9-2023

Market Outlet Choices of Small-Scale Fruits and Vegetables Producers in Arkansas

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A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Science in Agricultural Economics

by

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Universite Catholique du Congo
Bachelor of Science in Economics and Development, 2014

August 2023
University of Arkansas

This thesis is approved for recommendation to the Graduate Council.

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Abstract

This thesis comprises two studies investigating the market outlet choices of small-scale fruit and vegetable producers in Arkansas. By examining the marketing decisions of producers in the region, the objective was to profile producers based on their utilization of different available outlets and identify the factors influencing their decisions regarding where to sell their products. Data from a survey conducted in the Ozark Mountain Region (comprising Arkansas, Southern Missouri and Eastern Oklahoma) during Fall of 2022 were analyzed using k-means clustering to classify producers based on their characteristics, thus establishing distinct producer profiles. Multinomial logit regression was employed to determine the impact of selected factors on producers' likelihood of choosing one outlet over another.

The findings of this research reveal three distinct types of producers in Arkansas. Firstly, there are the farmer's market lovers, predominantly female, who prioritize selling at farmers' markets due to their preference for connecting with consumers rather than seeking additional outlets. Secondly, there are The Trial-and-error producers, whose small-scale fruit and vegetable production appears to be a hobby. Per their name they are trying out different outlets to sell their products as they also had the least sales. Lastly, there are The Experienced wholesalers, who predominantly grow for resellers. This group, mainly comprising men and individuals of white ethnicity, prefers selling to wholesalers and restaurants. Notably, this group attains the highest revenues and demonstrates a stronger focus on organic production practices. Also, they grew a large variety of crops which was considered counterintuitive given that wholesaling typically requires large minimum order quantities. A hypothesized reason for crop diversification is pest, disease, and weed management necessary with organic production.

Local governments and organizations can employ targeted strategies based on these findings. For instance, women should be the primary focus when providing market information and promoting organic production practices, given their significant representation among farmer's market lovers. Conversely, when introducing new services such as food hubs and delivery options, men should be the target audience, as experienced wholesalers are predominantly male. The second analysis highlights several factors that influence producers' choice of outlets. These factors include proximity to the market, production practices, market entry requirements, license/fee/registration/certification, and crop diversification. Since greater distance to market is costly in terms of fuel and labor, produce pickup by wholesalers is envisioned as a means to enhance a producer’s choice to sell to wholesalers, in turn making produce available to consumers at grocery outlets.

The limitations of this research include potential self-reporting bias and the exclusive focus on fruit and vegetable producers, limiting the generalizability of the findings. Additionally, certain relevant variables could not be considered due to incomplete information provided by respondents given the length of the survey.

Acknowledgements

I would like to express my deepest gratitude to all those who have played a significant role in making the past two years the most daring and rewarding stages of my life. While my individual efforts were important, I recognize that the meaningfulness of these years was a result of the collective contributions and support of numerous individuals. First and foremost, I am grateful to my advisor, Dr. Michael Popp, whose unwavering patience with my imperfect English and exceptional guidance were instrumental in shaping my academic journey. His support, kindness, advice, and expertise transformed the process of writing this thesis into an intense and effective learning experience. I am also immensely grateful to my committee members, Dr. Jennie Popp and Dr. Trey Malone, for their dedicated time and attention to my work. Their valuable insights, advice, and suggestions have made a significant contribution to the successful completion of this thesis.

In addition, I would like to express my gratitude to Dr. Nalley, whose constant advice kept us on track and ensured that all our questions were answered throughout our learning process. I would also like to acknowledge and thank the entire faculty and staff of the Department of Agricultural Economics and Agribusiness at the University of Arkansas, as well as the collaborators at the Center for Arkansas Farms and Foods and the University of Arkansas Cooperative Extension whose support and assistance in data collection were integral to the completion of this work. Finally, I would like to express my gratitude to my classmates for their unfailing support and collaboration. I am also thankful to The Fulbright program for their trust in me, and my family and friends for their constant encouragement and belief in my abilities.

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Chapter I. Marketing Channel Study Justification and Overview

A. Problem Statement

Providing good marketing information and advice to producers depends on understanding the characteristics of producers who choose to sell their products in one market as opposed to another. Understanding the factors that influence producers' marketing channel selections is essential, as these choices are critical to producers' financial success (Adugna et al., 2019). In addition to informing policy and project development, this knowledge can provide valuable insights for producers seeking to maximize profitability and/or how to scale up operations.

However, despite the importance of this issue, there is a notable gap in research on the factors that influence the market outlet choices of small-scale Arkansas fruit and vegetable growers. In addition, there is a notable lack of research profiling Arkansas small fruit and vegetable growers regarding the market outlets used. Therefore, there is an urgent need for research in this area to provide valuable information for developing effective marketing strategies and policies.

B. Rationale

In Arkansas, small-scale fruit and vegetable growers contribute to the local economy and provide fresh, nutritious produce to local communities (Mayo et al., 2013). However, the difficulties they face in choosing market opportunities can limit their potential for success and lead some to cease production. Therefore, understanding the profile of small-scale fruit and vegetable producers and the factors that influence their market outlet choices is critical to developing effective support programs and policies that promote the growth and sustainability of this agricultural sector in Arkansas. This study contributes to the existing literature on outlet choice and provides insight into the unique challenges faced by Arkansas producers. By profiling

growers and identifying the most critical factors influencing their decisions, this study aims to provide critical information to enhance consumer access to locally grown food.

C. Objectives

The primary objective of this research was to evaluate the marketing decisions of fruit and vegetable growers in Arkansas. Specifically, we aimed to assess their expenses throughout the production and marketing process and determine their profit margin at the end of the growing season as done in Jablonski et al. (2021). To achieve this objective, it was imperative to acquire labor compensation data, focusing on the level of pay for farm owners/producers and part-time and full-time employees. This explains the complexity of the survey questionnaire found in the Appendix. Obtaining this data for Arkansas proved difficult, as some of the information provided by some producers was error prone while others simply chose not to provide the information. Despite this limitation, we collected data that provided valuable information on the choice of outlets used by producers using producer responses to a variety of cost of production and marketing questions as well as reasons for favoring a particular market outlet. The focus of this study was thus on profiling producers regarding their marketing strategies and identifying factors that influence these decisions.

The thesis is organized to test the following null hypotheses, jointly and separately: 1) producers are homogeneous in the production and marketing methods they use as well as their demographics, and, 2) the choice of marketing channel(s) producers pursue is not influenced by cost, revenue, nor producer's characteristic such as size of operation, number of crops grown, experience, age, and education.

D. Overview of methods

In the fall of 2022, a survey was conducted with Arkansas' small fruit and vegetable growers to understand the factors influencing their choice of market opportunities. Please see the Appendix for the full questionnaire with all possible questions shown. With the survey conducted online, respondents' answers to specific question actually tailored the subsequent questions based on prior information obtained using display logic. Since ten initial market channel selections were possible (one of them being user-defined), the first step taken was to categorize market outlet choices: i) direct sales and community-supported agriculture (CSA) placing the burden of travel mainly on end consumers; ii) farmers' markets allowing producers repeated direct interaction with end users to build brand loyalty and gain feedback while also increasing transport and marketing costs; iii) restaurants enabling larger sale quantities per customer while minimizing direct end user contact; and, iv) wholesale, food processor, and grocery stores requiring larger volume in return for shifting unsold produce risk to intermediaries.

Using answers to questions ascertaining individual characteristics of producers, the data were analyzed using cluster analysis to group respondents into like groups, essentially to test the first null hypothesis. A second round of analysis, employing multinomial logit analysis attempted to identify whether and to what extent respondent, marketing channel, and production characteristics impacted the market channel selection to test the second null hypothesis.

E. Expected Results

The results of this study are expected to contribute to developing policies and programs to support fruit and vegetable production in Arkansas and promote sustainable economic development in rural communities while increasing the supply of healthy, locally grown produce

to consumers. For example, the effects of distance to market and investment in producer time to gain consumer recognition for repeat sales and feedback from end users on marketing channel selection was quantified. The effect of size of operation on marketing philosophy was analyzed. How the use of organic production methods would lead to differences in pursuit of market channels was also answered. Finally, the impact of number of crops grown to specialize vs. diversify production and marketing risk along with number of market channels to pursue, could assist growers entering this sector as well as intermediaries and policy makers with guidance about how to potentially increase operation scale and what marketing channels to analyze in efforts to promote greater access to locally grown produce to end users.

F. Overview of Chapters

Chapter II focuses on profiling fruit and vegetable growers in Arkansas to assist with targeting producer groups given their management philosophy. The chapter begins by providing an overview of efforts made by local governments and organizations to support local producers and the various marketing channels available to small-scale growers in Arkansas. A description of analytical producers follows along with study findings that detail grower characteristics of three types of producers. The chapter concludes with implications of the study's findings for policymakers and other stakeholders.

Chapter III analyzes whether and to what extent certain producer characteristics influence the four marketing channel selections mentioned above. A literature review of factors impacting marketing strategies supports the choice of survey questions asked. Statistically significant findings are then reported to guide recommendations made that would improve access to locally grown produce for end users. Chapter IV concludes this thesis by summarizing findings and suggesting improvements for further research.

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Chapter II. Profiling Small-scale Fruit and Vegetable Growers by Marketing Channel Selection

A. Introduction

Local governments and communities make many efforts to sustain small-scale fruit and vegetable producers. These efforts are reflected in the subsidies, loans, education, and market information made available to farmers by the U.S. Department of Agriculture (USDA) (Martinez, 2016; *Small and Mid-Sized Farmer Resources*, n.d.), and other regional organizations. In Northwest Arkansas, for example, the Walton Personal Philanthropy Group the Northwest Arkansas Land Trust support local farmers from food cultivation to commercialization, including facilitating access to education, land, technical expertise, and financial resources for established and emerging farmers; these organizations also strive to enhance farmers' access to outlets, product certification, and processing services (Northwest Arkansas Food Systems, n.d.). The marketing stage holds significant importance for producers since it is the sole means to recoup the resources invested in the production process while also providing consumers access to fresh produce (Andreatta & Wickliffe, 2005; Hall, 2002; Refera Jebesa, 2019). In providing marketing information and guidance to producers, it is crucial to gain insights about attributes of producers who opt to sell their products in a particular market over another, and this is possible by generating a profile of small-scale fruits and vegetables producers who select specific outlets while considering the various costs associated with marketing and the distance they travel to reach their customers (Wosene et al., 2018). By profiling these producers and examining the underlying determinants of their marketing channel choices along with associated benefits and opportunities, it is possible to develop targeted strategies and interventions to improve the competitiveness and sustainability of small-scale fruit and vegetable producers or ensure greater

access to local produce for consumers. Such an approach can be of great importance in advancing our knowledge of marketing practices in the agricultural sector and identifying practical ways to support small-scale producers in an increasingly competitive market.

Small-scale producers contribute to the food supply system and local economies (Visser et al., 2013; Rossi et al., 2017), making up 89 percent of all farms in the United States, occupying approximately 45 percent of the nation's arable land, and contributing 18 percent of the country's overall production value (Whitt et al., 2022). In contemporary agribusiness, producers face the dual imperative of producing quality products and identifying profitable markets to ultimately sell products before they deteriorate. It is impossible to overstate the importance of this dual mandate, as it directly affects the profitability of producers and the availability of fresh, adequate produce for consumers. Identifying the characteristics of producers and why they choose particular markets is therefore critical to producer viability and continued access to fresh local produce, which requires careful examination of these characteristics.

This research aims to identify the common traits that constitute the profile of vegetable and fruit producers in terms of how they think about their marketing channel selection. By identifying these traits, decision-makers can better understand the factors influencing producers' choice of outlet, including costs, demographics, and production reasons. With the help of this information, local governments and organizations can develop policies and programs that will help farmers gain access to select markets, to increase their capacity to make a living, and to improve consumer access to locally produced food. These are essential for policymakers, farm managers, and food producers to know as they create policies to sustain farmers and their marketing strategies.

B. Literature Review

Producers can choose from several existing channels to market their products. Farmers' markets are one such option that facilitates the gathering of regional producers allowing them to sell their products directly to customers without going through distributors. This outlet provides a platform where suppliers can interact with customers, showcase their products, and generate revenue by cutting out the intermediary (Hunt, 2007; Visser et al., 2013). Farmers' markets also provide consumers access to fresh, locally grown products which can be more sustainable and healthy (Arkansas Farmers Markets, n.d.; Visser et al., 2013). The remaining options are restaurants that serve farmers' products as dishes to their customers, supermarkets/groceries stores, community-supported agriculture (CSA), farm stands, and selling to wholesalers, grocery stores, food processors, or other intermediaries (LeRoux et al., 2010; Low & Vogel, 2011).

