

<b>Title: Serving Local and Regional Markets in the Intermountain West: Identifying and Overcoming Constraints in a Vast Geography</b>			
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**Program Code** A1601

**Program Name** Agriculture Economics and Rural Communities: Small and Medium-Sized Farms

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**Collaborating/Partnering States**

{NO DATA ENTERED}

**Collaborating/Partnering Countries**

{NO DATA ENTERED}

**Collaborating/Partnering Organizations**

{NO DATA ENTERED}

**Non-Technical Summary**

This project will conduct research to develop optimized strategies for small and medium-sized producers in Idaho to access local and regional markets. Through a survey of restaurants and grocery stores, we will estimate how consumer demand for local and regional products manifests in demand at restaurants and grocery stores. This effort will also estimate the market size for vegetable and livestock products, including the market for local and regional products and factors that influence demand for such products. A second research component will conduct supply-chain analysis to identify optimized strategies for aggregation, storage, processing and distribution for small and medium-sized farmers to access local and regional markets. A third effort will develop a geo-spatial database and model to determine the optimal spatial allocation of crop and livestock production based on the market-demand structure and supply chain configuration. This research will help small and medium-sized farmers make better strategic and operational decisions in terms of market positioning, supply-chain strategy, pricing, and benefits of collaboration with other producers. Outreach components will integrate research findings into education materials and training efforts as part of the University of Idaho Extension Small Farms Program. A workshop will be delivered to those involved in community, regional and state-level food-systems economic development, including Extension faculty and educators, community and state staff and policy makers, economic development professionals, producer and communities groups and others engaged in economic and community development. A second producer-specific training day will focus on preparing for entering new markets.

**Goals / Objectives**

Goals for the project include research, extension, and capacity building:

1. To identify through research the information needed to determine the feasibility of strategies for developing vegetable and

livestock-product supply chains for local and regional markets.

2. To increase the skills, ability and success of small and medium-sized producers to optimize their operational and marketing strategies.
3. To increase capacity at the University of Idaho (UI) and in the many local efforts around the state to engage in developing local and regional markets, processing infrastructure, cooperatives and other related economic-development activities.

#### **Specific Research Objectives**

1. To determine restaurant and retail-market size and characteristics, including demand for local and regional vegetables and livestock products.
2. To determine optimal supply-chain configurations for small and medium-sized farmers to access local and regional markets.
3. Develop demand thresholds and ranges for understanding how large of an area is needed to provide sufficient demand to support food-systems infrastructure development.
4. Identify best strategies, appropriate locations and scales of operation for aggregating, processing, storing and distributing vegetable and livestock products in Idaho.
5. Describe strategies for optimal spatial allocation of agricultural production based on the market-demand structure and geographical conditions.
6. Determine the economic impacts of alternative scenarios of vegetable and livestock production and expansion on sub-regions and on Idaho economies.

#### **Specific Extension and Outreach Objectives**

1. Increase producers' skills, knowledge and success in accessing local and regional markets.
2. Increase effectiveness of those involved with food-systems economic-development activities in determining the feasibility and prioritization of activities to develop supply-chain infrastructure to increase access to local and regional markets.

#### **Capacity-building Objectives**

1. Increase collaboration between UI Extension programs around the state and UI researchers in Agricultural Economics, Business and Geography.
2. Update and build upon previous UI Extension programs to address needs identified in past evaluation, research and other sources.

#### **Methods**

##### **Market-analysis Methods**

The market-analysis research component will use Choice Experiment Methodology and Survey Design to quantify and characterize restaurant and retail markets for local and regional vegetable and livestock products. Focus groups will aid in determining the appropriate number of attributes and wording of survey questions. Survey pretests will be conducted to aid in developing and testing the surveys. Survey design will include significant pre- and post-testing, including verbal-protocol analysis (Schkade and Payne, 1994).

##### **Survey Implementation, Format, and Sampling**

Surveys will be conducted by using a phone-to-web survey method in the three primary locations of interest. Among the various methods of surveying (in-person, mail, telephone and web), the choice of phone-to-web survey was determined to be most efficient and cost-effective to address the objectives of this project. Restaurant buyers are very busy people, and for this reason, they are unlikely to respond to mail surveys. The geographic distribution of the survey area makes in-person surveying cost prohibitive. The number of attributes being studied will likely result in questions too complex to present in a telephone survey. Thus, we believe that a phone-to-web survey method will increase the response rate from busy restaurant buyers and maximize efficiency and cost-effectiveness.

