they need or are interested in?”; he replies:

> It’s almost a 100 percent. I have an advisory group . . . It’s a big question we’re always asking our growers—what they believe they want. Our trials there at the farm are directly representative of that (organizer, E2).
In addition to formally gathering feedback from farmers through advisory groups, PSU researchers (in this case a graduate student Megan) also interact less formally with farmers to choose research projects:

My project is on apple scab, and it’s something that the growers had asked that we do. [Question: do you mean they call you? Or do you do surveys?] Phone calls mostly. Lots of times they’ll bring in samples, and we’ll just know basic things about them without doing the [sample] collection ourselves. So what I’m doing this summer is, I actually go out and do the collections, because we have kind of a collection scheme. And then, I meet the grower and collect from their farm, and then we also have a survey that they fill out . . . I just go collect samples and then bring them [to the research station], to analyze and things like that (grad student interview, E1).

In this case, farmer requests directed to the Fruit Research and Education Center led to a more formal research project. In this way, elements of level three partnership are evident, as the farmer and researcher determine together the focus of the study. However, the fact that the data gathering and analysis occurs without the farmer’s direct involvement makes level three (partnership) of Deshler and Grudens-Schuck’s typology less applicable.

Other circumstances may lead PSU researchers to have trials on their constituents’ farms, for the particular goal of obtaining feedback, as researcher Matthew notes:

Yes, and so there are things that I do on grower farms, and like this year, the musk melons, the primary site for that was there at the research farm where we did all the replicated trials for weighing and counting and all that, but I had a single replication of each of those varieties on two grower farms . . . I want to get the growers’ feedback on them. I want to get their opinion about the varieties. I don’t care how many fruit they harvest there. I can’t care what size they are. I want those subjective things that you know, from the grower’s point of view, I can’t care when they harvested them or how they harvested them, but I want their feedback. And that’s the kind of thing I try to do on grower farms. So we try to do as much as possible on grower farms where we think we can get the data out of it that we want, or where there is an obvious connection, when the grower has an interest they have expressed. There are reasons to do things on grower’s farms and reasons not to (organizer, E2).

Later, Matthew describes why he is at times resistant to grower trials, compared to the research station:
Don’t get me wrong, I love my clientele, they’re a blast to work with. Unfortunately, it is challenging when you have a lot of harvesting to do, and most vegetable trials are like that to do vegetable trials on a client’s farm. They just tend to be very very challenging. There on the farm we have a staff that is devoted to doing that kind of thing, and so when its time to harvest, they get harvested. The data gets collected—it’s specific data that we want, whether it’s preening or weighing or counting or whatever, we can do all that there because we can set the protocols and we have control over it. As soon as you move to a client farm, now you’re working with their schedule . . . I did a zucchini trial five or six years ago, and it was a total flop. I did it only on grower farms. Both grower farms had large harvest crews. I had worked with both of them the week before on what we were going to do and when I was going to be there on Monday morning for the first harvest. I arrived there exactly when I said I was going to get there, and they started a half-hour before me, and the five varieties of yellow zucchini that needed to be harvested separately so we could grade them, all went into one bin; and all the green zucchini went in one bin. So, with a half-an-hour of them harvesting, the trial was already finished for the year (organizer, E2).

This account speaks to challenges researchers can encounter when trying to co-produce knowledge on growers’ farms. In Matthew’s case, his priorities as a researcher conflicted with the harvest crew’s priorities of timely harvesting, an occurrence cited elsewhere (Henke 2000). In this example, PSU data gathering is assisted by farmers but analyzed elsewhere, so it is more indicative of level two, or paternalistic, participation.

These examples speak directly to research priorities and practices occurring in the PSU thought collective but not in the specific context of field days, where growers and researchers have direct communication. PSU growers appreciate the educational model at field days, including the opportunity to ask questions of presenters:

Yeah, I think it’s a good way to transfer information. I think it’s also, it’s also important in those sessions for time, for question and answer. ‘Cause I think it’s important that they hear from the grower, you know, their perspective on it (farmer interview, E1).

Megan agrees:

I think that the growers have a lot of really good questions to ask, so we can tell that they’re engaged, and I think that they appreciate the things that we do cover. And we’re open to suggestions if they have them (grad student interview, E1).
By creating an environment where farmer attendees and researcher experts can interact with mutual benefit, the PSU field day facilitates knowledge co-production more in tune with the level three, or partnership, degree of participation.

The types of farmer-expert interactions described in this analysis of the PSU thought collective were not apparent at all times during the field days. The Cattle Feeder workshop had much less time built in for questions and when questions were solicited, farmers had few to offer (field notes, W3). Nonetheless, my field observations suggest that the PSU thought collective falls between levels two and three in the Deshler and Grudens-Schuck typology of participation, at a level I would term “interdependent participation.” Interdependent participation denotes that both farmers and researchers mutually benefit from this type of participation. Whereas partnership participation indicates a voluntary, full collaboration, and paternalistic participation suggests top-down approaches, interdependent participation speaks to the PSU thought collective’s desire to produce research that is pertinent to constituent farmers but primarily in the controlled environment of the research station. Farmers have opportunities to co-produce knowledge at field days and help determine research priorities; however, data gathering, analysis and interpretation responsibilities are the purview of researchers, not farmers themselves. As a result, we can further conclude that these PSU field days partially challenge the historical conception of the diffusion model, as research does not occur separate from farmer constituents.

B. WAgN: A partnership-emancipatory level of participation

The WAgN field days corresponded more to a partnership-emancipatory level of participation in the Deshler and Grudens-Schuck typology. Emancipatory participation refers to the ability of learners to select their own research agenda and make their own decisions about how to conduct knowledge production and dissemination activities. The WAgN thought
collective, like PSU, selects its content based on surveys and interactions with constituents. Unlike PSU, however, WAgN’s membership structure assigns this responsibility to a WAgN farmer herself, exhibiting a higher level of participation:

I had done kind of a survey with the members within this area, and asked women, what are you looking for? You know, what kind of things do you want to learn and do you wish you had more knowledge about? And you know, there was a big response about learning how to maintain or repair their machinery (regional rep, farmer interview, W3).

This example demonstrates that by giving power to women farmers as regional representatives, the needs of WAgN’s constituent base are directly incorporated into programming decisions. WAgN also demonstrates an emancipatory level of participation by offering field days that are adaptable to farmer needs as they arise:

That’s the way WAgN events are; it’s totally on the fly. Because it is farmer run, if the farmer says she wants to do something totally off the schedule, I, most of the time, will agree, because it’s her farm. She’s putting in untold volunteer hours to do it (organizer interview, W2).

In this case, the farmer presenter, a WAgN member, determined what knowledge was applicable to the field day and had the autonomy to present this information. Based on Deshler and Grudens-Schuck’s typology (2000), this is an example of the emancipatory level of participation, since the farmer, not the researcher, determines what knowledge is included in the field day.

However, WAgN does not fully attain the emancipatory level of participation, instead demonstrating elements of partnership as well. Though women farmers exhibit high degrees of participation within the network, the structure still affords leadership responsibilities to non-farmers through the steering committee. In this way, the steering committee, including research and extension faculty, collaborate with member farmers to determine programmatic objectives. In addition, the WAgN field days also featured presenters and specialists from outside the network. For example, the Tractor Maintenance field day was led by Jerry, a specialist from
Penn State University who partnered with WAgN to train participants in engine maintenance. A more emancipatory incarnation of this field day might have instead featured a WAgN farmer in this leadership role, relating her experiences on the topic as a women farmer, as a steering committee notes in comments about possible future WAgN offerings:

[Attendees] like hearing from other women who’ve succeeded. So as good as Jerry was, they also like, maybe they’d like to hear it from [the farmer host] next year, you know? That has worked well (steering committee member interview, W3).

Finally, WAgN emphasizes a “hands-on” approach in which participants not only listen and watch, but also “do” (organizer interview, W1), fitting with the partnership level of participation in which learners collaboratively apply new knowledge with trained experts. I term this partnership-emancipatory degree of participation as “adaptive participation.” Adaptive participation suggests that farmers are empowered to determine research priorities, but they can benefit from collaborating with researchers who have the expertise and resources to aid knowledge production. Adaptive participation captures the value of both local and scientific knowledge within the WAgN thought collective.