As previously mentioned, producers must identify profitable outlets to sell their products. Farm financial performance depends significantly on the efficiency of marketing (Bauman et al., 2018; B. B. Jablonski et al., 2022). However, as producers choose their outlets, they are faced with numerous challenges, such as meeting quantity and quality standards, packaging costs, product processing requirements (e.g., cold storage, order picking, washing), travel distance, and market access fees, which can increase costs and reduce profitability (Hardesty & Leff, 2010; Low & Vogel, 2011). Before choosing certain outlets, producers need to make sure they can comply with all the above requirements, which may define the profile of producers that can access the outlet. Wholesale channels, for example, typically require consistent product size and quality, as well as packaging to standardized case weights, which can be a barrier to access for producers, as choosing this channel can lead to additional stress. At the same time, CSA channels may require high product volume throughout the production season, with fewer processing and

packaging requirements and fewer consumers, which can make this outlet quite profitable (LeRoux et al., 2010).

Although limited literature is available on profiling fruit and vegetable producers, several characteristics can determine the producer's profile. As producers select outlets based on their desire to generate revenue, Bauman et al. (2018) and Jablonski et al. (2022) referring to experience, indicated that beginning farmers start with direct sales. Furthermore, in their evaluation of scale and technical efficiency among farms and ranches with a local market orientation, Bauman et al. (2019) indicated that scale also played an essential role in determining sales volume. Therefore, we can assume that farming experience and scale can constrain producers' marketing options. Plakias et al. (2020) wrote about direct marketing channel choices among U.S. farmers, enumerated experience, and other characteristics like farm size and crop variety (vegetable, fruit, and nut production) to be leading factors for producers' likelihood of selling in a particular outlet. Other characteristics, although not clearly defined by existing literature, for profiling producers and their choices of outlets, can also be used to create a producer's profile. These characteristics are production capacity, production practices (use of organic or conventional methods), sales volumes, producer's proximity to markets and producer reasoning about marketing channel choice.

C. Materials and Methods

Data collection

The data used in this research are primary data from small-scale fruit and vegetable producers in the Ozark Mountain Region (comprising Arkansas, Southern Missouri and Eastern Oklahoma). We emailed an online Qualtrics survey (IRB #2008276843) to eligible respondents identified by the Center for Arkansas Farms and Foods (https://caff.uark.edu) and producers'

contacts of University of Arkansas Cooperative Extension agents. With duplicate contact possible, an estimated 300 unique fruit, nut, and vegetable growers received an invitation to participate in the survey. To incentivize participation, the respondents were eligible for two randomly drawn prizes valued in sum at less than $500. The survey questions included information about producer location, the type, and number of crops produced, years of commercial production experience, sales, acreage, employee information, market outlets used, marketing-related costs, and demographic information. The survey took an estimated 15-25 minutes to complete. In total, 38 producers responded to the survey, with 29 providing a sufficient number of responses for in-depth analysis. Figure 2.1 shows the respondents' geographical location, and Table 2.1 provides US census information about the number of fruit and vegetable growers across Arkansas, Missouri, and Oklahoma, although only parts of Arkansas, Missouri, and Oklahoma were targeted (USDA/NASS Census of Agriculture, 2023).

For the question regarding the outlets used by producers, respondents had to select from farmers' markets, roadside stands, on-farm sales, farm stands, CSA with(out) delivery, U-pick, restaurants, grocery stores, food processors, and wholesale/intermediary outlets. Additionally, respondents could choose "other" and define their outlets, such as food banks, florists, craft fairs, or websites. From the usable observations collected, we grouped respondents into four market outlet choice categories for analysis: i) Direct sales and CSA without delivery requiring minimal transportation, with 17 observations; ii) Farmers' markets and roadside stands with some transportation, with 25 observations; iii) Wholesale, intermediary, food processor, and grocery store options with greater transport, less end user contact, and larger sales per customer, with 20 observations; and, finally iv) restaurants, with eight observations.

As we identified four categories of outlets from the survey responses, this study aimed to group producers into categories of like characteristics to ultimately generate demographic and grower profiles that could later be used to inform decision makers about how to target specific market outlet choices or to increase consumer access to locally produced foods. To profile farmers, we used k-means clustering (Malone & Lusk, 2018) to generate producer profiles based on their production and marketing choices as well as their consideration of expenses and benefits associated with available market opportunities. The euclidean distance between a specified number of *k* clusters was minimized among groups' individuals (*j*) using k-means cluster analysis (Arabie & Hubert, 1996; Malone & Lusk, 2018) according to factors (*x*) as follows:

$$\min(distance_x) = \min \sqrt{\sum_{j=1}^{12}(x_j - \overline{X_{jk}})^2} \quad (1)$$

where $\overline{X_{jk}}$ is the center of the cluster associated with observations x_j from individuals' responses to a set of questions as defined next.

Variable definition

We used five categories of questions in our survey. These categories were: i) Market outlet variables: DCSA encompassed respondents that used direct sales on farm and sold produce via CSA without a delivery outlet; FARMER respondents used Farmers' markets and roadside stands as their sale outlets; WIFP were respondents that sold to wholesale, intermediary, food processor, and grocery outlets; RESTAURANT respondents sold to restaurants. Since a respondent could sell to more than one outlet, we used MDIV or market diversification as a variable that summarized how many of the four outlets each respondent used. A second category of variables were related to revenue where SALES would reflect the size of the operation in terms of annual produce sales as reported by the respondent, REASONS was the number of

checkmarks a respondent selected as a reason for choosing a particular outlet. Reasons ranged from no reason provided (REASONS=0) or choosing a market for the following reasons relative to other market outlet choices: high customer traffic, least labor-intensive, only choice available, and dealing with preferred customers. A final measure in the revenue category was the level of satisfaction with prices received (PSAT). The third category of variables encompassed measures related to production methods employed. A respondent could choose whether they followed mainly conventional production using herbicides and chemicals (CONV = 1) or was certified organic, in the process of converting, a certified natural grower, or relied on herbicides rarely (CONV = 0). The growers were also asked about the number of different crops they grow annually (CDIV or crop diversification). A final measure in this category tracked their level of experience as a commercial fruit, nut, or vegetable grower in years. A fourth category measured specific cost variables and the number of items checked when queried about market access and license fees, personnel needs at sales events, packaging and labeling costs, stand and refrigerated storage requirements (SCOST) by market outlet choice. A more specific question ascertained advertising expenses as a percentage of sales by market outlet (ADV). Again, per market outlet, each respondent was asked about the distance traveled in 10-mile increments as an indicator of transport cost (DIST). The percentage of unsold produce by market outlet (UNSOLD) was expected to also reflect a cost parameter. A final set of questions captured the demographic distribution of producers. Variables included binary gender (F = female, M = male, SI-G = self-identified or other genders); a categorical education variable that tracked education level (EDUC) where choices included, some high school, finished high school, some college, finished 2-yr associates degree, completed 4-yr college degree, master's degree, PhD, and other (non-specified); finally, a household income questions was raised (INCOME).

To be able to plot the data in a spider diagram that would allow easy visual examination of differences across producer groups with respect to the above variables, we scaled the responses using an index between 0 and 1, with 1 indicating the maximum value observed across all respondents and 0 the minimum value. In this study, k, the number of clusters was set to three groups after visual analysis of a dendrogram, obtained using hierarchical clustering, that suggested that four clusters would lead to respondent groups with only 1 observation and that analysis of only two clusters had larger within group sum of squares (WSS) in comparison to three respondent groups.

Further, three modeling approaches were employed. The first model used all of the above variables (except demographics) for grouping respondents into three clusters:

$$PG = f(\text{MDIV, SALES, REASONS, CDIV, CONV, YRS, SCOST, DIST, ADV, UNSOLD}),\ n = 44 \quad (2)$$

where PG is the producer group assignment based on the above variables used that are described in Table 2.2, and *n* is the number of usable survey responses with the average respondent using 2.4 market outlets. Since not all of the 29 respondents recorded an answer to all questions, ADV and UNSOLD were removed to increase the number of observations and as SCOST already captured relative cost differences across marketing outlets across observations increasing *n* to 53. Finally, since the DIST variable was not reported for 14 observations, the last specification of the model excluded the last three variables and used 67 observations.

D. Result and Discussions

Hierarchical k-means clustering using the short list of factors by excluding the factors DIST, ADV, and UNSOLD was deemed optimal with 3 clusters as seen in the dendrograms (Fig. 4). Both the specification with the least number of variables and most observations (short

specification – right panel of Figure 4) and the long specification shown in Eq. 1 (left panel) with most variables and least observations, led to identical cluster assignments. As such we report information using the most observations available. The spider-diagrams in Figures 2.2 and 2.3 showcase cluster results by market outlet, cost, sales, and demographic factors with their standard errors reported in Table 2.3.

Based on the data presented in Figures 2.2 and 2.3 as well as Table 2.3, it is evident that Group 1 producers, despite their limited experience, predominantly sold their produce at farmers' markets as a distinguishing feature in comparison to the second two groups. This group primarily focuses on organic food production and invests heavily in advertising their products. Several factors influence their choice to sell at the farmers' market, including market proximity, favorable prices, and the opportunity to meet and sell directly to consumers. In addition, it is worth mentioning that most sellers in Group 1 are women and have a relatively low level of education. These individuals are passionate about selling their products at the farmers' market, which is why we refer to them as "Farmers' market lovers".

Although they may be more experienced than Group 1, producers in Group 2 exhibited a wide range of diversity. They used all available outlets with low advertising costs and low sales, suggesting they may be part-time workers lacking specialization. The group's diversity is also evident in terms of years of education achieved, race, gender, and crop variety with high use of conventional production practices by comparison. As such, they appeared least established and also were least satisfied with the prices they received. Hence, we identify them as "Trial and error".

Producers in Group 3 exhibit unique characteristics when compared to the other groups. Specifically, they have a considerably larger male representation and ethnicity was only white.

They were both more educated and had greater years of production and marketing experience along with largest farm sales. We refer to them as the "Experienced wholesalers". Unlike other groups, they have the lowest use of farmers' markets. Instead, they supply the most to restaurants and mainly use organic production methods. These producers grow a wide range of crops and often travel long distances to distribute their products, which explains the high costs incurred. Furthermore, they have a significant presence in the wholesale and direct/CSA outlets. While we had hypothesized that growers, principally targeting WIFP, would focus on fewer crops to gain sufficient volume, high CDIV lowers production and marketing risk while at the same time likely leading to a more even or less lumpy distribution of cash flow that would otherwise occur with a more focused or specialized crop production strategy. Enhanced opportunity to manage pests, disease, and weed problems with greater degrees of freedom in terms of crop rotation as a function of greater crop variety may also make organic production more attainable given the least observed use of CONV in this group. Their self-reported satisfaction with prices received was higher than for the "Trial and error" group but less than the one for the "Farmers' market lovers".

Overall, this information can help understand the different strategies and preferences of producers in the market and the factors that may impact their success. As found by Plakias et al. (2020), this analysis revealed that, even when direct sales serve as a base for fruit and vegetable producers, they might not be used to their full potential. This is likely due to the farms' proximity to consumers, which may require long trips to reach farms typically located out of town thereby limiting consumer access. As a result, producers can only access consumers who are willing to travel long distances or those who reside near the producer's farm. Beginning farmers, or "Farmers' market lovers", use farmers' markets extensively, as found by Jablonski et al. (2022),

in their efforts to increase their market share and secure a place on consumers' plates. They use the opportunity to connect with consumers, showcase their products, and build lasting relationships with them, even though selling at these markets can be costly in terms of producer time invested and hence may limit sales potential. On the other hand, the “Trial and Error” group tended to explore all available market options while also the highest users of conventional production methods. These producers distribute their products to all available markets in an effort to achieve high sales while minimizing advertising and other costs. We expect that with the least sales and intermediate years of experience, this group is likely to transition to either the "Famer's market lovers" or to find the mix of outlets employed by the "Experienced wholesalers".

In contrast, the "Experienced wholesalers" were the most experienced producers who strive to grow as much organic produce as possible. They focus on wholesalers and restaurants, as well as direct sales. These producers emphasize minimizing advertising costs, as they likely have local name recognition established. Customer contact is likely less than with the "Famers' market lovers" as they spend time on the road delivering in larger quantities per sale.

Overall, this analysis provides valuable insight into the distinct approaches taken by producers that employ different marketing channels, as well as the strategies that enable them to succeed in this agricultural production sector. Local governments and organizations can play an essential role in supporting small-scale fruit and vegetable producers. They can create opportunities for producers to network with other producers, buyers, and consumers. This can help build lasting relationships with customers and increase market share. In addition, local authorities can help remove regulatory barriers that may prevent small producers from accessing specific markets or lessen difficulties associated with regulatory compliance. Local governments

and organizations can play an essential role in supporting the three identified groups of small-scale fruit and vegetable producers. They can create opportunities for Farmer's Market lovers to network with other producers, buyers, and consumers so that they gain experience by learning from other producers, build lasting relationships with customers, and increase their market share. As women are largely represented in this group, and as the group is less market diversified, women can constitute the target when local government or organizations seek to bring market information to producers and promote organic production methods among producers.