We intend to collect at least 60 completed surveys of restaurant and retail buyers in each of the three project regions, giving us a total of 180 completed surveys for the project. Randomization procedures will be designed to ensure that surveys are implemented over a random sample of buyers at each geographic location, with the intent to oversample current buyers of locally-produced products to ensure sufficient number of observations. Survey implementation will be done by the Social Science Research Unit of the University of Idaho.

Conjoint Models will be used to construct the survey design. To implement the survey design, we will use a choose-one structure for choice-experiment questions. The choose-one format has a strong justification in neoclassical economic theory - particularly with regard to unconditional willingness-to-pay estimation.

##### **Supply-chain Optimization Methods**

To address the identified project-research questions, we will use business analytics and mathematical optimization models to analyze various factors associated with distribution-strategy design. Factors such as distance, population density, infrastructure, demand range and demand threshold will all be incorporated in the model design. Mathematical optimization is

the selection of a best element (with regard to some criteria) from some collection of available alternatives. Simply put, an optimization problem consists of maximizing or minimizing an objective (such as revenue, profit, or cost) by systematically choosing input values (such as distribution mix and distribution routes) from all allowed values, and computing the value of the objective. More generally, optimization includes finding "best available" values of some objective function given defined problem settings. This methodology will afford us the opportunity to do extensive "what-if" analysis while simultaneously changing multiple factors.

### **Spatial-allocation Analysis Methods**

The spatial-allocation analysis will use the von Thunen approach to build on the data and analyses provided through the market research and the delineation of optimized supply-chain scenarios to focus on identifying recommendations for optimal locations for vegetables and livestock production. This sub-team will construct a spatial geo-database incorporating necessary spatial information such as market location and size, farm-production locations, and the transportation structure/system to assess land rent/bid rent and agricultural-production possibilities (Fujita and Thisse, 2002). The geo-database will be constructed on a standard ArcGIS 10 platform using readily available data sources from a variety of government sources such as Inside Idaho (State of Idaho GIS), Idaho Department of Transportation (IDOT), and Idaho Department of Lands. Specific data layers will include land use (using existing classifications or derived classifications from NAIP imagery ; 1-m resolution), transportation network, location of farms and urban places, a digital-elevation model, and river/stream and bodies-of-water layers.

The evaluation of regional hierarchies will be determined from the demand profiles from the market research and economic base analysis. Our supply-chain optimization research will provide inputs into the transportation and production-cost assessments. Spatial demand will provide a framework for measuring market areas and spatial competition. Market hierarchy will be evaluated through a structured analysis of the order of demand and services at different market centers using a log-linear framework (i.e., rank-size rule/Zipf's law (Berry and Parr, 1988; Christaller, 1966; Isard, 1956). Central place/market hierarchies will also be evaluated by means of time and distance analyses that directly assess market spacing (Skinner, 1965; Griffin, 1973).

We will extend the spatial market analysis with explicit spatial analysis that takes local effects into account for the market hierarchy. For this purpose, we will use semi-parametric statistical models of agricultural bid rent that simulate both regional and local effects using geographically-weighted regression that can calibrate the model using kernel-weighted least squares without violating patterns of agricultural productivity non-stationarity (Fotheringham et. al., 2002; Nakaya et. al., 2009).

### **Economic Impacts Assessment Methods**

Economic impacts will be estimated using a social-accounting matrix (SAM) input/output methodology. This project will develop an economic model for the study area using IMPLAN. The project will create an economic profile, which identifies the contributions of different state sectors and sub-regional economies. This profile will reflect the actual sales, value added, wages, jobs, unemployment, income distribution, and other measures of economic activity in each sector of the economy. Finally, a simulation will be conducted to estimate the economic impacts of optimized production and supply-chain scenarios.

### **Extension Methods**

Pre and post surveys will be used to evaluate extension activities. An event evaluation will be used at each event, and a survey of all training attendees will be conducted at the end of the project to capture actual training outcomes. Evaluation activities will be used to document project success and to refine future program activities.

### **Target Audience**

New data on regional markets, supply chain modeling and production scenarios will be useful to food systems economic development and feasibility efforts in Idaho. The spatial allocation analysis will give producers a portfolio of optimized crop production mixes and strategies based on demand from local and regional markets. This can be used to identify new opportunities to change production to better meet demand characteristics. The supply chain optimization modeling analysis will produce a portfolio of optimized scenarios based on different production, infrastructure and demand variables. This will be useful to producer groups and food economic development efforts to determine the feasibility of and to build new aggregation, processing, storage and distribution resources. This will help these effort identify profitable supply chain configurations for the three regions of Idaho. Economics impact analysis will help determine the value of research findings. Economic development efforts can focus on supply chain strategies that generate more benefit to their area of interest. Evaluation results and research findings will be used to refine extension programs and as a basis for planning the next wave of curriculum development.