C. PASA: partnership-emancipatory level of participation

Similar to WAgN, PASA’s field day model suggests elements of both the partnership and emancipatory levels of participation, what I refer to as adaptive participation. Whereas WAgN (and PSU for that matter) include specialized researcher experts within their esoteric circles, PASA does not generate their own formal research, acting independently of the university institution. Farmers within PASA, then, have considerable latitude to influence field day topics, since there is no formal in-house organizational research to inform selection of field day topics. Instead, the study PASA field day content was chosen by the organization based on successful experiences with the topic in the past (collaborator interview, P2), the excitement of a new,
innovative topic (organizer interview, P3), and interest from farmers who want to host, coupled with geographical constraints (P1). PASA’s organizer explains the impetus for the Diversified Livestock field day:

I believe that they… they offered. I think they may have filled out a survey, and one of the questions we have on our survey is would you be interested in hosting a field day. Pretty sure they contacted me. Um, and I’ll admit, depending on—I try really hard to spread out the events across the entire state since we are Pennsylvania Association for Sustainable Agriculture, so I really try to have some representation for as much of the state as possible— pretty much North, north-central and north-western it’s really, really hard to get hosts so um, yeah, this feels weird saying this but, yeah, we don’t have the—the options aren’t as wide open (interview, P1).

Similar to PSU, PASA field day topics are influenced by constituent farmers, but this information is not gathered by farmers themselves, as it is within WAgN. PASA’s agenda setting mechanism best fits the partnership level of participation.

Like WAgN events, PASA field days also feature adaptability to meet attendee learning needs, as their organizer explains:

This [field day] was a good example of how extemporaneity can work out so well. You know, people being willing to go with the questions instead of feeling whetted to their particular notion of what the day is going to be. And being responsive to the interest level and prior experience/understanding of the crowd. (organizer interview, P3).

As this quote suggests, PASA field days are intended to be responsive to attendee interests. In addition, two of the three PASA field days were led by host farmers who determined what knowledge about their farm they wanted to share with the field day attendees. These qualities at PASA field days point to an emancipatory level of participation, since farmers select and present field day content. Nonetheless, these field days also feature outside experts such as a grazing specialist from NRCS or an agronomist from the National Organic Farming Alliance-New York chapter to provide additional information to farmer attendees beyond the expertise of the host farmers, indicative of the partnership level of participation.
Also similar to WAgN field days, PASA emphasizes a hands-on approach, particularly their “intensive” field days which are longer and focused on a new or advanced skill set, such as biodiesel production. PASA’s co-collaborator on the day, Phil from the National Center for Appropriate Technology (NCAT) comments:

The goal of this workshop was hands on. And I think that’s important for what NCAT wants to do and what PASA wants to do, is to get field work and hands-on experience instead of just sitting there all day and having a lecture. So I think for folks to see the trailer, to see a seed crusher in action, and to actually make biodiesel, is just a valuable learning tool (collaborator interview, P2).

PASA’s approach to attendee participation is in many ways similar to WAgN’s by basing field day content on farmer feedback, ascribing strong roles in knowledge production and transfer to both host and attendee farmers, and emphasizing a flexible, hands-on approach to agricultural learning. As a result, the PASA field days suggest an adaptive level of participation, compared to PSU, which contains elements of both paternal and partnership degrees of participation.

This section has applied the idea of degrees of participation to agricultural field days. It has shown that knowledge co-production is a key aspect of field day programs, based on the interactions between attendees and presenters. However, I have shown that the degree of participation at three PSU field days was less than that at the studied WAgN and PASA field days. Differences in degree of participation hinged on who is considered an expert within each field day model, what Fleck refers to as the esoteric circle in knowledge production. In both the WAgN and PASA field day models, farmers are accorded some level of expertise, which affords them greater influence in the knowledge co-production process. At the PSU field days, farmers who were not positioned as experts did not participate in knowledge co-production by influencing the research agenda and validating or questioning scientists’ assertions. These
farmers have less influence than those at WAgN and PASA field days who attain or are granted expert status.

IV. Field day location: On-farm versus experiment station research locales

Agricultural science has been criticized for producing knowledge that is de-contextualized, reductionist, and ignorant of farmer’s experience (e.g. Gerber 1992). This knowledge is frequently produced at field stations in experiments that are not replicable in the practical lives and work of farmers. This renders agricultural research ill-equipped to meet farmers’ needs, particularly those who subscribe to highly contextualized management models such as sustainable agriculture (Gerber 1992). PSU research stations are sites for knowledge co-generation and in this study were host sites for two field days. Contrary to the literature, however, farmer attendees at these field days found the field station trials to be applicable to their agricultural knowledge needs:

One thing I do like about the field day here at the fruit research lab is that it is a real field day. It’s out in the field, we get a chance to look at the trees and uh, so I like that . . . as opposed to being in a classroom . . . You’re actually out in the field, [and] get the opportunity to look at some stuff and look at some new things, look at their trees. They’ve got all of these experimental plots here, so that’s very enjoyable. (farmer interview, E1).

This quote suggests that research stations in the field day context are hybridized as both farms and sites for experimentation that farmer attendees may not be able to able to, or desire to, reproduce on their own farms. Tony hints at this:

The water demonstration they had on drip irrigation was phenomenal. You know, it’s something you think is going on under that plastic all the time, but you never know. So to have something like that is valuable to see. Their use of the Company X Tunnel and the variety [tomato] trials—you can never see enough varieties (farmer interview, P2).

In this quote, Tony discusses two specific trials that were part of the field day. He says, “you never know” in reference to drip irrigation, suggesting that at his own farm, this is not the type of
trial conducive to their operation. A similar conclusion can be drawn from the tomato trials where 68 varieties were tested side-by-side (field notes, E2). How many farmers can do that? How many want to? The research station as a location for knowledge co-production has been challenged because it is frequently a controlled environment, and farmers’ fields are not so heavily controlled. However, PSU’s research stations, as both of the above quotes suggest, are comparable enough for field day attendees to assert that they received practical information relevant to their own local conditions. In addition, the interaction at field days allows farmers to add additional context to research station trials. By sharing their own experiences with varieties, field day knowledge is co-produced, as Tony’s quote clarifies:

Their stand of blackberries, that [variety XYZ] stand out there, if you could see ours at home, it’s 12 feet tall. We can’t reach the top; it’s exploding out of the trellis. The yield is amazing, so you know, what they have here is not at all our experience. If I saw that yield, I probably wouldn’t go home and plant it, but because we have it, and I see what we have, I would recommend it to anyone (farmer interview, E2).

The researcher and Tony discussed how their spray schedules differed based on local conditions, with Marvin, the researcher noting:

I don’t profess to know everything about [blackberries] (field notes, E2).

This example demonstrates that knowledge generated on research farms is not necessarily de-contextualized, particularly within the field day environment when farmers can offer their local knowledge to challenge or confirm research station results. Though experiment station field conditions may be difficult for farmers to replicate exactly, farmers in this study still saw benefits for themselves in research conducted at these sites.

Both PASA and WAgN field days, on the other hand, were held on working, commercial farms. This environment directly links field day content to the farmer’s local knowledge, since
the knowledge shared by the host farmer at the field day is contextualized by seeing her/his operation:

I think experience is the greatest teacher, so the fact that we could drive out with the farmer, talk to him directly, be involved with a group of people all interested in the same thing-- anytime anybody asked a question, you learned something (farmer interview, W2).

I think the idea of being on the wagon with [host farmer], and it is kind of a small intimate setting, it was very nice for everyone to have their questions answered, and to see what everyone was doing. (farmer interview, W2).