To support the experienced wholesaler, local authorities and organizations can set up food hubs, which act as intermediaries to bridge the gap between producers and buyers. These food hubs can act as central pick-up points for major buyers such as restaurants and wholesalers, effectively reducing transportation costs for producers. In addition, growers can collaborate and form distribution cooperatives that offer delivery services, thereby reducing individual delivery costs. By implementing these strategies, stakeholders can improve the efficiency and sustainability of the wholesale process while minimizing costs for growers. In addition, local authorities can help remove regulatory barriers that may prevent the 3 producer groups from accessing specific markets or lessen difficulties associated with regulatory compliance. The government can create a more resilient and sustainable food system that benefits producers and consumers by streamlining regulatory processes and providing guidance on compliance requirements. They can also provide advertising for producers to improve awareness about local food production and the outlets where they are available. This is possible in various ways, including social media, local newspapers, radio stations, and other media. In addition, local governments can encourage restaurants to source ingredients locally by offering tax incentives or other forms of support, which can further promote a sustainable and resilient food system.

E. Conclusions

This research aimed to profile fruit and vegetable producers common to the mid-southern region of the U.S. A survey of such growers provided the information for using k-means clustering to differentiate among producers using revenue, cost, production method, and market outlet choices they used. Three distinct clusters of producers emerged. The first cluster had intermediate sales with a prime target market of supplying local produce to farmer's markets. In terms of demographics, these producers were mainly female. A second cluster could be named the part-timers or the "Trial and error" group. They were the cluster revealing the least information about gender, ethnicity, and education level and used the most balanced set of market outlet choices among the three producer groups. The last cluster focused most heavily on wholesale, intermediary, and food processor market outlets and restaurants. They had the highest sales and were mainly white, male respondents.

This information is attractive to decision-makers as it may assist with targeting efforts to promote certain market outlets. At the same time, managing production risk and creating cash flow throughout the marketing season, which comes with growing a large assortment of crops, appeared an overarching goal of all producer clusters. Attempting to urge producers to meet quantity targets by growing fewer crops may thus not work well in encouraging wholesale production, for example.

This study has some limitations, such as self-reporting bias, as we collected data from small-scale growers themselves. The scope of the study was also limited, as it focused only on small-scale vegetable and fruit growers in parts of Arkansas, Missouri, and Oklahoma. This may limit the applicability of the results to other regions. In addition, the study may not have considered all relevant variables that may influence growers' market choices, such as farm size in

terms of acreage farmed, change in market conditions from year to year, and labor intensity (where survey responses to detailed questions led to unreliable results with our survey). This may limit the ability to draw definitive conclusions about the factors that determine producer profiles. Future research efforts could focus on conducting comparative studies with other regions. They could also focus on conducting qualitative studies, such as focus groups or in-depth interviews, to better understand the motivations and factors that influence producers' market outlet choices.

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G. Tables and figures

Table 2.1. Number of farm operations by industry classification and state.

Year		**2012**			**2017**	
NAICS codes	AR	OK	MO	AR	OK	MO
1112[a]	441	291	648	496	330	707
1113[b]	403	1411	868	565	1454	974
1114[c]	252	286	758	221	325	772
Total	**1,096**	**1,988**	**2,274**	**1,282**	**2,109**	**2,453**

Source: Data collected from USDA National Agricultural Statistics Services (USDA, 2023)

[a] Vegetable and Melon Farming

[b] Fruit and Tree Nut Farming

[c] Greenhouse, Nursery, and Floriculture Production

Table 2.2. Explanatory variable definition with indexed values and standard deviation from producer survey conducted across Arkansas, Oklahoma and Missouri.

Cat.	Variable Name	Definition	Min.[a]	Max.[a]	Avg.[b] (Std. Dev.)
Market Outlet	DCSA	Respondent sold some fraction of their produce on the farm and via CSA with customers picking up (1 = yes; 0 = otherwise).	0	1	0.239 (0.430)
	FARMER	Producers sold their products at the Farmers' markets, and roadside stands (1 = yes; 0 = otherwise).	0	1	0.358 (0.483)
	WIFP	Respondents sold their products to Wholesale, intermediaries, food processors, and grocery stores (1 = yes; 0 = otherwise).	0	1	0.299 (0.461)
	RESTAURANT	Producers sold their products to Restaurants (1 = yes; 0 = otherwise).	0	1	0.104 (0.308)
	MDIV	Number of market outlets a respondent used from above four choices.	1	4	0.653 (0.234)
Revenue	SALES	The aggregate revenue producers generated from the sale of vegetables and fruits in their selected markets.	5,000	175,000	0.263 (0.254)
	REASONS	Producer reasons for selecting one outlet over another. The reasons farmers had to choose from where: the chosen market was least labor-intensive, had high customer traffic, was the only available, and the producer sold to preferred customers. REASONS is the number of reasons they chose for a specific outlet.	0	4	0.306 (0.238)
	PSAT[c]	Producer satisfaction with price received (0 = not satisfied, .5 = satisfied, and 1 = very satisfied)	0	1	0.630 (0.317)
Method	CONV	Farmers either sell products grown under Conventional production practices or organic (1 = conventional; 0 = organic).	0	1	0.194 (0.398)
	CDIV	Farmers cultivate a diverse range of fruits and vegetables, whereby **CDIV** serves as a quantitative representation of the number of varieties within their crop. Producers had to choose between 1 (crops number lesser than 5) and 3 (crops number greater than 10).	1	3	0.756 (0.299)
	YEARS	Producer's years of experience in producing and marketing fruits and vegetables. The Maximum year of experience was 27 years of commercial farming.	1	27	0.292 (0.262)

... cont'd next page

Cat.	Variable Name	Definition	Min.[a]	Max.[a]	Avg.[b] (Std. Dev.)
Cost variables	SCOST	The number of costs producers could check from a list of cost categories as a proxy for how expensive a market outlet is. Cost categories to check included Licenses, access fees, stands, refrigerated storages, packing, labeling, order pick up, and workers.	0	7	0.360 (0.239)
	ADV	The percentage of sales revenues dedicated to advertising purposes. Producers had to choose between 0, less than 5% (1), 5-10% (2), 11-15% (3) and more than 16% (4).	0	4	0.369 (0.362)
	DIST	The Distance traveled by producers to reach a market outlet. Choices included on-farm (0), 0-10 miles (1), 11-20 miles (2), 21-30 miles (3) and more than 30 miles (4).	0	4	0.392 (0.395)
	UNSOLD	The percentage of crop harvested that remain unsold. The choices were 0 = 0% unsold, 1 = 2.5%, 2 = 7.5%, 3 = 12. 5%, 4 = 17.5%.	0	5	0.313 (0.238)
Demographic	F	The female gender.	0	1	0.328 (0.473)
	M	The male gender.	0	1	0.522 (0.503)
	SI-G	Self-identified or other genders.	0	1	0.149 (0.359)
	EDUC	Producer's education level. Choices included, 1) some high school, 2) finished high school, 3) some college, 4) finished 2-yr associate's degree, 5) completed 4-yr college degree, 6) master's degree, 7) PhD.	1	7	0.535 (0.282)
	INCOME	The household income. Producers had to choose from a defined range of income levels. These choices were: 1) 7,500; 2) 15,000; 3) 22,500; 4) 25,000; 5) 35,000; 6) 45,000; 7) 55,000; 8) 65,000; 9) 85,000; 10) 95,000; 11)125,000.	7,500	125,000	0.2955 (0.254)

Notes:

[a] Min./Max. is the minimum/maximum categorical or numeric choice respondents selected in the entire sample.

[b] The average and (standard deviation) reported represents the average of respondents' values chosen relative to the maximum.

[c] Since this variable is categorical in nature, it could not be used for clustering. Nonetheless, it is included in Figure 3 to showcase cluster differences.

Table 2.3. Average and standard deviation of explanatory variables used for clustering producers from a survey conducted across Arkansas, Oklahoma and Missouri using the market outlet, revenue, production method, and cost variables using k-means clustering that excluded DIST, UNSOLD and ADV that are reported to showcase differences across cluster. Fall 2022.

Cat.		Cluster Assignment		
	Variables[a]	**"The Farmers' market lovers"**	**"Trial and error"**	**"Experienced wholesalers"**
Market Outlet	DCSA	0.21 (0.43)	0.25 (0.45)	**0.26**[b] (0.44)
	FARMER	**0.54** (0.51)	0.38 (0.50)	0.19 (0.42)
	WIFP	0.17 (0.37)	0.31 (0.48)	**0.41** (0.50)
	RESTAURANT	0.08 (0.33)	0.06 (0.25)	**0.15** (0.36)
	MDIV	0.542 (0.204)	0.500 (0.158)	0.843 (0.157)
Revenue	SALES	0.11 (0.07)	0.03 (0.00)[c]	**0.53** (0.13)
	REASONS	**0.43** (0.26)	0.14 (0.16)	0.30 (0.21)
	PSAT[d]	**0.72** (0.33)	0.53 (0.22)	0.61 (0.35)
Production Method	CONV	0.25 (0.43)	**0.67** (0.48)	0.07 (0.26)
	CDIV	0.64 (0.31)	0.67 (0.32)	**0.91** (0.20)
	YEARS	0.30 (0.24)	0.31 (0.23)	0.37 (0.23)
Cost	SCOST	0.39 (0.17)	0.21 (0.20)	**0.43** (0.28)
	ADV	**0.52** (0.41)	0.23 (0.37)	0.38 (0.28)
	DIST	0.34 (0.36)	0.31 (0.36)	**0.48** (0.44)
	UNSOLD	**0.35** (0.22)	0.34 (0.37)	0.27 (0.14)

Notes:

[a] Please see Table 2.2 for variable name descriptions and scaling of values.

[b] Averages in bold represent highest values among clusters for highlighting results.

[c] Producers in this group reported the same sales amount.

[d] Interpret with caution as this is a categorical variable.

Table 2.4. Description of producer groups by market outlet, gender, ethnicity, education, household income, sales per outlet and overall farm sales using a survey conducted across Arkansas, Oklahoma and Missouri and clustered using market outlet, sales, production method and cost variables excluding DIST, UNSOLD and ADV.

	"**Farmers' market lovers**"	"**Trial and error**"	"**Experienced wholesalers**"
# of responses per cluster	24	16	27
MARKET OUTLET			
DCSA	20.8%	25.0%	**25.9%**
FARMER	**54.2%**	37.5%	18.5%
WIFP	16.7%	31.3%	**40.7%**
RESTAURANT	8.3%	6.3%	**14.8%**
Total	100.0%	100.0%	100.0%
GENDER			
F	**50.0%**	25.0%	22.2%
M	37.5%	31.3%	**77.8%**
Other/Not specified	12.5%	**43.8%**	0.0%
Total	100%	100%	100%
ETHNICITY			
White	**70.8%**	**56.3%**	**100.0%**
American Indian or Alaska Native	**12.5%**	0.0%	0.0%
Asian	4.2%	0.0%	0.0%
Other/Not specified	12.5%	**43.8%**	0.0%
Total	100.0%	100.0%	100.0%
EDUCATION			
High school graduate	0.0%	0.0%	**14.8%**
Some college	12.5%	18.8%	**33.3%**
2 Y Degree	**33.3%**	12.5%	0.0%
3 Y Degree	4.2%	0.0%	0.0%
4 Y Degree	**29.2%**	25.0%	22.2%
Masters	20.8%	6.3%	**29.6%**
Ph.D.	0.0%	**12.5%**	0.0%
Other/Not specified	0.0%	**25.0%**	0.0%
Total	100%	100%	100%
HOUSEHOLD INCOME (avg.)	28,333	21,666	**64,259**
OUTLET SALES (avg.)	10,417	2,500	**25,000**
FARM SALES (avg.)	20,000	5,000	**93,518**

Figure 2.1. Location and frequency of producer response by Zip code.

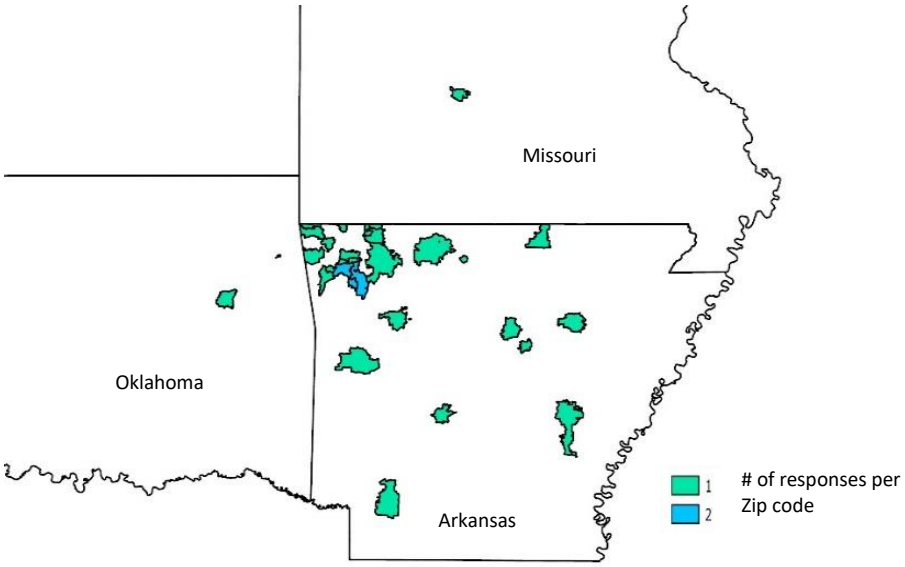


Figure 2.2. Explanatory Variables Used for Clustering from Fruit, Vegetable and Nut Growers Surveyed in Arkansas, Fall 2022.