The project builds new connections and activities internally at UI, developing new relationships and collaborations between faculty in Agricultural Economics and Rural Sociology, Business, Geography and Extension. Findings and recommendations will be developed into a PDF report, which will be hosted on the websites of the OCP, UI Extension and partners; and findings will be published as part of peer-reviewed journal articles.

### **Products**

1. The first research component will differentiate local and regional markets for vegetables and livestock products in three geographical areas of Idaho - Northwest, Southwest and Southeast. In each region, we will estimate the size of the market for each product type (Total Available Market) and the subsequent portion that pertains to local products (Serviceable Available

Market). In addition to estimating market size, we will investigate factors that may influence demand for such products. For this purpose, we will survey buyers (restaurant and retail markets). To collect this data, we will design and implement an in-person survey of buyers, applying choice-experiment methodology.

2. We will study agricultural market structure and performance in Idaho's food supply chain. On the supply side, we will examine the production and resource-use by various small farms in Idaho; on the demand side, we will evaluate local-demand volume for agricultural products from Idaho small and medium-sized farms, as well as potential export volumes from Idaho. To better understand food supply-chain operations in other states, we will also examine the farm-products distribution practices in other states through secondary data.

3. The spatial-analysis portion of the project will determine optimal spatial patterns of agricultural production with respect to multiple markets. A spatial geo-database will be used to understand and develop optimal models of the spatial distribution of crop and livestock production based on markets, supply-chain characteristics and geographical conditions. Our analysis will then identify the optimal spatial allocation of vegetable and livestock production based on market demand.

4. A social-accounting matrix (SAM) model will be developed using Minnesota Impact for PLANing Group's software and data package, IMPLAN (IMPLAN.com), for Idaho and the main three economic sub-regions within the study area (North, Southeast, and Southwest). The project will create an economic profile which identifies the proportional contributions of different sectors in the state economy and sub-regional economies. This profile will reflect the actual sales, value added, wages, jobs, unemployment, income distribution, and other measures of economic activity in each sector of the economy. The project will also create an economic base assessment of the regional economy, which will identify and report the actual drivers of the regional economy in each economic region.

5. Two-day outreach and training sessions will be held in each of the three regions during the second year of the project.

**Expected Outcomes**

**Expected outcomes**

1. Identification of market size and characteristics, and demand thresholds and ranges for vegetable and livestock products in Idaho local and regional markets.
2. Development of a portfolio of optimized production and supply chain scenarios based on demand size and characteristics.
3. Increased understanding of the feasibility of strategies for aggregation, processing, storage and distribution of vegetable and livestock products for local and regional markets.
4. Increased food supply chain related economic development involving small and medium-sized farms in the state.
5. Increased sale of products from small and medium-sized farms to local and regional markets.
6. Increased knowledge and skills among producers for accessing local and regional markets.
7. Increased knowledge, skills and resources for food economic development.
8. Increased opportunities and resources for small and medium-sized producers.

**Keywords**

GIS ~livestock ~market research ~restaurants ~retail ~small farms ~spatial allocation ~supply chain

**Estimated Project FTEs For The Project Duration**

Role	Non-Students or Faculty	Students with Staffing Roles			Computed Total by Role
		Undergraduate	Graduate	Post-Doctorate	
Scientist	1.0	0.0	2.0	0.0	3.0
Professional	1.0	0.0	0.0	0.3	1.3
Technical	0.0	0.0	0.0	0.0	0.0
Administrative	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0
Computed Total	2.0	0.0	2.0	0.3	4.3

**Animal Health Component** 0 %

**Activities**

**Research** 66 %  
**Extension** 34 %

**Research Effort Categories**

**Basic** 0 %  
**Applied** 100 %

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Education

0 %

Developmental

0 %

**Classification**

Knowledge Area (KA)	Subject of Investigation (SOI)	Field of Science (FOS)	Percent
601	6199	3010	100

**Knowledge Area**

601 - Economics of Agricultural Production and Farm Management

**Subject Of Investigation**

6199 - Economy, general/other

**Field Of Science**

3010 - Economics