FarmLab Study

Phase 1 - Needs Assessment

Appendix F – Ag Innovation

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1.0 Introduction

In their "Sustainable Local Food Initiative Report" for Indiana, Reding and Moody document a shift in local food production in response to new industry trends and market demands.[1] These shifts hinge on innovative strategies for filling local gaps in the wake of an increasingly centralized food system. While economies of scale still dominate production, these new technologies and practices - though small - can nonetheless provide attractive opportunities for small farms already seeking to diversify their production and utilize their unique resources.

Beyond agriculture, Elkhart County values its identity as a regional hub of innovation and entrepreneurship. Startup businesses often begin with a sharp idea and gather the capital and experience to bring their vision into being. In many industries, funding and infrastructure exist for research and development to be incubated on a small scale and develop prototypes to put that good idea to the test. Labs can play an instrumental role in helping these startups refine and continue to develop their product. Agriculture operates on a different timescale, however, constrained by weather and stretched by the laws of agronomy, where one season of "experimentation" is rarely enough. Ag innovation must therefore follow a different path.

Education and labs for ag research and development exist to support innovation and growth on a large scale. But because profits from local food production are by nature distributed, they are often still relatively small and slow to generate. There has therefore been little capital and support for research and development focused on localized and more diversified food production. Instead, local and global networks of small-scale producers often share lessons learned and best practices in a more open-source and collaborative way to spur and guide further innovation, seeking distributed rather than concentrated success. This generally leaves the producers themselves with the burden of applying these practices and refining each new product or technique to suit a particular place and market. This can involve taking significant risks for slow (and sometimes nonexistent) returns on their investment.

Capital for small-scale ag innovation is extremely limited. The Slow Money movement illustrates one response to addressing this challenge and unlocking some of the potential for increased and more diversified small-scale production.[2] The Ag TIF district addressed in this report helps address this challenge for 6 commercial farms in the district. A key question is whether TIF funding could also help catalyze growth for small farms in the area by supporting a FarmLab that would help carry the load of evaluating potential innovations, networking

interested producers, and facilitating the exploration and implementation of new production systems and techniques.

This Appendix surveys a variety of current efforts in different areas of small-scale ag innovation, local and around the country, that are particularly relevant to the needs identified in the report. Appendix G explores how such innovations can contribute to food localization as a means of economic development.

2.0 Season Extension

Specialty crop production (primarily fruits and vegetables) favors economies of scale due to the more intensive cultivation and labor required for harvest than most grains. America's robust national distribution network and current low fuel costs support the efficiency of concentrating specialty crop production in regions like Florida and California that have full-year growing seasons. These efficiencies are often subsidized in a variety of ways (i.e., transportation infrastructure and migrant labor) that can make it difficult for producers in the midwest to compete.

The increased demand of consumers wanting to put a face to their food and know how and where it was produced has begun to offset the disadvantages of a shorter growing season. Many producers are therefore employing various season extension strategies to increase their productivity and fill this demand throughout the year. Row cover, hoop houses, and heated greenhouses are some of the technologies seeing increased use in the region, and several Elkhart County producers have been at the forefront of this trend locally.

- **Sweet Corn Charlie Produce**[3], Millersburg - Chuck and Tami Mohler use heated and unheated high tunnels for early tomatoes and other produce, and low tunnels to have corn available by early June.[4]
- **Kruse Farm Supply**[5], Bristol - Steve Kruse uses a greenhouse for the production of herbs, greens, and other produce; he also heats high tunnels when he has enough wholesale accounts lined up through the winter to cover costs.[6]
- **Clay Bottom Farm**[7], Goshen - Ben Hartman and Rachel Hershberber practice intensive production on less than one acre, primarily through 4 heated high tunnels. They sell year-round to wholesale accounts and direct through the Goshen Farmers Market and CSA accounts.[8]

Micro-greens and salad greens can be grown year-round in Elkhart County, and production is increasing to meet consistent demand. As a high-value product requiring relatively little space but significant labor, greens are also a common focus of urban agriculture and social enterprises focused on such benefits as: improving food access; providing education and training; and generating income opportunities for youth and the underemployed. Hydroponic and aquaponic operations in particular have technology dimensions associated with indoor growing that can provide good experiential learning projects. The Crossing[9] has collaborated with hydroponic operations in Indianapolis to engage students in their job training program, while Green Bridge

Growers in South Bend is dedicated to "growing good food and good jobs for young adults on the autism spectrum."[10]

Michigan students benefit from extended access to fresh, local produce through the Hoophouses for Health program run by the Michigan Farmers Market Association. Qualifying farmers are enabled to build infrastructure for season extension with the assistance of a five year interest-free "loan," which they gradually pay back by fulfilling produce vouchers granted to schools and low-income families.[11]

Season extension and greenhouse production technologies present new challenges as well as opportunities for local farmers, which the FarmLab could potentially support through on-site demonstration and testing, and through networking local producers around best practices and shared needs. Access to land and facilities could assist community partners, including Purdue Extension Elkhart County, to aid with technology transfer.

Jeff Burbrink observed that his work as an educator for Elkhart County Extension is shifting from larger commodity operations to focus on smaller farms growing fruit and vegetables. He therefore saw value in the prospect of collaborating with the FarmLab to do site-based demonstrations and basic testing, avoiding some of the challenges of managing plot work with farmers or finding funding for more extensive research. According to Burbrink,

> "*You want something that you can put in, show, tear out and put something else in… show off crazy ideas. (Farmers), with limited resources, can't commit a lot to trying something out and having a massive failure. Having a place to do experiments would be helpful.*" (Burbrink)

Elkhart County Extension could help model different practices and techniques before farmers make investments.

