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Research Report: Growing a New Cut Flower Industry: Market Needs and Preferences

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Abstract

Cut flower production is a small, rapidly growing, and dynamic industry in Utah. Growers currently market their products through various outlets. Each outlet has different needs in terms of varieties, colors, and pricing, and the advantages/disadvantages of each are not well understood. Moving forward it will be important to understand the needs, hurdles, and capacity of markets to ensure continued profitability. This study provides crucial information on the florist market for local cut flowers. Marketing information and education will enhance the ability of current and potential cut flower growers to properly assess the profit potential of their decisions and assist with the long-term sustainability of their farming operations.

Keywords: florists, cut flowers, wholesale, market survey

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Introduction

Cut flower production is a small, rapidly growing, and dynamic industry in Utah. Other states are also experiencing tremendous growth and looking to Utah, particularly Utah State University (USU) Extension programs, to meet grower needs. Cut flower farms are primarily new businesses, often urban micro farms. Others are adding cut flowers to diversify existing crops, such as alfalfa and fresh produce. The number of flower farms has expanded from less than 20 farms in 2018 to approximately 135 farms in 2022. The Utah Cut Flower Farm Association (UCFFA) started in 2019 and currently has 140 members. Last August, USU Extension and the UCFFA hosted the first annual Utah Flower Day at Wheeler Farm (Salt Lake City, UT) with just over 500 attendees, demonstrating the substantial interest in local cut flower farming.

Most cut flower farms are women run, often aged 30–40, and are new to farming; thus, they represent a new and underserved demographic for agriculture. Until recently, the average farm size was a quarter acre, and now it's closer to a half-acre, as 2022 saw much farm expansion. Farms are highly entrepreneurial, and local cut flowers are predominantly sold direct to consumer (farmers' markets, CSAs/subscriptions, through Instagram, you-pick, etc.), wholesale to florists, and through events (arrangements for weddings, funerals, and other events). Farms also tend to offer educational experiences, such as classes on farming, floral arrangements, and agritourism-type events. As farms mature, they often move more into wholesale markets, which require high quality and large volumes. This is where the most growth has occurred, as awareness regarding the higher quality and selection of local flowers has grown among florists and consumers.

A study conducted in 2021 evaluated the economic impact of the cut flower industry on Utah's economy (Ward and Stock, 2022). A total of 21 farm responses were analyzed (n = 21; ~20% of farms), through the use of IMPLAN, with a conservative estimate of 25 acres in cut flower production statewide. The average revenue per acre was $64,000, with a low of $7,000 per acre and a high of $200,000 per acre. This range in revenue correlated with the number of years the farm was in business. The impacts assessed ranged from $3 million to $13.7 million in total output (sales); between $221,000 and $1.3 million in state tax revenue; and between $1.1 million and $5.8 million in labor income. Other benefits included raising families out of underemployment (many growers would otherwise not be working) and entrepreneurs converting small plots of land into profitable businesses. The use of this land in agriculture will improve the environmental quality of farmland, assure the availability of green space in rural and urban areas, demonstrate the potential beauty in farming to nonfarmers, and establish a contemporary crop that appeals to newer and younger generations of farmers.

Approximately 40 acres were devoted to cut flower production in 2022. Although this amount of farmland is small compared to other crops, the net returns are far greater than any other crop in Utah, save cannabis, which only a few can grow. Cut flowers are simply redefining profitability in agriculture. Growers are currently marketing their flowers through a number of outlets and are generally on their own in finding/developing markets for their products. Each market has different needs in terms of varieties, colors, quantities, delivery, pricing, etc., and the disadvantages and advantages of each are not yet well understood. Also, little is known about the willingness of

florists and consumers to pay premiums for locally grown cut flowers, especially in the Intermountain West. Research in this area has primarily focused on the U.S. Midwest and South (Yue and Hall, 2010; Rihn et al., 2011; Columbia and Stock, 2021). This study provides crucial information on wholesale florists' needs and preferences for local cut flowers. Marketing information and education will enhance the ability of current and potential cut flower growers to properly assess the profit potential of their decisions and assist with the long-term sustainability of their farming operations.

Methods

In the fall of 2021 and 2022, online surveys (via Qualtrics) of florists in Utah and surrounding communities were conducted to better understand their needs, preferences, and hurdles to sourcing cut flowers locally. An email directory of florists was assembled based upon internet searches for florist businesses across Utah and nearby communities. Survey questions (20 in 2021 and 24 in 2022) included florists' business details (years in business, business location, primary products and markets, annual flower expenditures, etc.), current usage of local flowers, interest in sourcing flowers locally, perceived barriers and hurdles to local sourcing, flower variety, color and delivery preferences, quality and quantity needs, and willingness to pay pricing above normal wholesale. Additional questions regarding market capacity and seasonality needs were added in 2022. The survey was tested with UCFFA member growers and florists before it was distributed to florists via email request.