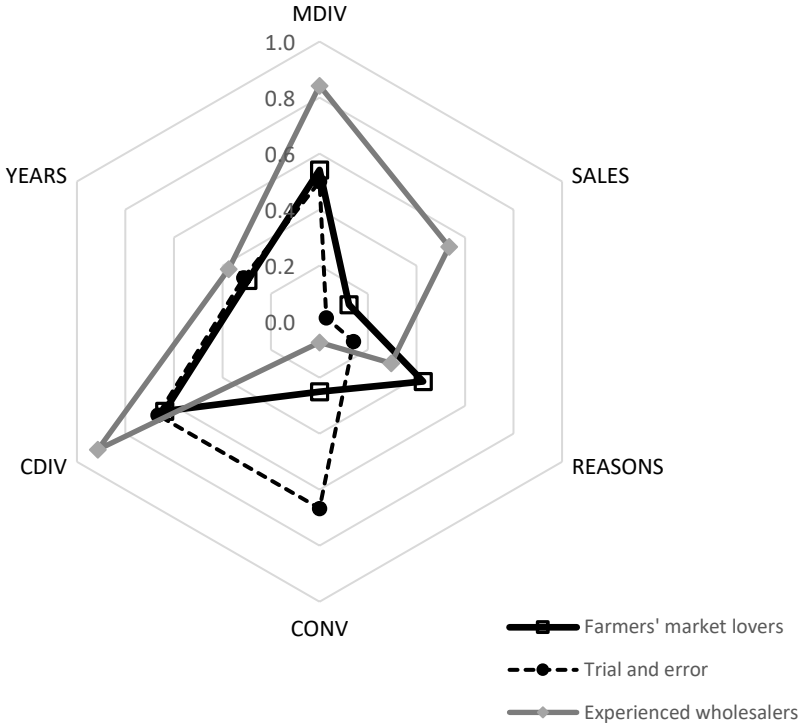
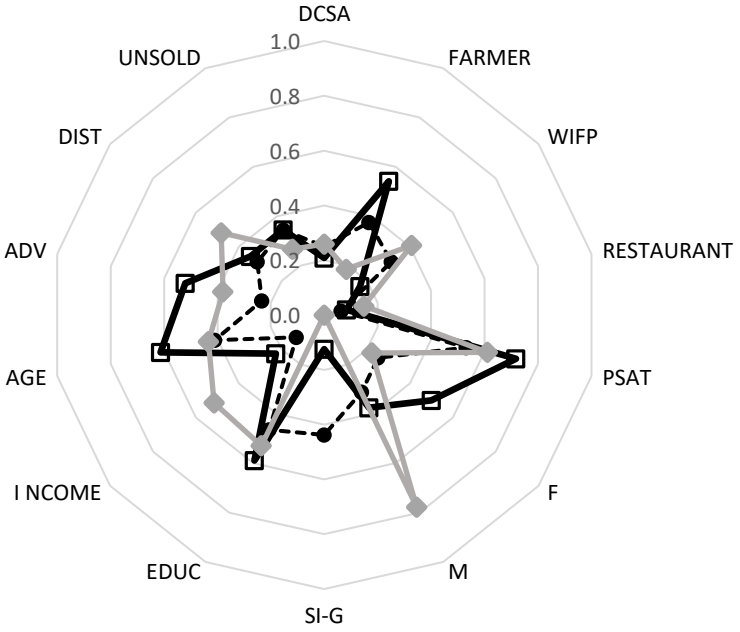
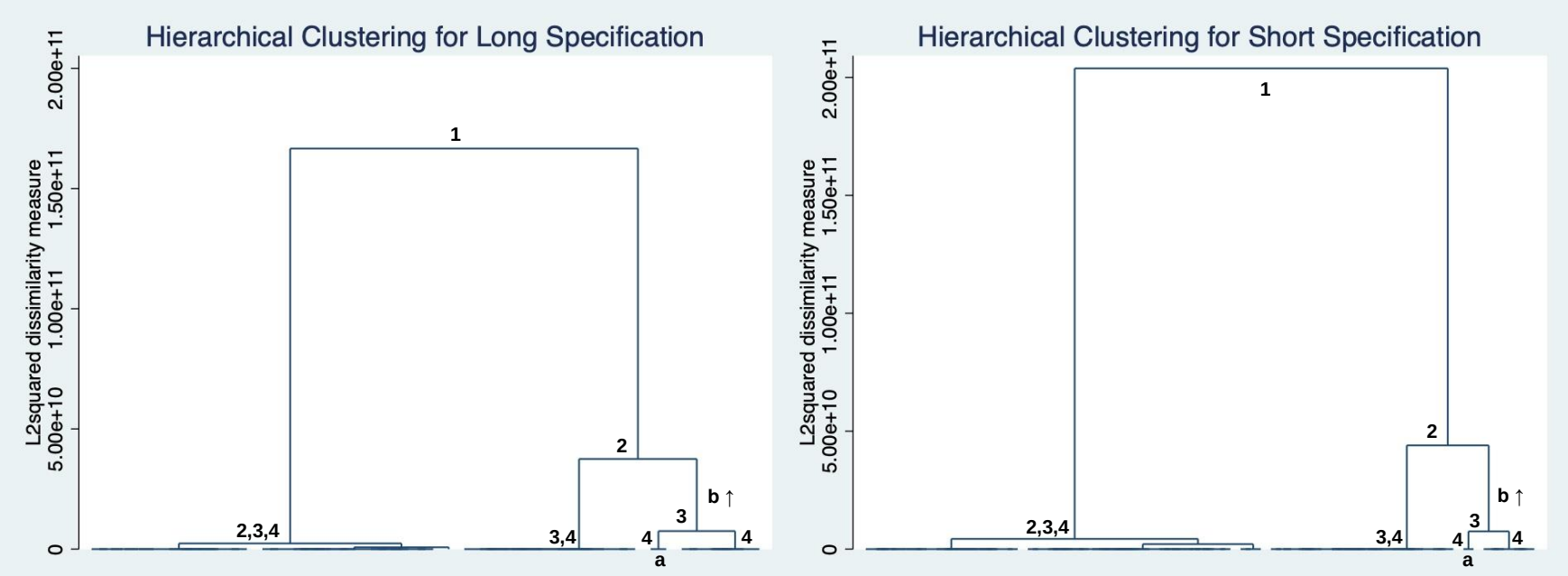


Figure 2.3. Market Outlet, Demographics, and Unused Variables for Clustering from Fruit, Vegetable and Nut Growers Surveyed in Arkansas, Fall 2022.



Note: Please see Table 2 for variable name definitions. A value of zero/one reflects the minimum/maximum observation across all responses. Plotted are the average scaled responses by variable by cluster.

Figure 2.4. Dendrograms or hierarchical clustering using all factors in the long specification and eliminating distance to customers, unsold produce, and advertising by market outlet for the short specification. Four clusters led to groups with few observations (a) and a large increase in within group sum of squares (vertical axis) was observed with two clusters (b). Cluster numbers are shown for each horizontal bar.



Chapter III. Factors impacting market outlet choice of small-scale fruit and vegetable growers

A. Introduction

Agricultural producers face many production and marketing risks. Once producers successfully harvest product on a farm, the choice of market outlet can dictate the selling price and what kind of product quality and quantity standards producers must meet. Hence, producers' marketing channel decisions have become as significant and intricate as production decisions concerning product quality and costs (Krafft et al., 2015) to ensure customer satisfaction.

Smallholder farmers sell food they grow in farmers' markets organized by local communities to support regional agricultural activity (CSA) and, less commonly, locally grown food is also supplied to wholesale markets for resale to other vendors (Hunt, 2007; LeRoux et al., 2010; Low and Vogel, 2011; Monson, Mainville, and Kuminoff, 2008; Uva, 2002). The choice of marketing strategy for smallholder farmers has been the subject of many studies that have tried to determine the best marketing strategy for smallholder farmers to maximize income and manage risks. While annual vegetable and fruit sales, as a size measure, do impact how many market outlets a farmer may pursue, it is not sufficient to determine what marketing system is optimal or whether decision makers can use it to guide the producer's choice of marketing system. The indicator is unreliable since it does not consider different costs and expenses associated with different market outlets a producer may pursue. Thus, prior survey work has considered several factors involved in the production and marketing process that drive the choice of market outlet for producers. Some factors that undermine this research stem from producers inadequately tracking labor force efforts and failing to allocate work hours to different production tasks on the farm vs. those incurred to sell produce at or post farm gate. Missing that

essential information may lead to erroneous interpretation of the actual value of their remuneration across marketing outlet (LeRoux et al., 2010).

Even though farmers have many direct-to-consumer and intermediary marketing options, making a good choice among these options is the key to success (Park, Mishra, and Wozniak, 2014; Uva, 2002). For many producers, direct marketing is a way to brand their product, collect direct consumer feedback, and evaluate their advertising effectiveness (Hunt, 2007).

Further, norms and standards that different customers desire and are willing to pay for vary by market outlet. This has both cost and revenue implications and hence impacts influences market outlet choice (Hardesty and Leff, 2010). The decision to determine where to sell the product thus requires knowledge about product certification, packaging standards, and cost of transportation for every outlet, so that producers choosing that outlet, can meet the needs of customers or intermediaries.

Somewhat related to the sales measure as an indicator of market outlet choice is the scale of production. Producers can diversify sales by growing a variety of products or focus on fewer products to meet market outlet-based quantity requirements (Monson et al., 2008). Wholesaling often contractually stipulates such quantity requirements leading to a preference of farmers' markets for those producers unable to meet the volume needs of wholesalers. Nonetheless, wholesale outlets can be considered a better option for beginning farmers as they guarantee sales. Evidence suggests that as farmers gain experience, they prefer to sell to outlets where they have greater control over the quantity they provide throughout the production season (Sáenz-Segura, D'Haese, and Speelman, 2009).

Bauman, Thilmany, and Jablonski (2019), in an assessment of the relationship between sales strategy and farm capital adequacy, based on differences in land ownership, identified

factors such as scale, product specialization, and expenditure management as having the most significant effect on producers' financial efficiency when using intermediate and direct-to-consumer outlets. Their results suggest focusing on a few products, a difficult strategy to adopt given the sporadic cash flow associated with this lack of diversification across production season and product, hindering the producer's objective of creating regular income to ensure survival. In addition, further research suggested that direct marketing (farmers' market, on-farm, CSA) will be the most efficient way of commercialization for small-scale producers and the preeminent strategy for obtaining better prices (Bauman, Thilmany, and Jablonski, 2019; LeRoux et al., 2010; Monson, Mainville, and Kuminoff, 2008; Uva, 2002). However, it is also important to remember that non-quantifiable factors such as marketing and management skills also play an essential role in selecting market opportunities and on-farm performance (Park et al. 2014).

This research examined market outlet choices of small-scale fruit and vegetable growers in Arkansas, as summarized in Figure 3.1. Using survey responses, we model what, among the factors discussed above, drove market outlet choices of current small-scale producers. This is important as attempts to increase locally grown healthy food alternatives in retail outlets for access by consumers that do not frequent farmers' markets, buy on-farm, or participate in CSAs, hinges on a better understanding of barriers to producer adoption of wholesaling needed for achieving the goal of increasing local food supply and consumption. At the same time, intermediaries benefit from knowing what services they may need to offer to encourage small-scale producers to become larger volume producers that supply to them.

B. Background on food products supply chain in Arkansas

Food supply chains are built and developed through the relationships that producers establish with critical players, such as supermarkets, restaurants, and wholesale distributors, to

foster regional food systems that improve economic outcomes (Maples et al., 2013). Diverse and growing consumer concerns toward overseas or large-scale production systems give locally produced food a comparative advantage as consuming local food reduces the perception of health and environmental risks (Bougherara et al., 2009; Maples et al., 2013). While the number of outlets available to producers varies depending on their geographic location, improvements in online marketing have created opportunities for small producers (Butu et al., 2020; Güsken, Janssen, and Hees, 2019; Hobbs, 2020). For the case of Northwest Arkansas, farmers have a wide range of choices in market outlets. The following were among the choice set, survey respondents could choose from: i) farmers' markets; ii) roadside stand; iii) on-farm sales – farm stand, community supported agriculture (CSA), U-pick; iv) CSA with delivery; v) restaurants; vi) grocery stores; vii) wholesale/intermediary; viii) food processor; ix) other respondent-defined outlets (foodbank, florists, craft fairs, website). Given the number of usable observations received, the following four categories remained for analysis: i) direct sales and CSA without delivery (little transport) – 17; ii) farmers' market and roadside stand (some transport) – 25; iii) wholesale, intermediary, food processor, and grocery store (transport and fewer customers) – 20; iv) restaurants (potentially lucrative) – 8.