This WAgN field day included a wagon ride to observe the host farmer’s fields. As these quotes suggest, the experiential aspect of the field day aided learning. Since the host farmer was talking directly to attendees about his experience while viewing his farm, attendees could put his comments into greater context. Similar observations occurred at PASA field days. As Melanie describes, an attractive aspect of farmer-hosted field days is observing farm conditions that may be similar to your own, which aids practical application:

The [field day’s] farm location is a similar location to where our farm is, so, the geographic area, the temperature, the weather, the conditions were all similar. And the farm size was comparable. I think there are about 40 acres and we’re 54. So we thought that was a good match. (farmer interview, P1).

For Melanie, the specific location of the field day helped her to think more about her own operation. Such an opportunity to learn in a very specific and relevant local context was less likely at a university research station.

One difference between PSU field days and those of the other two organizations is location—the former can occur at university managed research stations, while PASA and WAgN’s are almost exclusively offered on host farms. Contrary to research arguing that university research stations do not produce practical knowledge for farmers, the PSU research stations were well received at field days, with farmer attendees noting that they find research trial
findings applicable to their own farm experiences. The PASA and WAgN field day attendees described how they benefit by seeing first hand how other farmers farm. Though the local conditions of host farms may differ from their own in some ways, they still find it useful to see how other farmers manage their operations.

V. Different knowledges: Specialized vs. whole-systems agricultural knowledge

In this section, I discuss the knowledge content at agricultural field days as practiced by each of the thought collectives. As the titles of the study field days indicate (see table 1, chapter three), they covered diverse agricultural topics including fruit and vegetable production, animal husbandry, and newer technologies such as biodiesel and fruit automation. In addition to this topical variation, each organization’s field days tend to emphasize different levels of specialized, scientific knowledge. As noted in chapter two, university agricultural science is often associated with production-oriented knowledge while sustainable agriculture more often takes a whole systems approach. While this study presents some evidence to support these claims, I suggest that a more meaningful interpretation of the differences in knowledge content between the three thought collectives centers on the specificity versus generality of the co-produced knowledge within each network.

The PSU field days were much more oriented to specialized, production-oriented agricultural knowledge content than the other two organizations’ field days. PSU attendees typically operated larger farms, and they have more prior experience with the topics being presented at field days, which almost exclusively center on agricultural production. The PSU thought collective aims to present “new” science, what several farmer attendees identified as “cutting edge” research (farmer interviews, E1). For example, the Fruit Research field day demonstrated labor saving technologies that are more applicable to farms with larger amounts of
hired labor (field notes, E1). Labor is one facet of tree fruit production, yet labor saving technologies were a primary emphasis of the field day. In this thought collective, field day attendees are generally viewed as having established fruit orchards, and the content at the event stressed new production techniques for the experienced orchard grower.

The knowledge orientation at the PSU field days was not only specialized but also highly scientific relative to both the PASA and the WAgN field days. A presenter at the Fruit Research field day, describes the background of his research as a movement away from “organophosphates—azinphos methyl, the Guthions, broad spectrum insecticides, that we’ve been using basically since World War II” (field notes, E1), and a plant pathologist at the Small Fruit and Vegetable field day discusses “necrotic angular lesions from downy mildew on cucurbits” (field notes, E2). Since PSU field days often feature university scientists in the role of expert, it is not surprising that content at these field days is more scientific than the PASA and WAgN field days which more readily feature farmers as presenters of new information. In addition, the PSU field day with fewer scientific references and a greater emphasis on applied research, the Cattlefeeder workshop, featured industry representatives and cooperative extension educators who are trained in outreach as presenters.

As Hansen et al. (1995) suggest, sustainable agriculture education is not conducive to the add-on component orientation of the university agricultural sciences. Instead, sustainable agriculture tends to emphasize the entirety of the farm operation as a whole-system, and not just production. At all three PASA field days, topics were approached from start to finish. For example, Tom, the host farmer at the Diversified Livestock field day, began by explaining why he chose a diversified approach to livestock, and then attendees observed his process for
producing livestock in this way. At points throughout the day, the discussion included marketing of his output as well. One farmer attendee, Luke, comments on the orientation of the field day:

This field day is more generalized than some others I’ve been to. This is a gentleman’s entire operation, business, and life style (interview, P1).

As this comment suggests, the field day emphasized more than agricultural production, with content centered on the health of the farm business as a whole, but it may be a stretch to call it “whole systems” as the interrelationship of the producer’s varied practices, how his management scheme is linked together as a whole system, was not a significant feature of the field day. Luke refers to the field day content as “generalized” which may best describe PASA’s field day content. The Biodiesel field day presents another example of PASA’s field day content as focused on questions “beyond” the component emphasis of PSU field days, but not specifically whole systems. Attendees first heard a presentation on the background and science of biodiesel production. Then, the presenter demonstrated the process of producing a small amount of biodiesel, followed by the attendees working in groups to produce their own biodiesel. The presenters concluded the day by discussing how to both gather biodiesel feedstock (i.e. used cooking oil from restaurants) and process raw oilseed for biodiesel production (field notes, P2). This field day focused on production of biodiesel from start to finish, as opposed to emphasizing an add-on component to a pre-existing production process. As opposed to being whole-systems in orientation, the field day offered a broad overview of the biodiesel production process.

This general approach to agricultural learning is particularly effective for farmer attendees who are new to the field day topic, and my field observation determined that many attendees at PASA field days were interested in diversifying their farms with new systems and products. Tammy, a part-time farmer, conveys this at the Small Grains field day:
I would like to find a way for our farm to make a little bit more money, but we’re also interested in producing a local product. We do have two cows, and I tried to get into milking and doing some cheesemaking and things like that, but it’s just not feasible with my schedule. Because I work two long shifts a week in a shorter week, and during those two long shifts, I’m not at the farm at all. So, whatever I’m doing has to stop. But the grains seem like something that would be very interesting, and could stop when I’m not at home (farmer interview, P3).

For Tammy, the PASA field day offered an idea for a new crop that works for her situation as a part-time farmer. She is interested not only in the production of an agricultural product but also in how that production relates to her constraints as a part-time farmer and social goal of producing a local product. The field day content provided a general overview of the equipment, labor, and other farm inputs necessary to incorporate grain production into her farming system.

Similar to PASA, WAgN field days featured more introductory content than the PSU field days. For example, the Sheep and Fiber field day introduced attendees to the topic from the entry point of raising sheep, then discussed options for processing sheep fiber, and concluded with a hands-on demonstration of yarn spinning techniques. Although this field day was less attentive to the marketing of sheep and fiber products than originally advertised (interviews, W1), the emphasis was still on presenting a range of information for attendees to “take home,” as Jill, a WAgN steering committee member, notes:

I think people liked that they had something to take home—they took home a skill. Someone took home [bought] a spinning wheel. They took home some information . . . learning how to do it, the different types of fibers, and somewhere to start that way (interview, W1).

Jill’s quote suggests that the field day was strengthened by presenting a range of topics to enhance the opportunity for attendees to find at least one topic to help them begin their own process of sheep and fiber production. Additional farmer attendee interviews confirmed that the range of topics presented at the field day offered beginners a multitude of entry points to engage sheep husbandry or fiber production, as one producer explains:
I would say [the field day] is definitely geared toward beginners who are thinking about either getting into sheep, sheep keeping, sheep breeding, and even people getting into the fiber arts (interview, W1).

Just as Tammy from the PASA Small Grains field day (see above) found the overview knowledge orientation to fit her needs as a part-time farmer, Jill’s description suggests that the WAgN field day can also fit the specific needs of attendees, such as “beginners.”

WAgN’s tractor maintenance field day, on the other hand, did not feature an introduction to a new farming system, instead emphasizing one specific aspect of operating a farm. The purpose of this field day was not designed to introduce attendees to a range of farm management principles, but rather to hone in on the specifics of equipment maintenance. The field day occurred in two parts, first reviewing small engines, followed by a second more hands-on session on tractor maintenance. WAgN designed the field day, in response to member surveys, to focus on the particular topic of engines, and as a result, attendees came to improve their skills in this one specific aspect of farm operations, as several described during introductions:

We have a John Deere . . . This winter I definitely want to start working on it.

We have some machinery that we are just trying to keep going.

We have a Kubota 3400 tractor that we pay other people to service. We’d like to know more about how to do our some of our implements with our three-point hitch. We’ve tried to do it on our own and it is difficult (field notes, W3).