> "*High tunnel production is making a comeback. We could take people and see that or using the turnips or radishes as cover crops and see how that works … someplace you can go when something new is on the horizon.*" (Burbrink)

3.0 Niche crops and diversification

The recent history of conventional agriculture has largely been one of increasing specialization. In most cases, economies of scale have encouraged consolidation as a way to increase efficiency and adopt new technologies. The pressure for small farm operations to grow in order to remain competitive can lead to vulnerability amidst price fluctuations and environmental stresses. In his 2014 "Structure and Finances of U.S. Farms: Family Farm Report," Hoppe observes:

> "Over the past century, crop and livestock production largely separated from each other as farmers specialized in the production of a few commodities. For example, 75 to 90 percent of farms had chickens, milk cows, or hogs in 1900, but by 2010 less than 10

> percent of farms produced those livestock, generally specializing in one species and relying heavily on purchased feeds. More than 80 percent of farms produced corn in 1900, largely to feed their own livestock. By 2010, only one-sixth of farms produced corn, generally specialized crop farms. Specialization allows farmers to capture some efficiencies of scale, but also subjects them to greater market risks as well as production risks from pests and diseases. Diversification—producing several commodities—can help mitigate these risks, but can also lower resource-use efficiency.[12]

Typically in the U.S., diversification thus defined is associated with mid- to large-sized farms and the range of crops and livestock they produce.[13] Many small-sized farms have become dependent on off-farm income and often have limited capacity to manage multiple commodities. Nationally, according to Hoppe, "between 35 percent and 58 percent of (farms) with GCFI of $150,000 or more produced four or more commodities, compared with less than 10 percent of smaller family farms."[14]

However, three factors distinguish Elkhart County in this regard:

- Elkhart County has the highest concentration of small-acreage farms in the midwest, and the fourth highest concentration of farms less than 180 acres;[15]
- More than 1,000 principal farm operators in Elkhart County earn their primary income off the farm;[16] and
- Elkhart County has one of the highest Amish and Conservative Mennonite populations in the country.

As discussed in Appendix A, Elkhart County has exceptional levels of small-scale, intensive agriculture performance. Many small farms in Elkhart County are seeking to utilize their existing assets in new ways by employing land, equipment, and labor for more diverse production serving niche markets. According to Burbrink,

> "*We're going to continue to see (commodity) farms get bigger. The average size is around 400 acres; I wouldn't be surprised to see that be 600-800 (acres). That being said, the bulk of land being farmed will be controlled by that size acreage. Then you have the smaller farms located in between them with fruits and vegetables. That group of people is where Extension can focus on; my efforts will have to be there*." (Burbrink)

> "*I think our county has a resource that a lot don't have – we have vegetable growing experience and they are used to working on small farms … We've got that ability and that interest in growing the small backyard garden – more than a garden, (it can become an) income producer. There's an entrepreneurship aspect here that you don't have in other communities too. Its there and lingering; how do you take it to the next level?*" (Burbrink)

Entrepreneurial capacity is often attributed to the Amish community spanning Elkhart and Lagrange counties. In 2008, the loss of income caused by the recession prompted many Amish factory workers to generate supplemental income on the farm, raising produce and working with

livestock. Since then, Amish agricultural production has continued to increase, motivated in part by a desire to return to farming, and augmented by skills and capacities obtained off the farm.

As evidenced in Appendix B, there is a clear correlation between Amish settlements and the emergence of non-conventional farming, processing, and marketing practices. As farms diversify their production, products may emerge as particularly well suited to the climate, capacities, and resources of a particular place. Connecting these products to new markets can lead to distributed networks of producers collaborating to meet larger demand than can be met alone, and cooperatively supporting the necessary processing and distribution infrastructure. Two examples with respect to Amish produce farms include the Clear Spring Produce Auction in LaGrange County and the Green Field Farms Co-op in Wooster, Ohio.

Local organic dairy farms also provide a good example of this pattern. The available labor and resources among Amish producers are especially well-suited to small-scale dairy production. As indicated in Table 1, Elkhart and LaGrange Counties rank near the top of the state in total milk sales, but this production is distributed among a much larger quantity of farms than other top-performing counties. Based on the experience of author Mark Seeley as an organic inspector, many of these farms - though small in scale - have managed to sustain full on-farm employment for multiple operators. In the interest of creating additional on-farm livelihoods and succession opportunities, without increasing the size and scale of current operations, they are interested in using their existing land, infrastructure, and skills to further diversify their production into high value crops.

Table 1: Regional Milk Sales

	Dairy Farms	Milk Sales ($millions)	State Rank
Jasper County	7	$98	1
Elkhart County	232	$65	2
LaGrange County	507	$45	3
Marshall County	72	$27	4
Kosciusko County	36	$16	5

Source: Compiled from 2012 USDA Census of Agriculture[17]

Elkhart County was one of 225 counties in the U.S. identified as an ‘organic hotspot’ in 2013, referring to county clusters with high numbers of organic farms and businesses.[18] In the paper “U.S. Organic Hotspots and their Benefit to Local Economies,” Jaenicke notes:

> “Organic is the fastest growing sector of the U.S. food industry. Organic food sales increase by double digits annually, far outstripping the growth rate for the overall food market. Organic crops command a significant price premium over conventionally-grown crops. As a result, interest in organic at the production level has grown as the demand for organic has risen. More farmers are transitioning to organic production, more organic businesses are sprouting.”[19] (Jaenicke)

According to the USDA 2012 Census of Agriculture (Ag Census), Elkhart County ranked 2nd in Indiana in organic production with 20 farms generating $2.2 million in organic sales. LaGrange County ranked 1st with 123 farms generating $10.1 million in organic sales.[20] According to Seeley, these numbers have increased significantly since 2012, particularly in LaGrange County, which now has at least 200 certified organic farms.