C. Materials and Methods

Data collection

The primary data for this research was collected using an online Qualtrics survey (IRB #2008276843) that was e-mailed to small-scale fruit and vegetable producers. Eligible respondents were those involved in commercial fruit and vegetable production as identified by the Center for Arkansas Farms and Foods (https://caff.uark.edu), an organization engaged in production, marketing, business, and legal training for these types of enterprises in northwest

Arkansas. Also, the help of University of Arkansas Cooperative Extension agents involved with horticultural producers was sought to send an electronic invitation to participate in the survey in late October of 2022. Location and frequency of responses is shown in Figure 3.2. Assuming some e-mail addresses were out-of-date, and some reached duplicate respondents, we estimated the pool of e-mail recipients to number approximately 300 and be representative of the population of growers in the region. Given the anticipated 15 to 25-minute response time, survey respondents were eligible for two randomly drawn prizes valued at <$500 in total as an incentive to participate. We collected information about producer location, the type and number of crops produced using a range of conventional vs. certified organic production practices, years of commercial production experience, the prior two year's average sales and acreage, the number of full-time and part-time employees as well as expected labor hours and remuneration type (hourly vs. salaried), market outlet(s) used, and marketing related costs (transportation, advertising, distance to market, unsold produce, and other expenses) along with demographic information. We received responses from 38 producers with 29 responses that provided answers to all questions.

As already indicated in Figure 3.1, we hypothesized several factors as described in Table 3.1 to affect market outlet choice for producers as follows:

$$OUTLET = f\,(PSAT, DIST, FEES, OTHER, LABOR, UNSOLD, ADV, MDIV, CDIV, SALES, CONV, YEARS) \quad (1)$$

Where *OUTLET* is one of the four outlet choices with the farmers' market as the baseline market outlet choice and on-farm direct sales, wholesale and intermediaries, and restaurants as alternatives; *PSAT* is the level of satisfaction with prices received, *DIST* represents the distance to the market outlet and represents a cost to the producer; *FEES* was the number of checkmarks a

respondent checked off among requirements/standards/fees required to sell, pertaining in particular to GAP certification, license/access fee, organic certification, naturally grown, or web site requirements per market outlet; *OTHER* selling expenses where items checked per market outlet that included having to pay workers other than self, supplies needed for packaging, refrigerated storage, labeling or advertising, and order picking; *LABOR* is the number of owner and employee hours worked per year divided by acreage in production, a variable that unfortunately was deemed unreliable across respondents by the authors; *UNSOLD* is the percentage of sellable harvest not sold; *ADV* is the percent of sales spent on advertising per market outlet; *MCONC* is the % of farm sales dedicated to a single market outlet among the list of ten initial choices indicated above; *CDIV* was the number of crops grown on the farm; *SALES* were the last two year's average sales allocated to a particular market outlet; *CONV* was a binary dummy variable with 1 = using conventional or mostly conventional practices with occasional non-chemical practices, and 0 = indicative of certified organic, certified naturally grown, transitioning to organic, primarily organic practices with occasional non-organic inputs, and using organic practices but not pursuing certification, and; *YEARS* represents the producer experience with commercial fruit and vegetable production in years.

Statistical Analysis

Aside from Chi-square tests to inform about market outlet response distribution differences as shown in Table 3.1, we estimated Eq. 1 in STATA using multinomial logit analysis to analyze whether and to what degree the factors listed in Eq. 1 influenced market outlet choice. Mathematically, the base choice of using the most common farmers' market outlet is thus differentiated from alternative market outlet choices by regressing the logarithm of the

probability ratio of making an alternative market choice compared to the baseline as follows (Studenmund and Cassidy, 1992; Hosmer Jr et al., 2013):

$$ln\left(\frac{P_{1i}}{Pb_i}\right) \quad (2)$$

where P_{1i} is the probability of the i^{th} producers choosing the first market outlet alternative vs. Pb_i or the probability of the i^{th} producers choosing the base alternative.

Since we have four total market outlet choices, however, we model the i^{th} producer's utility (U) derived from selling to the j^{th} market outlet (Wanasinghe and Sachitra, 2022) as:

$$U_{ij} = \propto_i' x_j + u_i + \varepsilon_{ij} \quad (3)$$

where $\propto_i'$ is the coefficient for the factor x_j that influences the choice of outlet j, u_i the heterogeneity term and ε_{ij} is the error term using the following system of three equations (Hosmer Jr et al., 2013; Park et al., 2014) indicated the likelihood of choosing a given outlet:

$$\Pr(y_i = j) = \frac{\exp(\propto_i' x_j + \sigma_j u_i)}{1 + \sum_{k=1}^{J} \exp(\propto_i' x_k + \sigma_k u_i)} \quad (4)$$

where X is the vector of independent variables, i is the number of independent variables, j=1,… J, denote the different outlets, k is the base outlet, x_j is the i^{th} factor influencing the choice of the outlet j, and $\propto_{ij}$ are the coefficient estimate for the i^{th} factor on the log-odds ratio for the j^{th} market outlet choice relative to the baseline of the farmers' market choice with the probabilities of market outlet choices summing to 100% or 1.

Adding the heterogeneities term of each outlet choice (Nguyen-Van et al., 2017), the log probability function is given by:

$$\ln L_j = \sum_i^n ln\left[\frac{1}{H}\sum_{h=1}^{H}\prod_j^J \Pr\left(y_i = j|X_i, u_i^h\right)^{\mathbf{1}(y_i=j)}\right] \quad (5)$$

where for each u_i, H pseudo-random draws of u_i^h are generated. Using STATA, we also calculate the marginal effect of a change in any of the independent variables on the likelihood of choosing a particular market outlet.

$$MargEf_{x_i} \rightarrow \partial \Pr(Y_j = 1|\, X\,)/\partial x_i \rightarrow \Pr(Y_j = 1|\, x_1, \dots, x_{i-1}) - \Pr(Y_j = 1|\, x_1, \dots, x_i\,) \quad (6)$$

D. Results and Discussion

Data

We received 38 responses, with 29 complete and usable responses as summarized in Table 3.1. Since, on average, respondents sold to at least 2.4 different market outlets, we had a total of 70 unique market outlet observations regarding outlet choice. Although the number of responses was small given our sample size of approximately 300 producers, we consider the range of observations to showcase an extensive array of production and marketing options these types of operations may consider. Unfortunately, we cannot statistically measure to what extent our sample is representative of the population of growers given lack of available data about farmer characteristics for this type of operation that is specific to the region sampled.

Statistical Analysis

The chi-square tests shown in Table 3.1, reveal distance to market to be the only statistically significant finding at $P < 0.05$. Despite few statistically significant results, given the small number of observations, several interesting observations are revealed in Table 3.1. From a revenue perspective, producers were most satisfied with prices received at farmers' markets followed by on-farm sales. By contrast, and as expected, wholesaling received the only negative response. While price satisfaction is important, costs associated with outlet choice need

consideration. For example, the distance variable analysis reveals that farmers are willing or have to travel the farthest to sell to restaurants, with the farmers' market and wholesale outlets available at nearly half that distance. Licensing, certification and fee requirements are least for on-farm sales as expected but only marginally higher for wholesale outlets in comparison to farmers' markets. Other selling fees like order picking, payroll, refrigerated storage, labeling, and advertising again reveal farmers' markets to be most onerous compared to other market outlet choices. Farmers reported the greatest lack of market diversification despite these added costs by dedicating the largest percentage of sales to that single outlet. Surprisingly, market outlet differences in terms of the number of crops grown on farms were essentially non-existent. Dedicated market outlet sales were smallest for the farmers' market choice suggesting that smaller farms use this outlet the most.

Interestingly, farmers' markets also had the highest percentage of conventionally grown produce, whereas restaurants required organic production methods. Farmers' markets were also associated with a market outlet choice with the highest advertising expenses as a percentage of sales followed by on-farm, restaurant, and wholesales. Years of experience with commercial crop production, like number of crops grown, was also not a distinguishing factor across market outlet. Finally, unsold produce registered highest for the farmers' market outlet although not statistically significantly so. In sum, the farmers' market outlet choice incurred the most cost but also had the highest producer price satisfaction.

Given these initial observations with few statistically significant results we also estimated Eq. 1 using multinomial logit analysis in STATA v. 13.0 with the following specification:

$$OUTLET = f(PSAT, DIST, FEES, OTHER, MCONC, SALES, CONV) \quad (7)$$

As the study had a limited number of observations, the choice of factors to include in the model rested on the model's ability to converge as well as a Wald-test on the overall goodness of fit of variables (statistical results available from authors upon request). The farmers' market being the baseline market outlet, the multinomial regression on 57 observations resulted in a McFadden R-square or coefficient of determination of 57.14%. The goodness of fit was judged acceptable, and several variables were statistically significant with appropriate signs on coefficient estimates (Table 3.2).

Marginal Effects

The marginal effect of an explanatory variable indicates how a one-unit change in the explanatory variable influences the probability of choosing a particular market outlet. Insight can thus be gained on what market outlet choices decline or increase in popularity as a function of a change in an explanatory variable, all other explanatory variables *ceteris paribus*. However, model results do not determine what proportion of gains in a particular outlet choice came from what other market outlet choices. Marginal effects of explanatory variables are in the order shown in Eq. 6 in Table 3.3.

The producers were moderately satisfied (0.26) with the price received across all outlets (Table 3.1). These results are not surprising given their indicated level of satisfaction shown in Table 3.1. If a producer wanted to increase their satisfaction with the price received, they would sell more to farmers' markets followed by on-farm selling chiefly at the cost of wholesaling and restaurants (Table 3.3). Given that a one-unit change is unlikely, the size of this marginal effect is minor.

On the cost side, the average traveling distance for producers was 20 miles across all the outlets (Table 3.1). As on-farm outlets required minor travel, an average of 6.0 miles, adding

greater distance affected this outlet negatively. At the same time, wholesale outlets (avg. 21.3) also suffered from greater distance. Perhaps because of higher margins, producers drove the furthest (avg. 40) to reach restaurants. As farmers increase the distance to their target market by 10 miles, they are more likely to deliver to restaurants and less likely to sell to wholesalers or sell directly to customers on-farm or through a CSA.

As a proxy of difficulty for market access, producers were asked to check off how many licenses, fees, and certifications they required, to sell to a particular market outlet. The impact of adding one more such hurdle negatively influenced on-farm sales the most as that outlet had the least such requirements to begin with (Table 3.1). At the same time, these hurdles positively impacted wholesaling and farmers' markets. Perhaps producers are more complacent about meeting these requirements, or their marginal cost of dealing with further restrictions is lower for outlet participants that had the most hurdles initially (Table 3.1).

Selling costs (refrigerated storage, payroll other than self, supplies, etc.) averaged 2.2 across all outlets. The marginal effect of this factor showed that as a farmer faces an additional cost category for selling in an outlet, their chance of choosing the farmers' market outlet increased whereas it declined for all other outlets and significantly so for restaurant sales. Perhaps the farmers' market outlet, with the highest price satisfaction to begin with, had the most margin to deal with additional cost compared to the other outlets.

Selling a more significant percentage of farm sales to a single outlet or the lesser market-diversified a producer was, had a relatively minor impact per percent of market sales concentration. Assuming a producer wanted to concentrate sales to a single market outlet, the farmers' market outlet gained popularity whereas wholesaling lost in appeal. Since concentrating

sales in a single outlet is considered riskier, we again assume profitability at farmers' markets to exceed those of wholesale outlets.

Sales are a vital factor in allowing producers to recoup expenses incurred and indicate scale of operation. Average sales for all outlets was $44,855. A target of a sales increase of $1,000 is achievable with more on-farm marketing (Table 3.3). Indeed, this market outlet was associated with the second-largest farm sales at an average of $50,441 (Table 3.1). The largest farms with average sales of $56,000, especially when considering the least price satisfaction, were wholesalers. Desiring more sales did not impact the likelihood of choosing this outlet (Table 3.3). Losers for this factor were farmers' markets and restaurants, with the least average sales of $30,104 and $49,372, respectively. Perhaps increasing sales, mostly likely achievable with on-farm sales that require the least time devoted for customer delivery, is the differentiating factor. In contrast, selling at restaurants and farmers' markets requires time-intensive travel.

Conventional production practices are less prevalent, with 19% for all outlets, than organic production practices that accounted for about 81%. Farmers' market vendors have the highest proportion of conventional crops (28%), and restaurant sales were exclusively organic produce. Suppose growers want to consider switching to conventional production practices. In that case, they should be aware that this decision will drastically negatively affect restaurant sales while increasing the likelihood that they will sell at a market that seemed most tolerant of such production practices (Table 3.1).

E. Recommendations and Conclusions

This research was devoted to identifying the factors that influence producers' decisions about what outlet to choose for selling their products. As indicated at the beginning, choosing

outlets is a crucial decision for producers. Therefore, food producers, consumers, and local authorities may benefit from a better understanding of the barriers preventing producers from adopting certain outlets. This information could prove critical to developing effective strategies to increase the availability of healthy, locally produced foods via conventional retail outlets.

Chi-square analysis revealed distance to the market to be the only statistically significant individual factor describing differences in respondent answers across market outlets. Utilizing multi-factor analysis using multinomial logit regression revealed further statistically significant marginal effects for other factors regarding the likelihood of choosing a particular market outlet.