Although this field day emphasized one specific aspect of farm operation, the field day content was still at the introductory, broad overview level. It provided an introduction to engine maintenance geared toward farmers with little experience in equipment upkeep. However, even those attendees with more experience, appreciated the field day as a review:

I’ve been to a couple different tractor workshops and . . . my feeling is that it’s always important to keep seeing the same things over and over again (interview, W3).
Well, I thought it would be good as a refresher for tractor maintenance . . . Yeah, you know it did. I learned a little bit more. The beginning was good with the weed-whackers and stuff like that, ‘cause I use them all the time. So that was good (interview, W3).

As described in chapter two, WAgN emerged because women farmers’ learning needs were not being sufficiently met by traditional agricultural organizations. Specifically, women farmers could not receive basic training on topics like equipment maintenance from farming organizations which assumed that all farmers already had this knowledge (Trauger et al. 2008).

This section has explored differences in the content of three agricultural field day models. PSU field day content was characterized by more specialized scientific knowledge emphasizing research on on-farm production, including labor saving strategies, pest management, and cattle vaccination. This content meshes with the attendees who attend PSU field days, as these mostly male farmers have years of experience, are oriented to commercial production for wholesale markets, and are looking for innovative ways to improve their production efficiency. PASA and WAgN’s field day content emphasizes generalist knowledge of whole new farming systems, which is more conducive to an environmental management imperative (Vanclay and Lawrence 1995, p. 96). The farmers who attend their field days have typically committed to sustainable agriculture and view production as one facet of a complex system that cannot be isolated from the overall management of the operation. WAgN’s field days contain both specialized and whole systems approaches, depending on the field day topic. The farmers who attend these field days, mostly women, are relatively new to farming and appreciate the broad overviews of the whole systems field days, as well as the specificity of the specialized Tractor Maintenance field day, as it centered on a topic and skill-level rarely offered by other field day organizations. They often direct market their agricultural output and subscribe to sustainable agriculture principles, but the primary draw to many field days is the opportunity to interact with other women farmers.
VI. Field days as networking opportunities

Thus far, this chapter has primarily discussed differences among the PSU, PASA, and WAgN thought collectives in relation to their field days and knowledge production and dissemination processes more broadly—who attends them, what is the content, how they co-produce knowledge, and where they occur. In this section, I address the rationale for conducting field days, which in contrast highlights more similarities than differences across the three organizations’ efforts. For the most part, each field day organization has three similar objectives: a) share knowledge with constituent farmers that both experts and attendees deem important, b) foster face-to-face interaction between organizational leadership and attendees, often for the former to gain feedback from the latter, and c) create networking opportunities for farmers to strengthen their social ties to other farmers within the agricultural community. I discussed the first two of these objectives earlier in this chapter, and I will now focus on the third goal—farmer-to-farmer networking.

Hassanein describes the benefits of farmer networking at sustainable agriculture (Hassanein and Kloppenburg 1995) and women’s field days (Hassanein 1999, p. 93), what she calls the exchange of “horizontal” knowledge between farmers. My field day observations suggest that horizontal knowledge exchanges are highly valued in each of the three field day models in this study. The following comments describe PSU perspectives on the social and informational benefits of PSU field days as networking opportunities:

Yeah, that’s another part of the reason that I come. I know a lot of growers and even the research people here at [the Fruit Research Center], I enjoy seeing them (farmer interview, E1).

I think in the business of fruits and vegetables, and any business, there has to be a network between people, or information will never move and ideas will never move. And in something such as agriculture, where there is really no set way to do anything, it’s a great way to see other people’s operations and pick up ideas. (farmer interview, E2).
I sometimes think these are part social for them too because I look at it this way. Cattlepeople don’t have a, they are not structured like the swine and pork industries which are integrated, and they’ve got you know, it’s pretty systematic. Cattlepeople don’t always have that. Cooperative extension is valuable to them when we set up these meetings because it’s a place for them to network and socialize and learn (organizer, E3).

First, seeing old friends and colleagues is enjoyable. Since farming can be a physically and mentally demanding vocation, field days represent a pleasurable break from the day-to-day tasks of farm work. Second, networking assists the progression of agriculture in ways lectures and books cannot (see also Gamon et al. 1994). The field day is an opportunity to learn directly from other farmers and “pick up ideas” that can support the economic viability of the farm. Third, in some situations, farming can be extremely isolating work, as the organizer suggests is the case with cattle farmers. Field days provide a break from this isolation both as learning and social opportunities. Matthew captures just how important networking is within the PSU thought collective:

The social part is as important if not more important than the actual educational part of it (organizer interview, E2).

As important as knowledge dissemination is at field days, it is often secondary to the networking opportunities the events provide. Similar observations are also apparent in the WAgN and PASA field day models.

As WAgN’s name suggests, networking is a key aspect of the organization. Because women farm operators have historically felt under-valued and isolated, WAgN offers a forum to bond with other women farmers. Ingrid, a regional representative, explains when asked what attracted her to her leadership role in WAgN:

I’ve been thinking more about leadership roles, and trying to develop more opportunities for myself to be in that position. That, coupled with you know, my, of course, my interest in creating networks. Making women feel like they’re not alone-- more of a
simple reason of just wanting to help other young women farmers, with what they want to be and where they want to go (farmer interview, W3).

Similar to cattle feeders in PSU field days, women farmers can benefit from networks to feel less alone. Ingrid’s comment takes on another dimension, however, by implying that mentoring can positively influence the lives of women farmers. WAgn’s organizer describes another benefit of networking:

I thought there was a lot of sharing going on between the participants about their particular farms and what they were selling, and I thought that there were some possible working relationships that might come out of that, some women finding out about interns at other operations . . . The possibility for other, further working relationships to come out [of networking] I think is always important. (organizer interview, W3).

Not only is networking socially enriching, it can be economically beneficial too. By fostering collaborative connections between farmers, WAgn can help women farmers grow their businesses. Finally, networking at WAgn field days, as at PSU ones, is often more important than the specific knowledge content of the presentations:

I think the social networking is wonderful . . . I came out of the field day last week more inspired than I’ve been in a long time personally, to work on the ideas already going through my head, and even some new ones there. So coming away from the WAgn events, I always feel kinda refreshed and reinvigorated and re-inspired to continue working hard when sometimes it can seem pretty futile, at times. So that’s my biggest value, and then the learning opportunities are icing on the cake (farmer interview, W2).

WAgn, like PSU, values social networking for several reasons including reducing isolation, fostering business connections, and creating enjoyment and inspiration through farmer-to-farmer interactions. Similar networking benefits were also observed at PASA field days and described in participant interviews.

As the comment below suggests, PASA farmers also utilize social networking to stave off feelings of isolation:
So, I mean, it’s getting to know people even in a local area. Finding out what’s really there. You know, you’re not your own little island. There’s a lot of good people out there doing things (farmer interview, P1).

In this example, social networking is directly related to local geography, suggestive, though less formally, of WAgN’s regional representative model. Since farm conditions such as climate and topography and distance to market are similar in local areas, networking locally can both minimize isolation and foster new opportunities to learn. PASA field day attendees also look for business opportunities through networking:

I also came hoping to network, hoping to meet people, and I did meet people from the area. I was wondering if there maybe were people producing [biodiesel] that I didn’t know of, because I wouldn’t mind just buying—and also the idea that maybe there were a group of people who would want to do a cooperative or something, but I didn’t find that. (farmer interview, P2).

Even though this farmer did not find partners to cooperate with at this field day, she did make some connections to influence her farm decision making, with her interactions serving as informal “supply research” on the local availability of biodiesel. The notion that networking is a source of enjoyment at field days was also evident at the biodiesel field day. Here, I present a section of my field notes about the hands-on production of biodiesel at the field day.

Small groups were assembled to attempt to produce our own biodiesel after learning the process from the main presenter. I participated along with two farmer attendees. As the three of us talked and worked out how to proceed, we became increasingly comfortable working in a group applying new concepts. And with this comfort came laughter at our missteps and encouragement to finish the process . . . As our biodiesel sat and settled and we returned to the meeting room, Vern said to Pat and me, “Well, that was fun. Let’s hope it works!” (field notes, P2).