The introduction of new technologies can also provide smaller scale farms with new opportunities to diversify. One current example is increased production of blackberries and raspberries using Trellis Growing Systems[21] out of Fort Wayne. This vertically integrated business (including production, installation, and marketing) relies on distributed production among growers in Indiana, Ohio, and Pennsylvania, many of whom are Amish.[22] The system uses a rotating trellis to optimize growing conditions and reduce harvest labor.[23]

While most niche crops tend to be high-value vegetables, fruits, and nuts or berries, new opportunities for the cultivation of staple crops are also emerging. In Elkhart County, as in many locations, grains and legumes such as wheat and black beans are less common than corn and soy because they generate less income or are less cost-effective to produce than in other regions. However, across the country, new consumer demand is driving more diversified small grain production, especially heritage or 'land race' grains valued for flavor and other specific qualities desired by chefs, bakers and consumers (i.e., less gluten intolerance associated with einkorn wheat).

In addition to filling a growing market niche, efforts to preserve and cultivate traditional staple seed crops generally share an intention to conserve biodiversity and counter what Philip Ackerman-Leist, in "Rebuilding the Foodshed," describes as 'genetic erosion.'

> "Genetic erosion is the loss of a particular gene or combination of genes, As organisms of a specific type - a livestock breed, a vegetable or fruit variety, a wild plant or animal - diminish in number to the point of nearing extinction, the gene pool of the remaining organisms loses its diversity and therefore its resilience to disease, parasites, climatic shifts, and even certain husbandry methods. The loss of those individual genes and gene combinations is as great a threat as the loss of topsoil - perhaps even greater. To a degree, we can rebuild lost soils. However, once a gene or gene combination is gone, … it's gone."[24] (Ackerman-Leist)

Sherck Seeds in Bristol is dedicated to identifying and propagating open-pollinated and heirloom staple crop varieties that perform well in Northern Indiana. The farm illustrates several challenges associated with transitioning from conventional commodity crops bred for uniformity and efficiency. It currently sells seed for a wide variety of specialty crops (e.g., heirloom varieties of corn, rice, barley, wheat, peanuts, dry beans, millet, and teff) in small packets to gardeners and farmers across the country.[25] Owner John Sherck would like to support the production of larger quantities of the best performing seed varieties, for which there is considerable demand nationally but very limited supply. But creating and sustaining a viable market for local producers interested in diversifying production would require several concurrent efforts and investments:

- Larger-scale field trials for further refinement of best practices for cultivation, and to grow out more seed for additional production;
- Sufficient volume of seed to verify processing requirements and confirm initial demand with select markets; and
- Accessible, appropriate-scale processing infrastructure.[26]

To justify investment in intermediate processing infrastructure without burdening producers, a minimum threshold of production is needed. This in turn requires building a network of producers with the willingness and capacity to collaborate and distribute the associated risks.

In Athens, Ohio, taking these steps to rekindle the production of heritage staple crops was seen as a strategy for enhancing community food security. The Appalachian Staple Foods Collaborative launched Shagbark Seed and Mill to "develop a regional scale facility that (1) delivers affordable healthy food to all sectors of the market, including food access programs, and (2) increases farm acreage producing high-nutrition crops using sustainable production methods."[27] This prototype regional-scale processing enterprise seeks to open up new markets for small-scale producers by providing the intermediate infrastructure needed to cultivate, process, and distribute staple seed crops.[28] Shagbark works with eight area Amish and certified organic farmers to process more than 150 tons of corn, dry beans, spelt, and buckwheat into a variety of value-added shelf products distributed to small and large markets throughout Ohio.[29]

In addition to growing heirloom varieties of soybeans and dried corn for human consumption, another direction for diversified staple crop production using existing infrastructure is to cultivate varieties for specific niche industries. One such example is the production of canola or sunflower seed for custom oil pressing. Healthy Hoosier Oil in Converse, Indiana is a 6th generation family farm that in 2015 began producing cold-pressed canola oil and virgin sunflower oil.[30] The switch from traditional corn and soy cultivation began as an effort to produce high-nutrient animal feed, with oil as a by-product for bio-diesel. By investing in specialized cold-press and filtering systems, Healthy Hoosier Oil is producing a versatile oil for restaurants and consumers who value its taste, nutrition, and local origins.[31]

4.0 Value-Added Processing

The preceding examples illustrate the importance of scale-appropriate processing infrastructure in expanding opportunities for connecting local producers to local markets. Whether through intermediate aggregation, processing, and distribution infrastructure or through vertical integration on the farm, the goal is to add value to farm products and make them more accessible to consumers seeking local food products. Reding and Moody observe:

> "Ultimately, consumers do not eat number 2 yellow dent corn, soybeans, or hogs, chickens and cattle. However, they do eat pork, beef, milk, poultry, eggs , vegetables and fruits; and we can and do produce the best. The underutilized asset in this consideration is in adding value to our agricultural products grown on our farms. These assets not only create jobs, but they create engaging vocations which provides

> entrepreneurial opportunity for young people to stay close to the land. They will also create industry infrastructure, community leadership, educational opportunities, food security and contribution to wealth in the form of higher margins per acre for our producers."[32] (Reding and Moody)

Considering the strength of the local dairy industry noted above (both organic and conventional), and because the proposed FarmLab site is connected to a mid-sized dairy operation, the prospect of adding value to local dairy products surfaced throughout the study. Vertical integration represents one direction for innovation, as demonstrated in the following small-scale regional examples:

- **Scherf Farms Dairy and Creamery**, Michigan City IN - Scherf Farms is a grass based dairy and creamery that sells 'creamline' (non-homogenized) bottled milk, butter, cheese, and other fermented dairy products, as well as beef and lamb.[33] The Sherfs intentionally started small with a dairy herd of 25 Jersey cows, preserving time for building strong customer relationships through direct sales while maintaining wholesale accounts with three area markets.[34]
- **Traders Point Creamery**, Zionsville IN - Indiana's first certified organic dairy farm, Traders Point manages approximately 400 acres of pasture for rotational grazing and 100% grass-fed milk.[35] 100 Brown Swiss cows produce milk for creamline bottled milks, yogurts, and cheeses.[36] The farm operations also include a farm store, farmstead restaurant, dairy bar, farm tours, and event hosting.[37]

Fruit and vegetable specialty crops, though generally regarded as commodities, can also add value to overall farm production, albeit at higher time and energy costs than conventional grain crops. However, variable and unpredictable production - particularly when building new market demand - means that shortfalls and surpluses are almost inevitable until more diverse distribution channels and markets can be developed. In an area with a limited growing season but a year-round demand for local food, the need for processing, preserving, and storing produce is especially important. According to Reding and Moody,

> "there is a viable business opportunity for processing (via freezing, canning, dehydration) vegetables domestically in season, and then holding for sale in the off production months. It is recognized that this adds to the cost of the product. It is a cash flow issue for the producers and processors of these food products with the trade off being increased employment and infrastructure investments in our communities as well as food security in the preserving and storing of food."[38] (Reding and Moody)

A specific need and opportunity is harvesting, aggregating, and processing surplus ag produce to prevent it from becoming food "waste." Developing the capacity to preserve and store this produce and extend its availability throughout the year presents an important challenge. In addition to satisfying general consumer demand, this is relevant to charitable food networks and school food services as well.

In 2014, Church Community Services (CCS), the Elkhart County Jail, and Middlebury Community Schools initiated a pilot project to explore the use of the jail's certified kitchen and freezers to process and store local produce for later distribution in the community. The underutilized kitchen, which was designed by the Elkhart County Health Department, was envisioned as an ideal location in which inmates could help process produce donated or grown through the CCS Seed to Feed program. If successful, one potential goal was to invest in flash-freezing equipment to gather and process larger quantities for use in area schools.[39] However the project did not come together as envisioned, in part due to the closure of the Elkhart County Food Bank managed by CCS and also due to a lack of available supply.

In Fort Wayne, the Community Harvest Food Bank opened the Harry and Jeanette Weinberg Produce Preservation Center in 2015, becoming "the first regional food bank in America to open a facility for the purpose of preserving the harvest." The operation is housed in the processing center of a former restaurant commissary, which donated the facility to Community Harvest. After raising $5.5 million for renovations, the 1,880-square foot commercial kitchen now has state-of-the-art equipment for processing and freezing and approximately 1,500 square feet of freezer space and 1,300 square feet of cooler space.[40] Community Harvest hopes to primarily use the facility to aggregate and process surplus produce from area producers, thereby capturing potential 'food waste' and distributing it through its network. They are currently exploring options with potential community partners to determine how best to serve their clients while supporting the local food system.[41]

As discussed in Appendix D, school food services are increasingly interested in procuring local food in order to provide students with access and exposure to healthy produce while educating them about where their food comes from. Yet lack of local producers, school schedules out of sync with the local growing season, and limited food procurement budgets present significant impediments. Processing and preserving available produce for easier incorporation into school menus throughout the year is generally regarded as an intriguing but daunting strategy.

For a variety of food safety and logistical reasons, freezing would be the preferred preservation path for school food services. In a 2012 report "Frozen Local: Strategies for Freezing Locally Grown Produce for the K-12 Marketplace," the Institute for Agriculture and Trade Policy studied several small- to medium-scale processing and freezing options: "schools freezing on-site in their own kitchen facilities; mobile freezing units; commercial kitchens and small freezing enterprises; and co-pack relationships with existing freezing companies that could potentially serve the K-12 market." While the costs and benefits of the different options varied considerably, the study generally affirmed that freezing local produce for schools can make an effective contribution to farm to cafeteria programming, once preferred strategies are identified.[42]

5.0 Food Hubs

Evaluating the farm to cafeteria efforts of local schools (Appendix D) highlighted current challenges with the procurement of local produce in Elkhart County. While some distributors are able to source and distribute local produce, options for purchasing wholesale direct from producers are limited. Few area producers are currently able to meet the demands for quality,

quantity, and consistency of produce for restaurants, let alone institutions, and those that do must generally assume the distribution and marketing burdens themselves. The infrastructure that exists for food value chains nationally at larger scales is severely limited for small producers in Elkhart County and the surrounding area.

Food hubs represent an emerging strategy for providing intermediate infrastructure needed to reconnect producers and consumers in local food systems. Food hubs can be organized to fulfill different roles depending on the local needs and context. The USDA defines a food hub as "a business organization that actively manages the aggregation, distribution, and marketing of source-identified food products primarily from local and regional producers to strengthen the ability to satisfy wholesale, retail, and institutional demand."[43]

The Hoosier Harvest Market (HHM) is pioneering this approach in central Indiana. HHM provides an online marketplace for consumers to purchase items listed by area producers and pick them up at a preferred location. HHM receives products at a central facility and manages packaging, distribution, marketing, and billing for their producers in exchange for commissions.[44] 15 to 20 farmers currently offer their products to approximately 300 customers through HHM.[45] The primary market is residential consumers, for which there is still substantial demand, offering a higher price for producers than wholesale accounts. Lack of supply is the limiting factor for the growth of HHM. In evaluating the efforts of HHM to support local procurement for schools, Meter found that:

> "the volume that HHM can currently deliver is too low to attract many school food service purchases. Moreover, any farmer that grows enough produce to supply a school also has the market presence to sell directly to either the school, or to a larger distributor, so the Market may not have a clear role in that process."[46] (Meter)