With distance to the market adding fuel and labor constraints, wholesaling and on-farm sales lost adoption likelihood, whereas restaurant sales gained in popularity. We stipulate that restaurant sales increase as a larger sale per delivery allows for greater travel distance as found in Ozkan at. all. 2022. Locating further from customers hurts on-farm sales as the consumers' time and cost to travel to the farm increase. For wholesaling, the finding again makes sense from a cost perspective and suggests that adding farm produce pickup by wholesalers could have a drastic positive impact on diverting produce to this market outlet. Whether and to what extent such an effort would be cost-effective thus merits investigation.

An increase in license/fee/registration/certification negatively affects the choice of on-farm outlet as those producers chose this outlet based on fewer such regulations. This factor advantaged wholesaling. Likely because of the largest scale of farm production as indicated by sales, *FEES* per dollar of sales may have a much smaller impact than for smaller producers using other outlets.

Devoting personnel to selling efforts, packaging cost, refrigerated storage, labeling, advertising and order picking were most onerous for the farmers' market outlet. Adding more costs affected the farmers' market outlet positively whereas restaurant sales suffered. Given concomitant highest satisfaction with prices received at farmers' markets, it may be easiest to pass on cost to consumers using this marketing channel compared to restaurants. Wholesaling was minimally negatively affected and not statistically significantly so. Again, offering more pickup locations or on-farm pickup could reduce *OTHER* costs and may increase produce flowing to intermediaries.

The effect of the market sales concentration variable implies that producers prefer the farmers' market outlet. Relying solely on a single outlet was least common for wholesaling followed by restaurants; this suggested that producers prefer to market to a diverse array of consumers directly in farmers' markets or with on-farm sales compared to pursuing intermediaries. Efforts to contract all farm sales by restaurants and wholesalers may therefore meet with resistance.

Finally, conventional production practices show that farmers' market sellers may not be touting organic products to their customers as that market outlet had the most conventionally produced product. Switching to conventional production would lessen the likelihood of restaurant sales and raised the likelihood of wholesaling (the latter not statistically significantly so). It is possible that the appearance of product blemishes, likely more common with organic produce, explains the complete reliance on organic produce by restaurants. Minor product blemishes are still usable in food production or restaurant kitchens with organic designation offering the opportunity to charge higher prices to restaurant patrons. To avoid such blemishes,

however, some chemicals may be used to visually appease consumers at farmers' markets and intermediaries.

Surprisingly crop diversification had no measurable impact on outlet choice. It appears that larger producers have the volume for wholesaling but do not sell only to wholesalers. Conventional wisdom suggests that larger volume requirements for wholesaling would dictate fewer crops grown.

Limitations

The sample and the region targeted limit generalizations from this research. A larger production region may have led to more responses. In addition, some information respondents gave were incomplete and likely due to the survey's length. Farming experience and differences in unsold produce and advertising did not allow the model to converge. Hence, additional modeling efforts may be needed. In addition, as noted in the literature review, producers did not provide accurate information on labor utilization during the growing and selling seasons. Again, this was likely a function of the survey length and suggests that producers may need to track this information more readily.

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G. Tables and figures

Table 3.1. Variable description and statistical results of market outlet differences using Pearson's Chi-square test. Numbers in market outlet columns represent category response percentages across variable categories except for averages as defined in the description.

Variable	Outlet	On Farm	Farmers' Market	Wholesale	Restaurant	Total
PSAT measures the satisfaction with prices received. Numbers in parentheses are coded values used for calculating the average response.						
PSAT P = 0.070 n = 69	not satisfied (-1)	5.9	0.0	20.0	25.0	10.1
	satisfied (0)	47.1	50.0	65.0	50.0	53.6
	very satisfied (+1)	47.1	50.0	15.0	25.0	36.2
	Avg.	0.41	0.50	-0.05	0.00	0.26
DISTance to market outlet measured in miles with the average using the category number, the upper end of the category and 40 miles for the highest mileage.						
DIST P < 0.0001[a] n = 56[b]	0	73.3	0.0	6.7	0.0	21.4
	<10	13.3	28.6	33.3	0.0	23.2
	11 - 20	0.0	28.6	26.7	0.0	17.9
	21 - 30	6.7	14.3	6.7	0.0	8.9
	30 +	6.7	28.6	26.7	100	28.6
	Avg.	6.0	24.3	21.3	40.0	20.0
FEES represents the number of respondent checks among GAP certification, license/fee for market access, certified organic requirement, naturally grown certification, a web site requirement or none.						
FEES P = 0.819 n = 70	None	76.5	48.0	55.0	62.5	58.6
	1	17.7	36.0	30.0	25.0	28.6
	2	0.0	12.0	10.0	12.5	8.6
	3	5.9	4.0	5.0	0.0	4.3
	Avg.	0.40	0.86	0.87	0.80	0.73
OTHER represents the number of respondent checks to what other selling expenses do you have for a particular market outlet (e.g. workers other than self, supplies (e.g. packaging), refrigerated storage, labeling, advertising, order picking)						
OTHER P = 0.209 n = 70	0	35.3	4.0	30.0	25.0	21.4
	1	11.8	4.0	10.0	12.5	8.6
	2	11.8	36.0	25.0	25.0	25.7
	3	11.8	40.0	5.0	12.5	20.0
	4	23.5	12.0	20.0	12.5	17.1
	5	5.9	4.0	10.0	12.5	7.1
	Avg.	1.94	2.64	2.05	2.13	2.24

Table 3.1 (cont'd). Variable description and statistical results of market outlet differences using Pearson's Chi-square test. Numbers in market outlet columns represent category response percentages across variable categories except for averages as defined in the description.

Variable	Outlet	On Farm	Farmers' Market	Wholesale	Restaurant	Total
UNSOLD. The percentage of unsold product ranked categorically as the percentage of unsold products as indicated below.						
UNSOLD P = 0.606 n = 61	None	6.3	4.8	12.5	0.0	6.6
	< 5% (2.5)	56.3	28.6	31.3	50.0	39.3
	5 - 9.99% (7.5)	25.0	47.6	50.0	37.5	41.0
	10 - 14.99% (12.5)	0.0	4.8	6.3	0.0	3.3
	15% (15)	12.5	4.8	0.0	12.5	6.6
	> 15% (17.5)	0.0	9.5	0.0	0.0	3.3
	Avg.	5.2%	7.3%	5.3%	5.9%	6.0%
ADV measures the percent of sales used for advertising. Numbers in parenthesis are coded values used for calculating the average response.						
ADV P = 0.074 n = 65	None	37.5	12.5	44.4	42.9	30.8
	<5% (5)	6.3	4.2	16.7	14.3	9.2
	5-10% (10)	37.5	33.3	38.9	28.6	35.4
	11-15% (15)	0.0	16.7	0.0	0.0	6.2
	More (20)	18.8	33.3	0.0	14.3	18.5
	Avg.	7.8%	12.7%	4.7%	6.4%	8.6%
MCONC is a measure of market concentration or the % of farm sales dedicated to a single market outlet. The average is calculated using the number in parentheses for each category.						
MCONC P = 0.14 n = 70	0-19 % (10)	41.2	16.0	60.0	62.5	40.0
	20-39 % (30)	17.6	20.0	25.0	12.5	20.0
	40-59 % (50)	11.8	4.0	5.0	0.0	5.7
	60-79 % (70)	0.0	8.0	5	12.5	5.7
	80-99 % (90)	17.6	28.0	5.0	12.5	17.1
	100% (100)	11.8	24.0	0.0	0.0	11.4
	Avg.	43%	64%	24%	30%	44%
CDIV is the number of different crops grown on farm. The average is calculated using the number in parentheses for each category.						
CDIV P = 0.965 n = 70	<5 (5)	35.3	28.0	35.0	25.0	31.4
	5-10 (10)	11.8	20.0	20.0	12.5	14.3
	>10 (15)	52.9	52.0	55.0	62.5	54.3
	Avg.	10.9	11.2	11.0	11.9	11.1

Table 3.1 (cont'd). Variable description and statistical results of market outlet differences using Pearson's Chi-square test. Numbers in market outlet columns represent category response percentages across variable categories except for averages as defined in the description.

Variable	Outlet	On Farm	Farmers' Market	Wholesale	Restaurant	Total
SALES are total average annual sales (2021and2022) allocated by market outlet. Average is calculated using numbers presented in parentheses.						
SALES P = 0.792 n = 69	< $10,000 (5,000)	7.3	8.7	7.3	2.9	26.1
	$10,000-24,999 (17,500)	5.8	15.9	5.8	2.9	30.4
	$25,000 - 49,999 (37,500)	1.5	2.9	0.0	0.0	4.4
	$50,000 - 99,999 (75,000)	5.8	5.8	11.6	4.4	27.5
	$100,000 - 149,999 (125,000)	2.9	1.45	2.9	1.45	8.7
	$150,000 + (175,000)	1.5	0.0	1.45	0.0	2.9
	Avg.	$50,441	$30,104	$56,000	$49,375	$44,855
CONV represents conventional production practices including chemical use (yes) whereas the alternative (no) either strictly or mostly avoids the use of chemicals, and is termed organic.						
CONV P = 0.324 n = 70	yes (1)	17.7	28.0	15.0	0.0	18.6
	no (0)	82.4	72.0	85.0	100.0	81.4
	Avg.	17.6%	28.0%	15.0%	0.0%	18.6%
YEARS is the number of years of experience a producer had with fruit and vegetable production. The average represents the number of years provided by respondents by assigning experience years to the outlet generating the most sales.						
YEARS P = 0.697 n=68	<1 Yr	31.3	24.0	30.0	14.3	26.5
	1-5 Yr	12.5	28.0	15.0	42.9	22.1
	5 Yrs +	56.3	48.0	55.0	42.9	51.5
	Avg.	7.8	7.7	7.9	7.6	7.8

Notes:

[a] Pearson's χ^2 level of significance of differences across distribution of answers across market outlet.

[b] Number of respondents for the variable.

Table 3.2. Market outlet choice as a function of distance to market, fees, other selling costs, degree of market diversification, annual sales by outlet, production method (conventional vs. organic) and level of price satisfaction using multinomial logit with the Farmers' Market as the baseline market outlet, NW Arkansas region, 2022.

	Outlet								
	On Farm			Wholesale			Restaurant		
Variable	Robust Coefficient	Std. Error	P>z	Robust Coefficient	Std. Error	P>z	Robust Coefficient	Std. Error	P>z
Constant	7.68	3.02	0.011	10.72	2.95	0.000	-48.24	5.95	0.000
PSAT[a,b]	-0.66	1.03	0.523	-2.52	0.88	**0.004**	-5.09	1.42	**0.000**
DIST	-1.95	1.09	**0.075**	0.06	0.39	0.868	16.93	1.41	**0.000**
FEES	-1.56	1.02	0.126	0.43	0.73	0.553	-0.68	1.10	0.538
OTHER	-1.04	0.47	**0.025**	-1.05	0.40	**0.009**	-1.70	0.56	**0.002**
MCONC	-0.03	0.02	0.103	-0.07	0.03	**0.006**	-0.04	0.03	0.154
SALES	**0.00**	0.00	0.101	**0.00**	0.00	0.322	**0.00**	0.00	0.624
CONV	-1.76	1.61	0.273	-1.91	1.50	0.203	-14.69	1.91	**0.000**
Number of observations	54								
McFadden's Pseudo R^2	57.14%								

Notes:

[a] Please see variable descriptions in Table 3.1.

[b] Bold lettering of p-values and coefficient estimates add emphasis to findings.

Table 3.3. Marginal effects on market outlet choice as a function of distance to market, fees, other selling costs, degree of market diversification, annual sales, production method (conventional vs. organic) and level of price satisfaction, NW Arkansas region, 2022.

		Outlet			
Variable		On Farm	Farmers Market	Wholesale	Restaurant
PSAT[a]	dy/dx in %	4.9%	**18.4%**[b]	**-13.5%**	**-9.9%**
	Std. Error	0.064	0.071	0.064	0.040
	P > z	0.444	0.010	0.034	0.013
DIST[c]	dy/dx in %	**-17.4%**	-0.6%	**-37.7%**	**55.7%**
	Std. Error	0.057	0.120	0.119	0.135
	P > z	0.002	0.960	0.002	0.000
FEES	dy/dx in %	**-14.3%**	4.5%	**13.1%**	-3.3%
	Std. Error	0.067	0.065	0.077	0.031
	P > z	0.033	0.485	0.088	0.284
OTHER	dy/dx in %	-4.2%	**10.6%**	-2.7%	**-3.7%**
	Std. Error	0.033	0.034	0.034	0.015
	P > z	0.198	0.002	0.277	0.067
MCONC[c]	dy/dx in %	0.0%	**0.5%**	**-0.6%**	0.1%
	Std. Error	0.002	0.001	0.003	0.001
	P > z	0.997	0.000	0.022	0.577
SALES[c]	dy/dx in %	**0.8%**	**-0.6%**	0.0%	-0.2%
	Std. Error	$3.5 \cdot 10^{-6}$	$2.8 \cdot 10^{-6}$	$3.1 \cdot 10^{-6}$	$1.1 \cdot 10^{-6}$
	P > z	0.03	0.03	0.99	<.0001
CONV	dy/dx in %	-5.6%	**24.5%**	24.2%	**-43.0%**
	Std. Error	0.110	0.137	0.179	0.134
	P > z	0.607	0.075	0.177	0.001

Notes:

[a] Please see variable descriptions in Table 3.1.