This excerpt reflects the opportunity for enjoyment through interaction with other field day attendees. What may have been intimidating to do alone (at least for the researcher) became instead a time of camaraderie and enjoyment with others.
Networking is crucial to the success of agricultural field days, with participants at times deeming it more important than the specific topic for the field day. Knowledge creation and social networking are mutually reinforcing. When field day attendees interact with other farmers, they enjoy positive experiences both socially and professionally. They also co-produce knowledge through this networking interaction. Networking, in this sense, facilitates and reinforces knowledge production at agricultural field days. Attendees make social connections by discussing and describing their experiences as farmers in general or as learners and co-generators of the specific content of agricultural field days. This study suggests that networking may be the most important rationale for utilizing the agricultural field day model.

VII. Borderlines in the field: Opportunities for cross-fertilization among thought collectives

The final section of this chapter explores potential opportunities for collaboration among the three thought collectives in the study to foster the production and dissemination of agricultural science through new relationships. In spite of many differences in the structure, content, methodology, and location of field days held by the three thought collectives, field days emerge as an opportunity for cross-fertilization, what Fleck (1979, p. 110) terms the “borderline of the field.” Given the emphasis each thought collective places on networking, inter-collective communication presents a promising opportunity to create new relationships and learning environments for both field day organizers and farmer participants.

Fleck (1979, p. 110) states that the “borderline of the field” results when individuals must negotiate closely related thought styles, such as different approaches to agricultural knowledge production or agriculture more generally. New thought styles can emerge from such an overlap, creating a borderline in the field between two or more extant thought collectives. When thought collectives are introduced to new externally-derived ideas, they may cast aside these innovations.
as alien, but these new ideas can also have the positive effect of opening new doors for knowledge creation. This section explores several possible directions of overlap to create an emergent borderline of the field.

The three field day organizations in this study do not function in isolation of each other. First PSU and WAgN share an important overlap as both exist within the Penn State University College of Agricultural Sciences institutional structure. In this way, WAgN could be considered a part of the PSU thought collective, though this chapter has shown why such a coupling would mask important differences between these two thought collectives. Nonetheless, by sharing an institutional affiliation these thought collectives could potentially collaborate more closely than they currently do. Some collaboration already exists, as WAgN’s steering committee includes an extension educator (steering committee member interview, W3) who creates and markets educational opportunities aimed at both of her constituent bases. Nonetheless, a tension can be discerned between PSU and WAgN:

There’s a tension, a strong tension, going on, because the field days are being run by someone within WAgN. And even though she has an extension title, except for reporting at the end of the year to extension, she’s not really part of extension. And we use the word extension [as part of WAgN], I think, but a lot of [the field days] are really just WAgN. Well, we tell the extension educators that we’re doing it, but it’s been very hard to actually plan field days with the educators. And the source of that, people have said, is on both sides (steering committee interview, W3).

According to the WAgN field day organizer, one positive possibility for better integration of WAgN and PSU is a new supportive College of Agricultural Sciences Dean. His support of WAgN since its inception, prior to his appointment as Dean, is seen as encouraging for future links between these two thought collectives.

Historically, two main divisions make overlap difficult between PSU and WAgN, and to a lesser extent PASA. First, perspectives on the value of farmer participation in education events...
are believed to differ, with PSU subscribing more to a “top-down” transfer-of-technology approach (Trauger et al. 2008). However, as this research project and others have shown (e.g. Conner and Kolodinsky 1997), there is evidence that this culture is changing and PSU researchers and educators are more accepting of farmer participation approaches. A PSU extension professional who is also involved with WAgN reiterates:

A really important concept is that extension [PSU] is not monolithic. And that even up, even last year, for instance, there were actually marvelous field days, out in the field, in the classroom, where the instructors involved the people in the class in hands-on ways. But that’s not necessarily true of all extension programs, where there’s reliance on things like PowerPoint. OK, so I would say both exist. It kind of depends upon who the instructor or professor is and their philosophy of involvement or not. But I’ve seen both conducted over the years, very well (researcher, W3).

This quote suggests that while all PSU educators may not be open to farmer participatory research models, same may well be untapped sources for collaboration between WAgN and PSU in the creation of a borderline of the field.

A second perceived barrier to facilitating a borderline of the agricultural field are approaches to sustainability. I’ve concluded that each thought collective approaches sustainable agriculture differently: PSU sees sustainable agriculture as one approach, WAgN as the best approach, and PASA as the only approach. Previous research has suggested that university agricultural sciences and extension educators more specifically are resistant to sustainable agriculture education (e.g. Egri 1999; Lacy 1993; Paulson 1995). Also many sustainable agriculture farmers do not trust extension educators or have had negative experiences with university agricultural sciences education (e.g. Agunda and Igodan 2007; Hassanein and Kloppenburg 1995). This research suggests that PSU is not strictly unreceptive to sustainable agriculture, a point also supported by case studies about other land grant universities (e.g. Delate and DeWitt 2004; Francis et al. 1995; NRC 2010). In addition, Penn State has recently hired a
main campus extension specialist in sustainable agriculture as well as supported a sustainable agriculture county-level position (steering committee, extension educator, W3). The second barrier, that sustainable agriculturalists do not trust extension educators is also challenged by this research in some cases:

The big help was the Cooperative Extension at East County, a lot of help from the individuals there. It was such a large diverse group of people that work there. We were able to work one on one with an individual who did just beef or just poultry or one did just equine types of stuff (farmer interview, P1).

I try to attend both [WAgN and PSU field days]. So I just try and keep it balanced, between understanding what is being done out there in the research world as well as what farmers are doing. And I think that makes a good farmer, keeping up on that stuff (farmer interview, W3).

This last quote suggests that a combination of both types of field days can serve “good farmers.” In this example, the farmer is benefitting from merging thought styles, suggesting the possibility for a borderline in the field.

In addition, several farmers and presenters from both PASA and PSU believe that unnecessary walls exist between sustainable and conventional agriculture, suggesting another possibility of a borderline in the field. Crossover between the two thought collectives appeared in several of the field days to suggest such a borderline is already being forged. First of all, a PASA staff person attended one of the PSU field days as an exhibitor to promote a new program:

I was at that particular event . . . to introduce a [new] sustainable certification program . . . Our strategic target market for this programming is mid-size farms . . . And because this field day was targeted to small to mid-size vegetable growers, it seemed like a good, sort of soft introduction to people who may have some interest in sustainable certification (exhibitor interview, E2).

This program, by appealing to mid-size farms, suggests a possible client base within the PSU thought collective.
The mirror situation has also occurred in the past, as extension educators have previously worked with PASA at field days, though this was not the case in the three I attended. Here an extension educator discusses similarities and differences in extension and PASA farmer stakeholders:

I teach at a number of PASA field days . . . there really isn’t that much difference between them [and PSU’s audience], except you know that the crowd there are not conventional growers; they are organic or organically-oriented—typically, smaller farmers. You know, there really isn’t that much difference between them. Probably 20 years ago there was a huge difference between the crowds that would have come to the two field days, but we are long past the “two people throwing rocks at each other over the fence” (educator interview, E2).

A farmer attendee, Tony, at the same extension field day presents a similar feeling:

People look at conventional and organic as black and white. I heard it even here today, that the conventional OR the organic grower—there’s such a hard line that’s been put up. We’ve built a wall in between conventional and organic farming, and I really don’t think that wall should be there. It seems that a conventional grower can’t use a technique from an organic situation, and an organic grower can’t revert back to a conventional technique. There’s no set way; I think we need to loosen up that black and white and get into the grey area (farmer interview, E2).

Tony’s desire for a “gray” area between conventional and organic agriculture suggests the possibility of Fleck’s “borderline.” As noted above, the PASA and PSU thought styles view sustainability differently, yet Tony is calling for a third way that more cohesively brings the two together. This new thought style challenges previous dualistic conceptions of the agricultural learning taking place at field days (e.g. Carolan 2008). It suggests that there are opportunities for inter-collective dialogues and knowledge co-production between the PASA and PSU thought collectives.