Food hubs can take other forms and fill other roles more specific to farm to school programming, including facilitation, education, support, technical assistance and logistics, and outreach coordination. The Vermont study "Using Food Hubs to Create Sustainable FTS Programs" compares the performance of 4 different food hub models in Vermont serving local schools.[47] The food hub models and their primary activities included:

- ACORN - *Facilitating Food Hub*: Using matchmakers to connect community producers and buyers.
- Green Mountain Farm-to-School - *Support System Food Hub*: Localized aggregation and distribution to increase local food sales.
- Mad River Localvores & Mad River Food Hub - *Product Line Development Food Hub*: Developing local food products and recipes for schools.
- Rutland Area Farm and Food Link - *Facilitating Food Hub*: Promoting community engagement to support farm to school programs.[48]

These food hubs participated in a grant-funded community of practice aligned with the study. Among the lessons learned through their diverse activities were the following:

> "the project partners learned the value of relationship building, individualized support structures, and the increased administrative effort associated with collaboration and network development. … Initially, many of the food hubs believed that Vermont needed more aggregation and distribution infrastructure to connect smaller producers with institutional and wholesale markets. However, most learned through their independent projects that their areas had sufficient infrastructure, but required better coordination of the available resources. Some food hubs were able to identify existing infrastructure within their regions that could serve the same aggregation and distribution functions they looked to create." [49]

Some models for the aggregation and distribution of produce for local markets and beyond, particularly growers co-operatives, precede the current focus on food hubs. An especially relevant example for Elkhart County is the Green Field Farms produce co-operative in Wooster, Ohio, established in 2003.[50] The co-op includes approximately 80 Amish farms, all of which are certified organic, smaller than 200 acres, and committed to growing healthy food using traditional Amish farming practices. The co-op has developed a central aggregation, packing, and distribution center with its own brand to serve consistent wholesale markets in Ohio and beyond.[51]

As an innovative strategy for rebuilding local food systems, food hubs have produced varied results around the country. As Meter observes:

> "While the role of an aggregator or food hub is valuable - in working with emerging growers to help connect them to buyers and ensure that they grow and package their food items in a safe and marketable manner - it is difficult to imagine that hosting this capacity would pay for itself as a business proposition. At this juncture, this is typically a non-profit educational function, one that some for-profit firms have shouldered as an investment in future local food trade. It necessarily will require subsidy, either because private firms build this into their budget, or because philanthropic or public funds pay to maintain this capacity in each community or region."

> "Building a physical aggregation center or larger food hub will not, in itself, solve the issue of growing new farmers. Indeed, a food hub requires support from enough emerging farmers to cover operating costs, and the farmers in turn require support from the hub. These capacities must be built simultaneously, with supply and demand in balance at all stages. This will require stable long-term investment for limited short-term returns."[52] (Meter)

When appropriately designed and organized to perform specific functions in a local context, food hubs can be a catalyst for broader innovation in their local food systems. The primary challenge is to determine the specific niche that a food hub can successfully fill and discern an appropriate balance between the scale of facilities, facilitation, and service. Elkhart County is fortunate to have existing small farm infrastructure and skilled farm workers in place that very few communities in the Midwest can match, suggesting that exploring potential food hub opportunities would be worthwhile.

Evaluating the feasibility of a specific food hub model for the FarmLab was beyond the current scope of this Phase 1 report. However, based on the references and examples surveyed above, and the consideration of food hubs in Appendices G and H (in the contexts of economic development and farm to school, respectively), the best organizational structure and focus for a food hub model serving the FarmLab mission would likely be a non-profit organization providing value chain facilitation and education.

Additional resources that should guide further food hub feasibility analysis include:

- Indiana Farms, Indiana Foods, Indiana Success: Central Indiana Food Hub Feasibility Study (Prosperity Ag and Energy Resources, 2012)[53] - An initial feasibility study for a food hub in Central Indiana (laying the foundation for the Hoosier Harvest Market).
- ISDA Food Hubs Feasibility Study (Thomas P. Miller & Associates, 2015)[54] - assesses "the needs of growers and consumers regarding the potential of regional food hubs operating as part of a statewide network to facilitate the marketing and purchase of specialty crops" in Indiana.[55]
- Counting Values: Food Hub Financial Benchmarking Study (National Good Food Network, 2014)[56] - highlights financial and operational data from 48 of the more than 300 regional food hubs in the nation, providing a "planning tool for hubs to benchmark their business performance against industry peers and find areas in need of improvement" as well as "a starting point to guide the flow of capital into the new local food sector"[57] (see the National Good Food Network of the Wallace Center for extensive food hub resources[58]).

6.0 Direct Sales and Marketing

While food hubs offer potential strategies for wholesale aggregation and distribution, local products must ultimately be recognized as local by the end consumer if their value is to be fully appreciated. There are abundant opportunities to build awareness of local food products through branding and differentiation.

In 2015, the Indiana State Department of Agriculture (ISDA) revamped its Indiana Grown brand, which it developed to promote farm products grown in Indiana and support economic growth. The goal for the brand is to make Indiana Grown products more visible to consumers in large grocery and retail operations as well as farmers markets and co-ops.[59] The program is designed to:

- "Help Indiana farmers and producers have a greater market for their products;
- Support Indiana processors in their effort to process more Indiana Grown products; and
- Educate consumers on the importance of buying Indiana Grown products."[60]

The Indiana Grown program can provide an important resource for local producers looking to diversify production.