[b] Bold lettering adds emphasis to findings that are deemed statistically significant.

[c] The *DIST* variable was modeled as a categorical variable with roughly a 10 miles difference across categories. The marginal effect thus is in increments of 10 miles. Similarly, *MCONC* was modeled as the numeric percentage of total farm sales in a particular outlet using category mid-points shown in Table 1 and as such, dy/dx is per 1% increase in market outlet sales concentration. The marginal effect on *SALES* was multiplied by 1,000 to assess the change in likelihood of market channel per $1,000 increment in sales. For *CONV*, *OTHER*, *FEES*, and *PSAT* the marginal effect represents a one-unit change.

Figure 3.1. Marketing outlet choices and factors expected to drive market outlet choice. Darker shading in blue factor bars showcases anticipated greater impact on market outlet. Advertising and conventional vs. certified organic producers' bars are shaded differently as they are associated with greater degree of uncertainty. Please see Table 3.1 for variable name definitions shown in capital letters in parentheses.

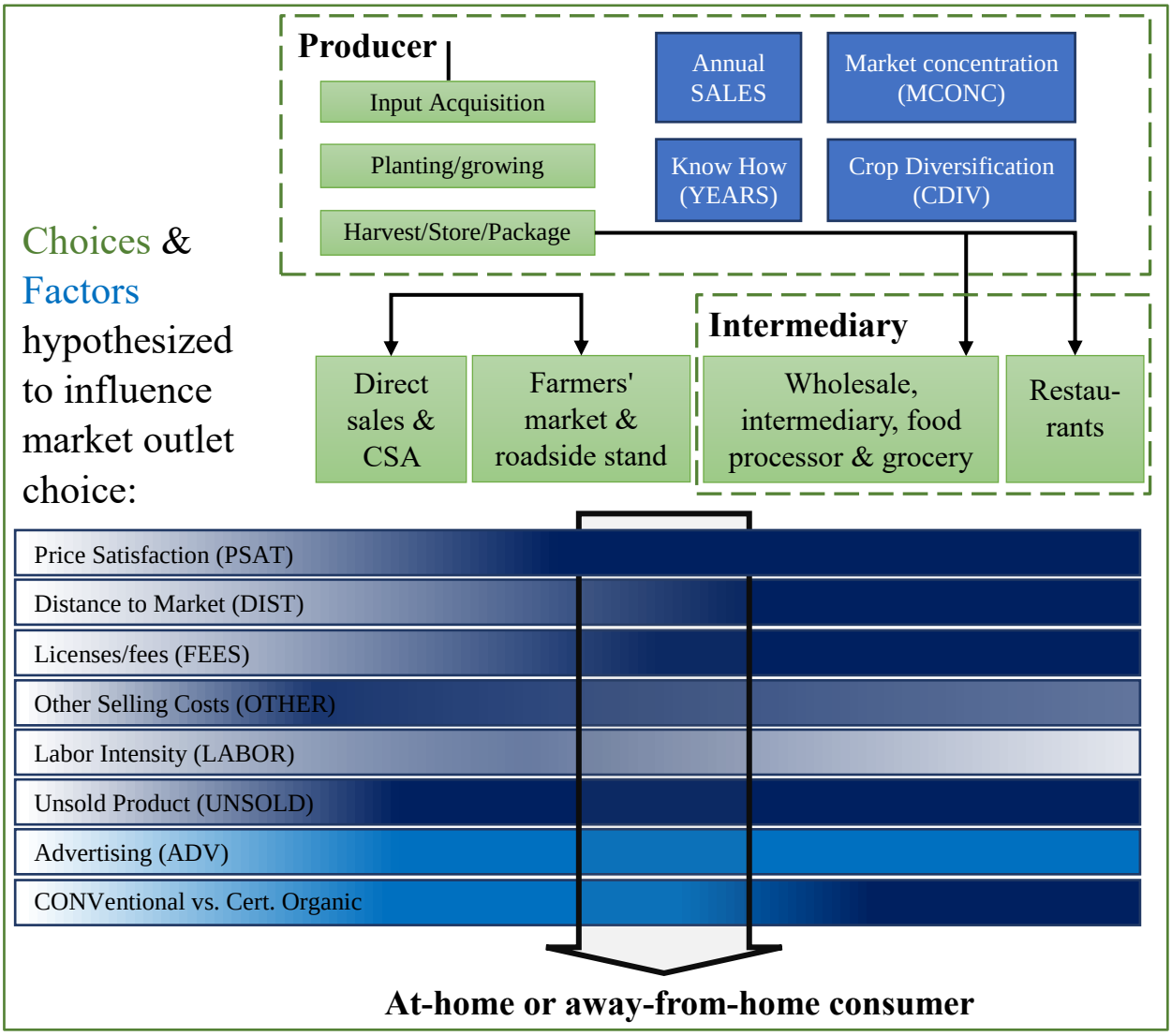
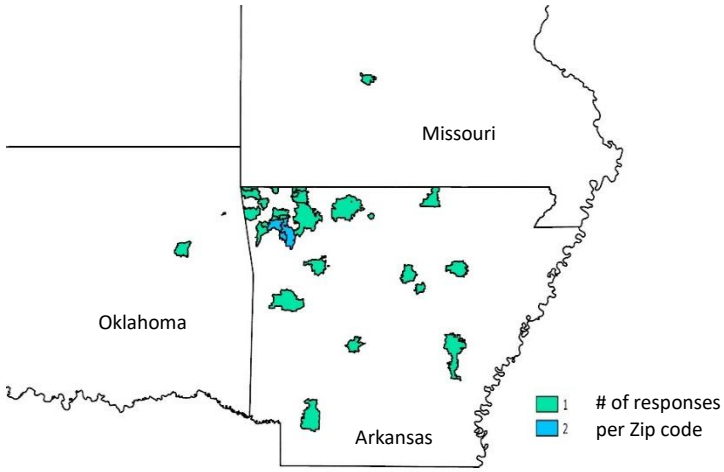


Figure 3.2. Location and frequency of producer response by Zip code.



Chapter IV. Summary of results and conclusions with prospects for further investigation

A. Results Summary

This study aimed to assess marketing strategies of small-scale fruit and vegetable growers in the Ozark Mountain region. Examined in detail were marketing channel preferences of producers, and what cost, revenue and production method selections impact that choice. Chapter II profiled producers into three separate groups using distinguishing marketing, production, and demographic attributes. The study revealed that all producer groups primarily aimed to manage production and marketing risk and to create cash flow throughout the marketing season by growing a large number of crops and using several marketing channels. As such, attempting to incentivize growers to meet quantity goals by growing fewer crops may not be effective in encouraging wholesale production. The three groups had different outlet choices: the first group, which we called "Farmers' market lovers," were primarily female producers with an intermediate level of education, supplying the greatest fraction of their products to farmers' markets relative to the other groups. The second group, termed "Trial and error," is the group of producers with a balanced set of outlet choices, very diverse in terms of gender, and least years of education relative to the other groups. The merit of their name comes from the fact that they consider all available markets, probably to test markets to ultimately determine which management philosophy to pursue given their youngest age and least investment in organic production, crop diversification, and advertising. Finally, the third group of producers focuses mainly on wholesaling and restaurants but also direct sales, while using time-intensive farmers' markets the least, again relative to the other groups; this group is mainly composed of white producers and has the most significant number of men. The group was named the "Experienced wholesalers."

Chapter III identified factors influencing marketing channel choice for Arkansas fruit and vegetable growers using a multinomial logit model. The null hypothesis of this research was that producer characteristics that vary among growers do not influence a grower's choice of marketing channels. We found distance to market to be the only statistically significant individual factor, and other factors such as licensing, fees, registration and certification, other costs, and market sales concentration to also significantly affect outlet choice. The results suggest that adding on-farm pickup by wholesalers may positively impact diverting sales to that outlet and that offering more pickup points or on-farm pickup may reduce other costs and increase the flow of products to intermediaries. Producers prefer to market their products to a wide range of consumers directly at farmers' markets or through on-farm sales rather than through intermediaries as revealed in their stated satisfaction with prices received, which also increased cost. The use of organic production methods impacted access to restaurant sales that were deemed to be lucrative as producers traveled farthest to reach that outlet. Crop diversification had no measurable impact on outlet choice; a result that could help guide strategies to promote wholesaling where conventional wisdom suggests that specialization with fewer crops could assist with meeting volume requirements but are detrimental to production, marketing and cashflow risk management.

B. Study Limitations and Prospects for further investigation

The study has certain limitations that must be acknowledged. Firstly, self-reporting bias was evident as data was gathered directly from growers, which may not accurately reflect their true intentions. Secondly, the study was limited in scope, focusing only on fruit and vegetable growers in select Arkansas, Missouri, and Oklahoma counties; this restricts the generalizability of the findings to other areas. Furthermore, the study did not account for all relevant variables that

could impact growers' market decisions, such as farm acreage (poorly answered), changing market conditions (only one point in time was surveyed), and labor intensity (questionnaire was too complex). This lack of information may have impeded the drawing of definitive conclusions about the factors influencing producer choices and also an accurate description of producer profiles. Future research could address these limitations by conducting comparative studies across larger regions with a shorter survey to gain more data. Another strategy could be to focus on qualitative studies, such as in-depth interviews or focus groups, to better understand the factors influencing producers' market outlet choices. Additionally, the survey used in the study was lengthy, resulting in incomplete responses from some participants. Hence, further research could involve reducing the survey length and exploring alternative data collection methods.

Appendix – Survey with sample entries to all possible entry fields.

A Section too complex B Not analyzed to date C Few/no responses

Introduction

Market outlet choice survey

Dear Specialty Crop Producer,

We are researching how to improve market opportunities for small-scale vegetable and fruit growers in Arkansas and would appreciate your help in completing this survey (~ 15-20 minutes). Information about your experience with producing and marketing fruits and vegetables will help us identify factors that can be a hurdle for expansion. With your responses, we plan to study what market outlets may work to enhance profitability taking crop production plans into consideration.

Be aware that your individual responses are anonymous and strictly confidential. Answering all questions is greatly appreciated but voluntary. Two students will use these findings for their thesis work.

The survey link from the e-mail you received keeps track of your responses using your computer IP address. Please use the same computer. You can leave and reenter the survey until you get to the last screen at which point your answer will be recorded. The survey will be available until **December 6**, 2022. This survey only has a small target audience and the more answers we get the more realistic the interpretation of the data. Once the data has been analyzed and the project is completed, we plan to delete data after 3 years per federal and state regulations.

If you have any questions on the survey or the larger study, please contact: Michael Popp, University of Arkansas, mpopp@uark.edu or (479)-575-6838.

Please contact Ro Windwalker, Research Integrity & Compliance, 205 MLKG Building, University of Arkansas at Fayetteville should you have any concerns about your rights as a participant (479)-575-2208 and ask about IRB#*2008276843*.

Please use the Next or >> button to advance.

Which crop(s) do you grow? (please select at least one answer for normal flow of survey)

- [ ] Vegetables, Herbs, and Cut Flowers
- [ ] Fruits and Nuts
- [ ] I no longer or do not produce specialty crops
  (We will remove your contact information)

From the list below, please select the **Vegetables, Herbs, and Cut Flowers** you grow (Please select all that apply)

[ ] Beets	[ ] Irish Potatoes	[ ] Squash
[ ] Broccoli	[ ] Lettuce	[ ] Sweet Corn
[ ] Cabbage	[ ] Melons	[ ] Sweet Potatoes
[ ] Carrots	[ ] Okra	[ ] Tomatoes
[ ] Cucumbers	[ ] Onions	[ ] Turnips
[ ] Eggplants	[ ] Peppers	[ ] Herbs
[ ] Garlic	[ ] Pumpkins	[ ] Cut flowers
[ ] Green Beans	[ ] Radishes	[ ] Other (Please specify):
[ ] Greens and spinach	[ ] Snap peas	[ ] Other (Please specify):
[ ] Herbs	[ ] Southern Peas	[ ] Other (Please specify):

From the list below, please select the **Fruits and Nuts** you grow (Please select all that apply)

[ ] Apples	[ ] Muscadine	[ ] Peanuts
[ ] Blackberry	[ ] Nectarines	[ ] Pecans
[ ] Blueberry	[ ] Peaches	[ ] Walnuts
[ ] Grape (Table)	[ ] Raspberry	[ ] Other (Please specify):
[ ] Grape (Wine)	[ ] Strawberry	[ ] Other (Please specify):

Which statement best describes your production practices? (Select all that apply)

- [ ] Conventional
- [ ] Certified Organic
- [ ] Certified Naturally Grown
- [ ] Transitioning to organic
- [ ] Use organic practices, but not pursuing certification
- [ ] Mostly organic practices with occasional non-organic inputs
- [ ] Mostly conventional practices with occasional non-chemical practices

How many years of commercial production experience do you have?

	Vegetables	Cut Flowers	Fruits	Nuts
Years (incl. 2022)				

What were your average sales (2021 & 2022)?