**VIII. Conclusion**

This chapter has discussed and analyzed results from a study of three different agricultural field day models in Pennsylvania. Through participant observation and interviews,
this study develops an account of the different ways knowledge is produced and disseminated in Pennsylvania agriculture through PSU, PASA, and WAgN. Descriptions of field day participants show that attendees at the field days had different profiles. PSU field day farmers tended to be more experienced and from larger farms. PASA field day farmers tended to have diverse product mixes, while WAgN field days tended to be attended almost exclusively by women farmers with interest in direct marketing. WAgN emerged to meet the particular needs of women farmers in a way other educational contexts have not. This study suggests the value of a woman-focused educational context, since women farmers did not typically attend PSU field days, and gender dynamics at the observed PSU field days sometimes delimited the unique experiences of women farm operators. Sustainability emerged as an important source of farmer identity at both the PASA and WAgN field days, though the latter’s orientation toward women farmers irrespective of production system presents a different prioritization of target farmers. The PSU field days, on the other hand, included farming practices and ideas falling under the “sustainable agriculture” umbrella, but these topics were presented alongside conventional techniques as a possible way to farm, not necessarily the best or only way for farmers to manage their operations.

Applying Ludwik Fleck’s concept of esoteric and exoteric circles, this project shows how expert and general practitioner roles are distributed differently in each thought collective. These structures affect how knowledge is co-produced at each field day type, which affects the degree of participation farmers experience at field days. In short, PSU’s thought collective gives expert status to researchers and includes a lower level of farmer participation than PASA and WAgN. PSU field days are opportunities for farmers to interact with these experts and offer their personal experiences, but field day knowledge centers on the expert research of university
scientists, though these research agendas are informed by farmer stakeholders, constituting interdependent participation that is beneficial to farmers and researchers alike. In contrast, both WAgN and PASA suggest an adaptive level of participation that more readily incorporates the experiences of constituent farmers as field day expertise. WAgN, as part of the university system, has a more formal structure than PASA and features frequent input in knowledge creation processes from women farmers in their network. PASA also features an adaptive degree of participation, but unlike WAgN and PSU, research and planning are not affiliated with a university structure.

PSU conducts agricultural research at experiment stations, and as a result, two of the three field days I attended were at these sites. PASA and WAgN field days, on the other hand, generally occur at working farms where organization members host attendees and present their on-farm experience. The attendees at each type of field day asserted the benefits afforded by the site selection of the field day they attended—PSU attendees enjoy the large number of trials they can observe at research stations, while PSU and WAgN farmer attendees appreciate the opportunity to observe how other farmers organize and carry-out their daily farm activities.

Content at field days also varies considerably with PSU emphasizing field day topics that are specialized, scientific, and production-oriented. These field days were geared toward experienced farmers who did not require an introduction to the field day topics, emphasizing new techniques to aid farm production and management. In contrast, PASA field day content approached farming systems in a “start-to-finish” fashion. As opposed to demonstrating a new production technique, field days hosts described their operations more holistically, including production, marketing, and lifestyle components of their farm businesses. As a result, PASA field day content often had an introductory tone, demonstrating emerging farming techniques and
processes new to many Pennsylvania farmers such as biodiesel production and small grain production for human consumption. WAgN field days, similar to PASA’s, emphasized farm processes beyond production. These field days were introductory and geared toward the needs of women farmers who may have less farming experience compared to male farmers. This was evident in the tractor maintenance field day where attendees learned basic engine upkeep skills that could be considered tacit knowledge among more experienced farmers.

Regardless of which thought collective sponsored them, the field days were featured as networking venues for their participants. This occurs in similar ways across the three sample field day organizations. Attendees gain new business connections and knowledge by attending field days, and they experience interactions that reduce the isolation that is common in agricultural operations. In some cases, field day organizers suggested that the networking component of the field day was perhaps more valuable than the specific content of the program.

Finally, the last section of the chapter, returning to the work of Fleck, explores how field days could be sites for cross-fertilization among the three agricultural knowledge thought collectives. By seeking out common points of intersection, PSU, PASA, and WAgN can support new knowledge co-generation not only at their field days but also at the organizational level, potentially reducing barriers that have made interorganizational collaboration a challenge in the past. In the final chapter, I will further discuss my findings, linking them to the extant literature on knowledge co-production within the agricultural sciences. Then, I will discuss the implications of the research. Finally, I will conclude by acknowledging potential gaps in the project and highlighting areas for future research.
CHAPTER 5

Discussion and Conclusion

Observation and interviews conducted at nine agricultural field days in Pennsylvania revealed both similarities and differences between the three thought collectives associated with the sponsoring organizations. In this final chapter, I further discuss these findings and suggest how they do and do not support previous literature on agricultural networks, knowledge co-production generally, and agricultural knowledge creation and dissemination specifically. I also elaborate some of the practical implications of the study and opportunities for further research, and I discuss some limitations of this research project.

I. Discussion of key findings

Based on the theoretical contribution of Ludwik Fleck, I have argued that it is informative to understand the PSU, PASA, and WAgN agricultural networks as distinct thought collectives. Fleck contends that thought collectives are marked by thought styles—worldviews, predispositions, scientific approaches—that define how the group generates new knowledge. As a result, the organizations in the study conceptually differ in ways that highlight the uniqueness of their respective thought collectives. The agricultural field day presents a helpful context to observe how knowledge production and dissemination occurs differently in each of these sponsoring organizations, and in the previous chapter I have described the participants and structure of field days, as well the knowledge co-production processes that define each of the three thought collectives in the study. The succeeding section presents further discussion to interpret the results of this research project.

A key finding of the project is that PSU, PASA, and WAgN encourage farmer participation via the field day model, confirming earlier findings by Carolan (2008) and
Hassanein (1999) that describe agricultural field days. Fleck’s (1979) theoretical contribution of esoteric and exoteric circles suggests that scientific knowledge co-production is a bi-directional process of exchange between expert scientists and laypersons, and this study shows that in each of the organizations, farmers maintain participatory roles to influence knowledge co-production. However, the study also confronts a key shortcoming of Fleck’s concentric circles model by exploring the varying degrees of participation (Deshler and Grudens-Schuck 2000) farmers (or “general practitioners” in Fleck’s [1979, p. 115] terms), can have in knowledge co-production processes. In other words, Fleck may have correctly asserted that knowledge generation occurs relationally between experts and non-expert practitioners within a thought collective, but he did not articulate that different thought collectives will involve non-expert participation to different extents. In this way, I interpret degree of participation as one aspect of thought style, which helps define how one thought collective might approach science differently than another.

Some scholars have asserted that the university agricultural sciences utilize a uni-directional knowledge production and dissemination model in which scientists conduct research in isolation, cooperative extension educators share this information, and farmers either adopt or reject the new findings (Chambers 2008; Black 2000; Lacy 1996). My observation and interviews from the PSU field days suggest that the field day is a significant step away from this classic diffusion (or transfer-of-technology) model, because farmers do have some opportunities to influence research agendas and participate in project demonstrations, as well as offer feedback directly to scientists. This latter finding challenges the idea that scientists and farmers must be linked via extension educators; although many agricultural scientists have partial extension appointments, the field day still offers a venue for formal experts and farm operators to interact.
Although farmer participation occurs at PSU agricultural field days, the degree of participation is less than that of both PASA and WAgN programs. The PASA and WAgN thought collectives not only solicit farmer input more directly than PSU but also challenge the notion that farmers themselves cannot be experts. In the case of WAgN, some member farmers have significant mentorship and programming responsibilities as regional coordinators, and in some cases act as field day hosts, sharing their farm experiences. PASA routinely asks farmers to host field days, and affords them the autonomy to direct and lead field days based on the knowledge they deem important. These findings point to another shortcoming in Fleck’s concentric circles model, namely that the esoteric circle of experts must correspond with trained scientists and researchers. As this project and previous analysis by Arksey (1994) demonstrate, non-scientist practitioners need not be confined to the exoteric circle of non-expert participation. Instead, in some thought collectives like PASA and WAgN, these participants can and do attain expert status. Furthermore, PASA and WAgN’s level of participation supports prior claims that sustainable agriculture is highly conducive to participatory research models that incorporate local knowledge (e.g. Carolan 2006; Eshuis and Stuiver 2005; Hassanein and Kloppenburg 1995; Ingram 2008; Kloppenburg 1991; Pretty 2008). The same has been said of women’s agricultural networks (e.g. Trauger et al. 2008; Hassanein 1997; 1999).