> "Equally important is for ISDA and its partners to better educate producers about diversification into specialty crops. Understanding entry costs, the potential return-on-investment, and the state's wholesale and direct-to-consumer markets provides knowledge to make informed decisions about diversification. Through Indiana Grown, ISDA can showcase the state's specialty crops and make a strong case for why traditional grain and bean producers have a viable alternative with higher sales." [61](Thomas P. Miller & Associates)

Overall, direct sales between producers and consumers remain at the heart of local food systems. Not only do they sidestep the complexities of fragmented local value chains, they create essential opportunities for producers to build direct relationships with consumers and educate them about their practices while gathering feedback to guide further production. Direct transactions therefore provide an important means of differentiating local produce from lower-priced competition. As Reding and Moody observe,

> "With a high percentage of agricultural food products being produced and marketed as a commodity, with the value to the customer as price point, or the least expensive, the opportunity to differentiate is often overlooked. This is leaving a void in the market for those customers who place their highest value in other areas. This void, or niche, is formed from the limitations of the current commodities system to differentiate a business to meet this sector's expectations. It is in this void where local food businesses will bring agri and culture back together … The basis of thought is that of a local food business which, by consistently meeting the expectations of a large enough sector of the market, or critical mass, will monetarily sustain the business by marketing not only the end product but by innovating the entire system toward the customers in this sector."[62] (Reding and Moody)

While in-person transactions are preferred, the recent growth in online tools for initiating transactions can help make sales more accessible and convenient to consumers. Numerous online guides and directories continue to offer means of finding local producers. But a variety of new services can facilitate actual ordering to simplify distribution on the part of producer. This type of system has been the backbone of the Purple Porch Co-op's farmers market in South Bend since its inception. Farmersmarket.com is a newer platform based in central Indiana that creates virtual markets for multiple producers.[63] Vintage Meadows of Goshen, which aggregates and distributes local produce to the Chicago area, uses FarmMatch.com to manage ordering.[64]

Beyond the immediate economic benefits, direct sales tend to manifest additional value on the farm itself. Studies based on national USDA Census of Agriculture data yield the following observations with respect to farms with direct sales:

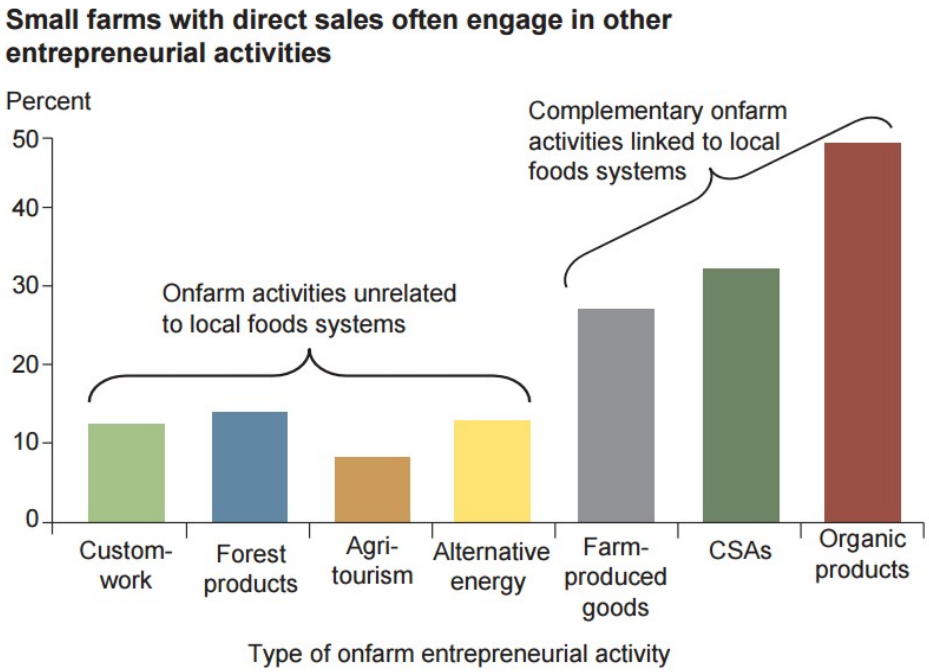
- “Farmers who market food directly to consumers have a greater chance of remaining in business than similarly sized farms who market through traditional channels.”[65]
- “The likelihood of a farm being involved in direct marketing was greater if: a farm was smaller; a farm grew more types of products; and the farmer placed greater importance on using environmentally friendly production practices.”[66]
- 85% of farms with direct sales had sales less than $50,000 per year.[67]
- 18% of farms with direct sales sold vegetables and melons, 17% sold fruits and nuts, and 79% sold livestock and livestock products.[68]
- “While only 26 percent of all direct-sales farms were vegetable and fruit farms, they accounted for 56 percent of all direct sales.”[69]

Direct sales to consumers is also a good indicator of entrepreneurial activity. Thus, not only does targeting direct sales represent a means of making local food more accessible and increasing production, it can also motivate additional on-farm innovation. According to Martinez,

> “In 2007, direct-sales activities surpassed customwork to become the leading on-farm entrepreneurial activity involving farm household participation. Integrating other on-farm entrepreneurial activities with direct-sales ventures appears to capture synergies, which leads to increased income from direct sales to consumers.”[70] (Martinez)