Local Foods Inc.
Income Statement

	2021	2022	Avg. '21 & '22
Sales			
Vegetables	50,000	60,000	55,000
Herbs	2,000	5,000	3,500
Cut Flowers	5,000	10,000	7,500
Fruits	25,000	20,000	22,500
Nuts	18,000	25,000	21,500
Total Revenue	100,000	120,000	110,000

- ○ less than $10,000
- ○ $10,000 - $24,999
- ● $25,000 - $49,999
- ○ $50,000 - $99,999
- ○ $100,000 - $149,999
- ○ $150,000 - $199,999
- ○ $200,000 - $249,999
- ○ $250,000 - $299,999
- ○ $300,000 - $349,999
- ○ $350,000 - $399,999
- ○ $400,000 - $449,999
- ○ $450,000 - $499,999
- ○ $500,000 or more
- ○ Other (please specify to nearest $5,000

What is your percentage split in sales across product(s)?

Vegetables	25
Cut Flowers	25
Fruit	25
Nuts	25
Total	100

Please enter the Zip code(s) where most of your production is located... (please enter as many as three and at least one)

Zip Code for first location	72542
Zip Code for 2nd location if any	72703
Zip Code for 3rd location (if any)	

How many acres do you have under specialty crop production?

(Please specify number)

Total acre owned

5

A C

Total acre rented

2

What is the percentage split in acreage across product(s)?

Vegetables	85
Cut Flowers	5
Fruit	5
Nuts	5
Total	100

Other than yourself, how many persons and what type of labor is required in this operation? *(You get to specify hours worked and for what period later)*

	How Many **(Nov. - Feb.)**	How Many **(Mar. - May)**	How Many **(Jun. - Oct.)**
Family member(s);	0	1	1
Salaried employee(s) & business partner(s):	0	0	1
Hourly employee(s)	0	0	2

A

Excluding benefits, workman's compensation, etc., please **edit** the pay rate for different staff over the course of 2022.

(In case of more than one employee in a category, please specify average pay across employees)

	Average Pay
Myself (**$/month** ... choose zero if you consider farm income your pay)	0
Family Member (avg. **$/hr** for family members other than yourself)	15
Salaried employee(s) and/or business partner(s) (avg. **$/month**)	2500
Hourly employee(s) (avg. **$/hr**)	10

Typical Working Hours per Week

For yourself

For the periods indicated below, please use the drop-down windows to select typical work hours involved in the business.

For example, if you work **12 hours** a day AND **6 days**/week that means **72 hours/week.**

In the following periods, I work approx. so many hrs/week ...

November to February	16h to 25h
March to May	46h to 55h
June to October	76h to 85h

Typical Working Hours per Week

Average per Family Member

For those months you indicated you employed family members, please use the drop-down windows to select work hours and report an average across family members working in the business. For example, if you have **3** family members contribute a combined **12 hours** of work a day over **5 days per week** that would be 60 hrs/week**, or 20 hrs/week per average family member.**

In the following periods, my family member(s) work approx. so many hours/week ...

March to May	Less than 5 h
June to October	46h to 55h

A

Typical Working Hours per Week

Average per Salaried Employee/Business Partner

For those months you indicated you had salaried employees and/or a business partner(s), please use the drop-down windows to select work hours and report an average across salaried employees working in the business. For example, if you have **2** salaried employees contribute a combined **20 hours** of work a day over **6 days per week** that would be **120** hrs/week**, or 60 hrs/week per average salaried employee.**

In the following periods, my salaried employee(s)/partner(s) work approx. so many hrs./week ...

June to October	36h to 45h

Typical Working Hours per Week

Average per Hourly Employee

For those months you indicated you had salaried employees, please use the drop-down windows to select work hours and report an average across salaried employees working in the business. For example, if you have **5** hourly employees contribute a combined **30 hours** of work a day over **5 days per week** that would be **150** hrs/week**, or 30 hrs/week per average hourly employee.**

In the following periods, my hourlies work approx. so many hrs/week ...

June to October	36h to 45h

Below is a tally of salary and wages by period using your answers above

(*Please use the back button to correct errors if any*)

	Yourself: 0 $/month		Family Member(s) Avg. Pay: 15 $/hour			Salaried Employee(s) & Business Partner(s) Avg. Pay: 2500 $/month			Hourly Employee(s) Avg. Pay: 10 $/hour		
	Avg. hours per week	Payroll	Avg. hours per week per person	# of persons	Payroll	Avg. hours per week per person	# of persons	Payroll	Avg. hours per week per person	# of persons	Payroll
Nov. to Feb. (15 weeks)	20	0		0	0		0	0		0	0
Mar. to May (13 weeks)	50	0	2.5	1	487.5		0	0		0	0
June to Oct. (22 weeks)	80	0	50	1	16500	40	1	12500	40	2	17600
Total	100	0	52.5	2	16987.5	40	1	12500	40	2	17600

Which market outlets did you use for your products?
(Please provide your best estimate of the percentage of sales for 2021 & 2022)

Farmer's market	25
Wholesale or intermediate market	5
Restaurants	5
Direct sale (U-Pick, Farm stand)	5
Roadside stand	5
CSA (community supported agriculture)	5
Grocery stores	30
Food processors	10
Specify if other: Website	10
Total	100

What percentage of your **sales revenue** is **spent on marketing** in each of these markets?

Example: After selling at the farmer's market, **per** $1,000 of sales, you spent $30 to get to the market on fuel, $100 for labor to staff the stand, and another $50 on miscellaneous items (tax, membership, packaging, labels, advertising, web site, and other related expenses). To get the percentage spent on marketing, you need to sum expenses and divide by total sales: **[($180/$1,000)*100]= 18%**

(Please provide your best **estimate** of the percentage for 2021 & 2022 after consulting your financial records if needed)

	%
Farmer's market	5
Wholesale or intermediate market	5
Restaurants	0
Direct sale (U-Pick, Farm stand)	0
Roadside stand	10
CSA (community supported agriculture)	5
Grocery stores	5
Food processors	0
Website	10

What were your reasons for choosing the market outlet(s) you have indicated?

	Farmer's market	Wholesale or intermediate market	Restaurants	Direct sale (U-Pick, Farm stand)	Roadside stand	CSA (community supported agriculture)	Grocery stores	Food processors	Website
Getting the highest price	☐	☐	☐	☐	☐	☐	☐	☐	☐
Traveling the least	☐	☐	☐	☐	☐	☐	☐	☐	☐
High consumer traffic	☐	☐	☐	☐	☐	☐	☐	☐	☐
Least labor intensive	☐	☐	☐	☐	☐	☐	☐	☐	☐
It's the only market available	☐	☐	☐	☐	☐	☐	☐	☐	☐
I sell to customers I like	☐	☐	☐	☐	☐	☐	☐	☐	☐
Least regulated	☐	☐	☐	☐	☐	☐	☐	☐	☐
Largest Sales/Customer	☐	☐	☐	☐	☐	☐	☐	☐	☐
Specify if others	☐	☐	☐	☐	☐	☐	☐	☐	☐

C

How satisfied are you with the prices obtained in the following market(s) where you sell your product?

	Very Satisfied	Satisfied	Not satisfied
Farmer's market	○	○	○
Wholesale or intermediate market	○	○	○
Restaurants	○	○	○
Direct sale (U-Pick, Farm stand)	○	○	○
Roadside stand	○	○	○
CSA (community supported agriculture)	○	○	○
Grocery stores	○	○	○
Food processors	○	○	○
Website	○	○	○

To gain access to a market outlet(s), certain requirements/standards/fees are required. Please which requirement(s) apply across different markets on your farm.

	GAP certified	Market license/ access fee	Organic certification	Naturally Grown	Web Site	No requirements
Farmers market	☐	☐	☐	☐	☐	☐
Wholesale or intermediate market	☐	☐	☐	☐	☐	☐
Restaurants	☐	☐	☐	☐	☐	☐
Direct sale (U-Pick, Farm stand)	☐	☐	☐	☐	☐	☐
Roadside stand	☐	☐	☐	☐	☐	☐
CSA (community supported agriculture)	☐	☐	☐	☐	☐	☐
Grocery stores	☐	☐	☐	☐	☐	☐
Food processors	☐	☐	☐	☐	☐	☐
Website	☐	☐	☐	☐	☐	☐

Over the past two years, how far did you travel from the farm to specific market outlet(s) on average?

	Less than 10 miles	10 to 20 Miles	21 to 30 Miles	More than 30 Miles
Farmer's market	○	○	○	○
Wholesale or intermediate market	○	○	○	○
Restaurants	○	○	○	○
Roadside stand	○	○	○	○
CSA (community supported agriculture)	○	○	○	○
Grocery stores	○	○	○	○
Food processors	○	○	○	○
Website	○	○	○	○

What type of expenses do you pay when selling at each of these markets?

B

	Workers (other than yourself)	Supplies (e.g. packaging)	Refrigerated Storage	Labeling/ Advertising	Order Picking
Farmer's market	☐	☐	☐	☐	☐
Wholesale or intermediate market	☐	☐	☐	☐	☐
Restaurants	☐	☐	☐	☐	☐
Direct sale (U-Pick, Farm stand)	☐	☐	☐	☐	☐
Roadside stand	☐	☐	☐	☐	☐
CSA (community supported agriculture)	☐	☐	☐	☐	☐
Grocery stores	☐	☐	☐	☐	☐
Food processors	☐	☐	☐	☐	☐
Website	☐	☐	☐	☐	☐

What percentage of your sales are processed in the following ways...

Credit Card	65 %
Cash	20 %
Venmo/Cash app	5 %
On Account	5 %
Other (Please specify) Barter	5 %
Total	100 %

Which of the following markets typically has the most/least unsold **Vegetables, Herbs and Cut Flowers**?

(Please drag as many items as you wish to the group boxes on the right. **Skip if you sell to only one market outlet**)

Items

- Farmer's market
- Wholesale or intermediate Market
- Restaurants
- Direct sale (U-Pick, Farm stand)
- Roadside stand
- CSA (community supported agriculture)
- Grocery stores
- Food processors

Most Unsold Vegetables, Herbs and Cut Flowers

Least Unsold Vegetables, Herbs and Cut Flowers

Which of the following markets typically has the most/least unsold **Fruits and Nuts**?

(Please drag as many items as you wish to the group boxes on the right. **Skip if you sell to only one market outlet**)

Items

- Farmer's market
- Wholesale or intermediate Market
- Restaurants
- Direct sale (U-Pick, Farm stand)
- Roadside stand
- CSA (community supported agriculture)
- Grocery stores
- Food processors

Most Unsold Fruits and Nuts

Least Unsold Fruits and Nuts

What percentage of **harvested** farm production is usually unsold?

Vegetables, Herbs and Cut Flowers

- ◯ Less than 5%
- ◯ 5 to 10%
- ◯ 10 to 15%
- ◯ More than 15%

Cut Flowers

Fruits

Nuts

Please break down what percentage of unsold product goes to...

B

Sell at a lower price later	5 %
Household consumption	5 %
Trashed	0 %
Donate to charity	25 %
Compost	25 %
Other (please specify) Foodbank	40 %
Total	100 %

Do you encourage both positive and negative customer feedback?

- (●) Yes
- ( ) No

What are principal complaints

- [ ] product is not fresh enough
- [ ] packaging was inappropriate
- [ ] didn't offer credit card payment
- [ ] didn't offer account sales
- [ ] prices are too high
- [ ] Other (please specify)

B

What is the highest level of education you have attained?
(Please use drop down menu)

2 year degree

How old are you?

Under 18
18 - 24
25 - 34
35 - 44
45 - 54
55 - 64
65 - 74
75 - 84
85 or older

In addition to the $ 16987.5 of wages paid you specified for yourself and other family members above, please tell us your average annual farm income over the past two years

- ( ) Less than $10,000
- ( ) $10,000 - $19,999
- (●) $20,000 - $29,999
- ( ) $30,000 - $39,999
- ( ) $40,000 - $49,999
- ( ) $50,000 - $59,999
- ( ) $60,000 - $69,999
- ( ) $70,000 - $79,999
- ( ) $80,000 - $89,999
- ( ) $90,000 - $99,999
- ( ) $100,000 - $149,999
- ( ) More than $150,000

Please complete the following information about the primary operator:

Gender

Ethnicity

Over the last two years (2022 & 2021), please reflect on the importance of farm income relative to other income in your household?

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

B

Farm Income as a % of Total Household Income

Please add your cell phone number and first name so we can enter you in our drawing for first prize CoolBot and second prize plug in cooler. We will use this information only to contact you in case you won.

CoolBot®
GET CONNECTED · STAY COOL™

Please also feel free to add any other comments.

Please type in your answers below

Cell Phone Number	
First Name	
Other Comments	

CAREFUL

You can only submit your responses once using the same computer.
If you need to return and edit, you can exit the survey by closing this browser window (in the top menu bar with the 'X'). Closing the browser will save your data. When you revisit the survey by again clicking on the survey link that was e-mailed to you from the same computer, your survey information will have been saved and kept.

We would appreciate only one response. If you are ready to submit your responses, please, click on the '>>' button at the bottom right.
You will NOT get an e-mail confirmation but should receive a 'Thank You' message.
Thank you for your time!
Your answers are recorded anonymously and strictly confidential.