The degrees of participation typology presented by Deshler and Grudens-Schuck (2000) has offered a useful starting point for clarifying how participation levels can vary between thought collectives. Originating in the adult education literature, this typology is helpful for understanding farmer participation in applied agricultural research, particularly agricultural field days, since these interactive events are designed for the production and transfer of practical knowledge that farmers can use on their own operations. Nonetheless, this research has
suggested modifications to the Deshler and Grudens-Schuck model to improve its applicability to the agricultural sciences. First, I have suggested two new categories to better capture degrees of participation in agricultural research at field days—interdependent and adaptive participation. Conceptually, these new categories reconcile participatory approaches that combine elements across the typology, offering hybridized types of participation that better capture the range of farmer-researcher relationship possibilities in agricultural knowledge co-production. Interdependent participation recognizes that both farmers and scientists can benefit by incorporating farmer feedback and collaborative data collection into research design, though scientists still ultimately lead projects. Adaptive participation refers to circumstances in which farmers are empowered to lead and conduct their own knowledge production, while also recognizing that research scientists can play important roles in this endeavor. Combined with Deshler and Grudens-Schuck’s original four types, this six-category typology of participatory research better captures the nuanced relationships between Fleck’s esoteric and exoteric circles.

Second, the phraseology (extractive, paternalistic, partnership, emancipatory) and tiered design of Deshler and Grudens-Schuck typology suggests a normative hierarchy in which emancipatory research should always be the research goal. This research suggests that beneficial farmer-researcher dynamics can emerge at other levels of participation. For example, PSU farmer interviews and participant observation indicate that these farmers prefer a field day model that positions scientists as experts with “cutting edge” research to share and farmers as stakeholders who question and respond to researcher conclusions. In the case of both WAgN and PASA, field days demonstrated that there are important roles for non-farmer experts to play in knowledge co-production, particularly when attendees engage topics new to them in agriculture. This research supports the literature suggesting that both scientific and local
knowledge are key ingredients to agricultural knowledge production and dissemination (e.g. Eshuis and Stuiver 2005, Vanclay and Lawrence 1995; Lockeretz and Anderson 1990).

Differences in gender dynamics within each thought collective were an important aspect of this study. Prior research on WAgN asserts that the organization was founded in response to women’s agricultural needs being ignored within other agricultural institutions (Trauger 2009). Furthermore, a majority of PSU extension educators note that women’s farming needs differ from men’s and as a result, more programs should be marketed directly to women farmers (Brasier et al. 2009), but few extension educators cite interacting with women farmers, often asserting that they are meeting the needs of these farmers (Trauger et al. 2010b). Observation at PSU field days suggests that few women farmers attend these field days, indicating that women’s farming needs may be better served by other programs. Interviews with WAgN farmers confirmed that these women generally feel more comfortable in a learning environment of all women, though one farmer noted that she attends PSU field days on occasion and has had positive experiences. In addition, women’s contributions to agriculture are more highly valued in sustainable agriculture (DeLind and Ferguson 1999; Trauger 1999), and university-led agricultural education is commonly linked to conventional, not sustainable agriculture (Carolan 2008), which may explain why so few women attended PSU events. However, although PASA’s field days attracted more mixed-gender attendance, gender distinctions between male farmers and their wives were observed occasionally. This finding supports Feldman and Welsh’s (1995) claim that local knowledge, like that exchanged at PASA field days, is not immune from gender divisions, as well as Allen and Sachs (1993) assertion that the pervasiveness of traditional gender roles extends to sustainable agriculture networks.
University agricultural science has been criticized for conducting research exclusively within the controlled environment of the experiment or field station, which is not seen as representative of the diverse conditions of working, commercial farms (e.g. Gerber 1992; Walter et al. 1997). This study has both supported and questioned these assertions. On one hand, PASA and WAgN farmers generally prefer attending field days held at working farms (suggesting that these environments can better meet their learning needs than the research station). There appears to be a great deal of emphasis on understanding and seeing how other farmers do things in these thought collectives. On the other hand, the PSU field days, while often held on research stations, are seen as useful by these field day attendees. PSU farmer attendees appreciate the research station field days for their capacity to conduct field trials and experiments that they consider difficult or impractical on their own farms.

In spite of the many differences among the three thought collectives, this project also highlights a key area of overlap among the three field day models. PSU, PASA, and WAgN field day leadership and attendees routinely referenced the socializing and networking benefits of agricultural field days. Women farmers are noted for desiring horizontal and relational learning environments (Sachs 2007; Hassanein 1997; Trauger 2009; Trauger et al. 2008), but this research shows that the social learning and interactive aspects of field days are also important to other farming organizations like PSU and PASA. Sustainable agriculture can be isolating, particularly in settings where there are few other sustainable farmers (Delind and Ferguson 1999), and women farmers must routinely contend with feelings of isolation by engaging in a male-dominated industry (Hassanein 2007). Women farmers who also farm sustainably are then exposed to isolation on two levels (Trauger et al. 2010a). However, the findings from this research show
that field days can relieve isolation for growers outside sustainable and women’s agricultural networks like those in PSU’s thought collective.

As discussed in chapter four, the importance of sustainability differed within each field day thought collective. All three of the organizations in the study incorporated sustainable agriculture into their programming in some capacity, but they did so to varying degrees. PSU included organic and IPM management principles as possible approaches to agricultural production, while PASA’s field days positioned sustainability as an essential aspect of their model. Sustainability is also central at WAgN’s field days, however, the organization is first and foremost oriented towards women farmers, regardless of their management practices. In spite of these clear differences, sustainability may offer one possible area of overlap amongst these three agricultural networks, what Fleck (1979, p. 110) refers to as the “borderline of the field.”

Fleck’s borderline of the field has not received empirical attention, and this study attempts to incorporate the concept to describe collaborative opportunities in knowledge creation. Fleck indicates that inter-collective communication presents opportunities for the creation of innovation and new thought, since the exchange of ideas outside of respective thought collectives introduces actors to new ways of thinking. This study on agricultural field days suggests that increased inter-collective communication could have practical benefits in agricultural knowledge production and demonstration by introducing farmers to management techniques they had not previously considered in their own thought collectives. In addition, the PSU field days which are geared toward more experienced growers might appeal to PASA and WAgN farmers who require training beyond the introductory level common at the field days of these latter two groups. As networking opportunities, greater collaboration across field day
organizations will expose farmer attendees to a larger base of farmers whom they may not already be in contact with, increasing the size of their farmer networks.

II. Project limitations

This project illuminates not only how agricultural field days function as knowledge coproduction venues but also differences across field day sponsoring organizations. Nonetheless, there are several limitations to this study that need to be acknowledged. First, the study would have benefitted from a mixed-methodological approach by including a structured survey of all field day attendees. Such a survey would have provided helpful demographic and background information about field day attendees, aiding an assessment of who attends agricultural field days as well as describing background information about their farm experience, management practices, and business operations. Field day interviewees were asked to describe themselves and their farm operations, but the study could have benefitted from a more complete survey of field day attendees, not just those who were interviewed, providing a more robust characterization of field day attendance.

I attended nine field days for this project, aiming for variation in both field day location and topic to provide the best comparative overview of field days in Pennsylvania. Attending additional field days, particularly on topics not covered in the project’s sample, would have provided a fuller picture of PSU, PASA, and WAgN’s field day activities. While the study suggests many similarities in the operation of field days within each thought collective, there is still a marked amount of internal variation that could be better identified by attending more field days. More specifically, I could have attended field days that were co-sponsored by the groups in the study. For example, PASA and WAgN co-sponsor at least one field day annually, and including this field day in the study could have further elaborated the actual and potential cross-
fertilization opportunities among these two organizations. In addition, I learned during the study that PSU agricultural sciences faculty and educators have presented at PASA and WAgN field days in the past, and the study would have benefitted from attending a field day featuring such an arrangement.