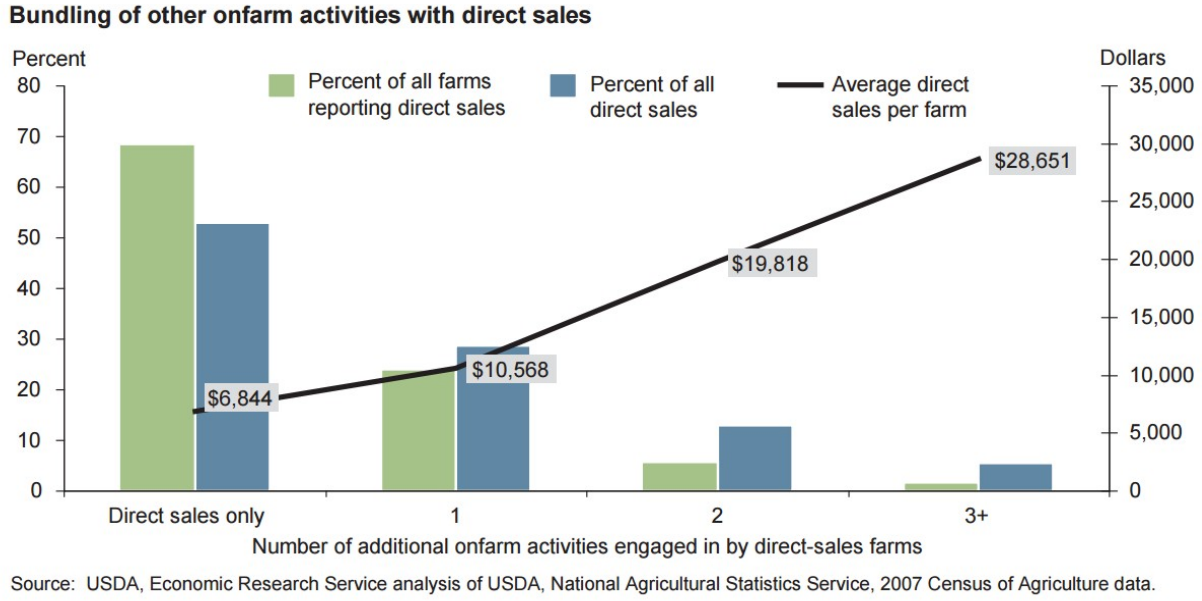
Figures 1 and 2 below are copied from the report “Local Food Systems: Concepts, Impacts, and Issues” by Martinez, et al.[71] Figure 1 illustrates the range of complementary on-farm activities associated with small farms selling directly to consumers. Figure 2 illustrates how farms with more diverse entrepreneurial activity, while less prevalent, tend to realize higher direct sales.

Figure 1: Direct sales and small farm entrepreneurial activity



Source: "Local Food Systems: Concepts, Impacts, and Issues" by Martinez et al. (2010)[72]

Figure 2: Direct sales and degree of entrepreneurial activity



Source: "Local Food Systems: Concepts, Impacts, and Issues" by Martinez et al. (2010)[73]

Based on the 2012 USDA Census of Agriculture, Elkhart County farms sold $2.4 million of farm products directly to consumers, amounting to 0.8% of all farm product sales, more than twice as much as the national average.[74] As shown in Table 2 below, Elkhart County farms ranked at or near the top of most categories associated with direct sales, value-added processing, and increased entrepreneurial activity. Thus, it seems reasonable to conclude that they are likely to reflect - if not exceed - the range and levels of entrepreneurial activity associated with direct sales in Figures 1 and 2. This would give further support for food localization as an economic development strategy, explored in Appendix G.

Table 2: Direct sales and related entrepreneurial activity in Elkhart County

Farm Product Sales	Amount	State Rank
Farms with direct sales	191	1
Direct sales to consumers ($ millions)	$2.4	1
% increase in direct sales since 2007	95%	-
Direct sale percentage of total farm product sales	0.8%	-
Farms produce and sell value-added products	98	1
Farms marketed products directly to retail outlets	71	1
Marketed products through community supported agriculture (CSA)	18	1
Farms selling vegetables	80	2
Organic product sales ($ millions)	$2.2	2
Farms selling organic products	20	2
Farms had on-farm packing facilities	34	2

Source: Compiled from 2012 USDA Census of Agriculture[75]

For each of the categories included in Table 2, Elkhart and LaGrange counties rank either 1st or 2nd (LaGrange County Ranked 3rd for on-farm packing facilities). Appendix B highlights how these attributes are reflected more broadly in other counties with high concentrations of Amish, giving further evidence to the entrepreneurial capacity associated with these communities, and the potential value they represent for food localization and ag innovation.

7.0 Training and Capacity Building

Many of the examples surveyed thus far highlight the range of needs and opportunities for innovation throughout the food value chain. Ag innovation is as much about transforming food systems as it is about improving food production. However, as these examples also frequently illustrate, a substantial portion of the burden for adapting to change (whether environmental, economic, or social) ultimately falls on the shoulders of the producers themselves. At the core of the FarmLab mission is a focus on building the capacity of local farms to respond healthily

and proactively to these changes. Thus, the FarmLab proposes to work directly with local producers to help them develop the skills and knowledge necessary for success and alleviate burdens of innovation and risk where possible.

As noted above, one approach for the FarmLab to introduce new crops and practices would be to coordinate on- or off-site demonstrations. A step beyond demonstrations and field trials would be working directly with growers at the FarmLab site to build their own production skills and capacity directly while still introducing new products and practices to the broader community. Farm incubators represent an integrated approach to supporting new or transitioning farmers in this way. According to the National Incubator Farm Training Initiative (NIFTI):

> "A farm incubator project is a land-based multi-grower project that provides training and technical assistance to aspiring and beginning farmers."[76] (NIFTI)

NIFTI is a 'backbone' organization serving a network of more than 100 incubator farms throughout North America by providing consulting, training, and educational resources, including the NIFTI Farm Incubator Toolkit,[77] which distills the knowledge and experience of these farms into a comprehensive guide for the management of farm incubators.

One of the oldest ongoing farm incubators in the U.S. is the Intervale Center Farms Program in Vermont. Each year, their Farms Program helps up to 3 new independent farm businesses get started by providing access to land, infrastructure, and business planning assistance. The Farms Program also leases land to 7 established mentor farms, who provide mentorship to the incubator farms.[78] The Interval Center manages a complementary array of programs aimed at supporting local food systems, including the Intervale Food Hub which helps provide markets for the incubator farms.[79]

The closest example of a farm incubator to Elkhart County is the Tillers International Incubator Farm (see interview summary in Appendix J). Tillers International generally serves as a training and demonstration site for appropriate ag technologies for small scale production, often in developing nations. Their courses also attract local farmers interested in preserving and applying traditional (heritage) ag practices.[80]

The Tillers International Incubator Farm provides aspiring farmers with land, training, storage and equipment, and market access. In keeping with incubator principles and Tillers International ideals, all cultivation is managed with animal traction, which in some cases enables them to utilize older equipment better-suited to small-scale production than larger and more expensive conventional alternatives. This is of course relevant to an Amish farming community that still relies on animal traction as their primary energy source on the farm.

Nationally, movements such as Farm Hack[81] are helping fill the research and development gap for small-scale production by repurposing and redesigning traditional equipment to serve current needs, especially for intensive cultivation practices. In some cases, this involves converting traditionally horse-drawn equipment for use with small tractors. However, increasingly specialized equipment for use with horses, as well as walk-behind equipment, is being

developed around the world to facilitate the small-scale cultivation of specific niche crops. The FarmLab could help maintain connections between organizations like Tillers International and local Amish farmers who have interests in refining small-scale practices, tapping into new production opportunities, and applying manufacturing and technology skills developed through off-farm work.

8.0 Innovation for Conservation

Another focus area for training and capacity building, central to the mission of the FarmLab and very much in sync with Amish farmers in particular, is soil management. Although it may not be the first thing people typically associate with innovation, strategies for building soil fertility and reducing soil erosion are gaining prominence with local farmers. There is of course a tension between pushing the limits of agricultural production through innovation, and stewarding ag resources through conservation. But in the case of soil management, through the restoration of traditional knowledge and the rapid expansion of new understanding, innovation and conservation are both redefining best practices for preserving agricultural land and productivity.

State Extension Services, Soil and Water Conservation Districts, state and federal departments of agriculture and various other public and private entities have developed extensive resources to improve soil management, and thus the sustainability of crop production, while promoting such practices as cover crops, mulching and field composting, diversification, conservation tillage, and buffers and windrows. Support for such practices (such as through the USDA Sustainable Agriculture and Research Education Program[82]) provides critical funds, peer-to-peer encouragement, exchange of information and other less tangible incentives for agricultural innovation.

There are diverse motivating factors for farmers to adopt these practices, including: improved farm health; increased production through higher yields and lower input costs; improved profits from meeting increased consumer demand for nutrient dense produce and sustainable farming practices; and broader social and environmental concerns for runoff pollution and carbon sequestration. Amish farmers seem to be especially mindful of these connections between soil, human, and animal health, especially with respect to pasture management. To serve this audience, the LaGrange County Soil and Water Conservation District, in partnership with Purdue Extension, hosts the Northern Indiana Grazing Conference in Howe, which draws hundreds of area farmers each year to learn about best practices for soil management and livestock health. According to the Ag Census, Elkhart County is 2nd in the state with 258 farms reporting use of these methods; LaGrange County is 1st with 701 farms.[83] The prominence of organic production in Elkhart and LaGrange Counties discussed above is another indicator of attention to soil management.

9.0 Networks

Local food stakeholders in Elkhart County surveyed by Jantzen in the "Elkhart County Foodshed Initiative Interview Project" identified communication as the primary need and opportunity for strengthening local food systems in Elkhart County.[84]

> "Despite an overall desire for increased connectivity between all players in the food system, there is a lack of awareness about existing resources and an uncertainty about how to navigate various networks."[85] (Jantzen)

As relationships continue to be built through food localization, and as interdependencies become more evident, it will become increasingly practical to find alignment around common needs and intentions, enabling more effective collaboration and guiding further innovation.

An overarching strategy for facilitating this work is to support the formation of local food networks anchored by farms who are able to respond and adapt to changing market demands. This is the focus of the Northeast Indiana Regional Partnership. The following observations from Meter's survey of emerging networks throughout Indiana highlight their potential value:

> "Our team interviewed in depth several local food networks. Each was identified by our local partners as food business clusters worthy of attention. Each has been launched by farmers who realize that to create more stability for agriculture and local food systems, new forms of farming and marketing must be created, with supportive infrastructure. These pioneering farms produce higher value food items, differentiated from the conventional marketplace. To create sustainable businesses, each builds new social capital that engages farmers, businesspeople, and consumers in a common purpose."[86] (Meter)

> "By vertically integrating, by taking advantage of emerging technology, and by building direct and mutual bonds of loyalty with consumers, these farms have created a profound new set of possibilities for themselves."[87] (Meter)

> "What each of these farmer-centered networks share in common is that each has focused on building social and commercial support for farm production that is geared to household consumers, but also available to wholesale accounts. Each has constructed innovative production systems that produce high-value, differentiated food products. Each has built up business by selling direct to households and restaurants, building added-value production, and seeing wholesaling as a longer-term strategy at best, and perhaps not even in their interest. Each has sought out customers who can afford higher-priced food."[88] (Meter)

The FarmLab could play a lead role in convening and guiding the formation of networks by facilitating communication and education around best practices and emerging market opportunities. In some cases, networks may already exist in Elkhart and LaGrange counties that the FarmLab could help connect and support. In either case, these networks would likely

provide a more effective audience for the FarmLab to serve and collaborate with in addressing the needs of other constituencies.

10.0 Conclusion

For local food enterprises and networks to pioneer new practices and flourish in Elkhart County, the question for this feasibility study is how the FarmLab could be a catalyst for research and development beyond the current capacity of local producers. As an agricultural 'lab' and 'incubator,' the FarmLab could uniquely serve these networks by exploring, prototyping, and demonstrating innovative technologies and practices, ultimately assuming the cost of failed experiments and disseminating whatever succeeds.

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