III. Implications for practice and policy

A key finding of this study is that the agricultural field days sponsored by PSU, PASA, and WAgN were not only beneficial opportunities for knowledge co-production, but also valuable networking spaces for farmer constituents. As a result, the field day should continue to be a prioritized format for knowledge production and dissemination among each of the three groups. For PSU, which currently faces budget constraints throughout the College of Agricultural Sciences (Danahy 2010), increasing its number of field days may be a challenge; however, doing so might offer significant benefits to farmer stakeholders looking to tap into the knowledge production spearheaded by the university and could enhance public support of the college.

As a program of Penn State’s College of Agricultural Sciences, WAgN is well positioned to link women farmers in Pennsylvania with the research institution. The low numbers of women farmers in attendance at traditional PSU field days suggest that WAgN’s programming is filling a valuable need, particularly in light of the increasing number of women farm operators in Pennsylvania. This research suggests that the university should continue and increase its support of WAgN’s programmatic efforts. WAgN field days not only provide an attractive learning environment for women farmers in Pennsylvania but also feature introductory content that is not offered at the other field day formats. As a result, WAgN can fill a learning niche for new and beginning farmers in Pennsylvania that includes both female and male constituents. This wider
applicability of WAgN’s programming also presents challenges, as the organization was founded to specifically support women’s agricultural learning needs, since other agricultural institutions were failing to do so. Organizationally, WAgN leadership must continue to dialogue internally and with its women farmer constituents to ensure that as the organization grows and expands, its emphasis on women’s agricultural learning needs remains central to their activities.

PASA’s field day events have been the central component of their educational outreach program. As a membership organization that aims to build relationships among farmers and support sustainable agriculture, the field day is a primary tool for meeting these goals, and PASA should continue to highlight practical knowledge co-production through field days. With an emphasis on diversified agriculture, PASA is uniquely positioned to reach out to growing numbers of small-scale farmers who farm part-time and/or are seeking whole new systems to implement on their operations. The organization should seek programmatic funds to continue growing this program. In addition, interorganizational crossover is already apparent between the PASA and WAgN thought collectives, including co-sponsored field days, field day attendees with dual memberships, and PASA board of directors overlap with WAgN leadership. As a result of these relationships as well as PASA’s experience working with PSU in the past through field days, PASA may be best positioned to coordinate increased partnerships across organizational lines.

As a public land-grant university, PSU is obligated to reach out to and support Pennsylvania farmers with practical, applied knowledge that can help their farm businesses and quality of life. This research shows that PSU field days attract more experienced farmers with larger and less diverse operations. To fulfill its mission, PSU should continue to seek partnerships that grow its constituent base, including growing numbers of small-scale and
sustainable agricultural producers. The university has recently increased these efforts, evident in the creation of two sustainable agriculture extension positions one based on their main campus and the other as a county extension educator. Such efforts should be expanded to other regions and counties in Pennsylvania. The county sustainable agriculture educator has successfully facilitated collaborations with PASA and WAgN, bringing a diverse mix of Pennsylvania farmers together to build relationships and expand education efforts in sustainable agriculture. Creation of this position was instigated and funded at the county-level, and subsequently approved by the administration. In the future, PSU should be proactive in creating new sustainable agriculture educator positions, as opposed to relying on counties to launch these positions.

IV. Future research considerations

The findings described in this research point to several areas for additional research. First, this project is a rare instance of empirically comparing university, sustainable, and women’s agricultural knowledge production and dissemination in the same project. It would be helpful to conduct similar research in other states and regions to explore further the generalizability of these findings. Survey research of farmer attendees should be part of these efforts to provide a clearer understanding of who attends agricultural field days, as well as their attitudes and farming beliefs.

This study utilized a typology for learner participation for action research from the adult education literature. Although these “degrees of participation” (Deshler and Grudens-Schuck 2000, p. 603) provide a helpful guide to evaluating participation in the agricultural sciences, further research should continue to explore heuristic models for understanding levels of farmer involvement in research. This research has engaged the Deshler and Grudens-Schuck typology,
both confirming aspects of its conceptual design and suggesting potential improvements to improve its applicability within agricultural science. Future research should further explore the degrees of participation model to potentially expand, modify, and adapt its utility for understanding how researchers and farmers can interact to produce and disseminate knowledge. In particular, I have suggested that this model incorporate two new categories to help clarify levels of participation in agricultural research, and these modifications merit further empirical attention to better understand their applicability.

This project has concluded that levels of participation vary among the three different field day sponsoring organizations. Future research should attempt to link these degrees of participation to implementation of new knowledge at the farm-level. It is unclear what exactly the farmers in this study “do” with field day knowledge once they return to their farms. Similarly, the project has shown that networking is a crucial benefit of each organization’s field days, yet it is unclear if and how this networking affects farmer-to-farmer relationships once the field day concludes. A next step in research of knowledge co-production at agricultural field days would include follow-up interviews with field day attendees to better understand how participation levels and networking relate to on-farm adoption and application of new knowledge.

The university agricultural sciences have been criticized for devaluing both farmer participation and sustainable agriculture (see Buttel 2005). This project counters these claims by showing that farmer input and research on sustainable agriculture are at least part of the agricultural sciences agenda at PSU. Future research is necessary to more clearly articulate the relationship of land-grant university research and sustainable agriculture. It may be the case that colleges of agricultural sciences across universities invest in sustainable agriculture research at
different rates or that interest in sustainability varies across departments within the agricultural sciences. Some field day attendees indicated that they are weary of drawing sharp lines segregating conventional and sustainable agriculture, and future research should further explore how agricultural institutions navigate these crucial divisions. The scale of farm operation appears to be a key point of demarcation among each of the three field day groups, and future research should clarify how and why farm size affects knowledge production and dissemination.

V. Conclusion

This project compared agricultural knowledge production and dissemination among three different networks through the lens of agricultural field days. Applying theoretical insights from Ludwik Fleck, it has shown that PSU, PASA, and WAgN each encourage farmer participation and knowledge co-production through field days, but they do so to varying degrees and in different ways. PSU’s field days feature more experienced farmers and more specialized, technical knowledge on new research being conducted at the university. Farmer knowledge and feedback helps shape the research agenda, and farmers can use the field day to relate researcher knowledge to their own operations. PASA’s field days emphasize sustainable agriculture and feature farmers with diverse operations. The field days are often led by farmers themselves and are designed to facilitate high levels of participation among participants. Farmers achieve expert status in the PASA field day model. WAgN’s field days are oriented to the unique learning needs of women farmer’s. These field days feature more basic agricultural knowledge and high levels of interaction among participants. WAgN’s structure facilitates mentoring by more experienced women farmers, and constituents have ample opportunities to influence the programmatic agenda. A key similarity among the field days was the high value placed on
farmer networking, indicating that the purpose of field days is not only to produce and disseminate knowledge but also to encourage social interaction among field day attendees.
REFERENCES


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APPENDIX- Interview Guide for Field Day Participants

1. Tell me a little about yourself:
   - Are you a farmer?
     • What, where, and how much do you farm?
     • For how long have you been a farmer?
     • Do you farm full-time?
   - If you’re not a farmer, please describe your occupation.

2. Field Day background:
   - Why did you come to the field day today?
   - Have you been to other field days in the past? Who sponsored these field days? (Specifically ask about PSU, PASA, and WAgn field days).
   - Why have/have not you attended field days by these other groups?

3. What were your favorite parts about today’s field day? Least favorite?

4. Field Day participation:
   - How would you describe how people interact at this field day?
   - Do people ask lots of questions at field days?
   - How do the instructors interact with participants?
   - How do you participate at field days? Do you ask questions, talk with presenters afterward, talk with other attendees about the content, etc.?

5. How old are you?

6. Can you describe “good farming,” or what a “good farmer” is?

7. Is there anything else about the field day or farming that you’d like to share?