The 2021 survey was completed by 42 florists, and 60 completed the survey in 2022. In 2021, 44% of the respondent florists had been in business 5 years or less. This percentage dropped to 28% in 2022. Their primary clientele were weddings and daily florals, with funerals coming in at a strong third. In 2021, 68% sourced their flowers through wholesale channels, dropping to 66% in 2022. Also, local flower usage increased from 11% to 16% from 2021 to 2022. In 2022, 32% spent $30,000 or less on flowers annually, while 30% spent more than $60,000 annually. In 2021, 71% felt their 2021 sales reached pre-pandemic levels (74% for 2022). The wedding market is important as the average wedding provides between $1,000–$5,000 in sales (62%), with 5% from $5,000–$10,000. In 2022, average wedding income dropped to 49% for $1–$5,000 in sales but increased to 11% for $5,000–$10,000 in sales. Flower quality, flower selection, and delivery schedule were the respondent florists' primary challenges in sourcing from wholesale providers.

Results

Table 1 provides an overview of 2021 and 2022 survey results for the local cut flower sourcing questions. Current cut flower sourcing increased between the 2021 and 2022 surveys. Florists sourcing more than 50% of their flowers from local growers increased from 9.1% to 16%. Those sourcing 11%–50% of their flowers locally increased from 41% to 42%. The number of growers florists sourced from increased. Those sourcing from more than 10 growers rose by 4%, and those sourcing from six to 10 growers rose by 14.5%.

Table 1. Local Sourcing Statistics, 2021 and 2022 Florist Surveys

Question Description	Response Choice	2022 (N = 60)	2021 (N = 42)
What percentage of the flowers you used this year were sourced from local farms/growers? (Utah, or within 150 miles of your floral business)	None	16.13%	13.64%
	10% or less	25.81%	36.36%
	11% to 25%	25.81%	15.91%
	26% to 50%	16.13%	25.00%
	51% to 75%	8.06%	4.55%
	More than 75%	8.06%	4.55%
What percentage of your flowers would you like to source locally next year?	None	1.67%	0.00%
	10% or less	8.33%	6.25%
	11% to 25%	16.67%	16.67%
	26% to 50%	30.00%	27.08%
	51% to 75%	18.33%	25.00%
	More than 75%	25.00%	25.00%
If you sourced flowers locally this year, from approximately how many growers/farmers did you source?	2 or less	26.09%	48.72%
	3 to 5	41.30%	48.72%
	6 to 10	17.39%	2.56%
	More than 10	4.35%	0.00%
	Cut flower coop	10.87%	NA
What do you feel are the benefits of sourcing flowers locally? (Choose all that apply.)	None	0.00%	0.00%
	Quality—vase life	21.74%	20.62%
	Quality—event ready	15.46%	13.92%
	Unique selection	20.29%	18.56%
	Reliable supply	5.80%	8.25%
	Support local economy	21.74%	20.62%
	Sustainable production	14.01%	17.01%
	Other	0.97%	1.03%
Would you be willing to pay more for locally sourced cut flowers? If so, what percentage over wholesale pricing?	No	23.33%	34.04%
	Less than 5%	36.67%	31.91%
	6% to 10%	26.67%	23.40%
	11% to 20%	10.00%	6.38%
	21% to 30%	0.00%	0.00%
	31% to 40%	0.00%	0.00%
	41% to 50%	1.67%	2.13%
	More than 50%	1.67%	2.13%
What barriers do you currently face in sourcing local flowers? (Choose all that apply.)	Don’t know growers	13.79%	15.38%
	Communication time	11.72%	14.62%
	Pricing	12.41%	12.31%
	Lack of inventory/supply	22.07%	17.69%
	Lack of types/varieties	18.62%	20.77%
	Delivery capabilities	15.86%	13.85%
	Other	5.52%	5.38%

Table 1. (cont)

Question Description	Response Choice	2022 (N = 60)	2021 (N = 42)
What is the minimum number of bunches per flower you need weekly from a local grower/farmer to meet your quantity goals for a supplier?	1 or less	3.70%	15.91%
	2 to 5	37.04%	34.09%
	6 to 10	31.48%	18.18%
	11 to 15	7.41%	13.64%
	16 to 20	5.56%	6.82%
	21 to 30	9.26%	4.55%
	31 to 45	1.85%	0.00%
	More than 45	3.70%	6.82%
How many flower deliveries would you need weekly from a local grower/farmer?	1 or less	51.72%	NA
	2	29.31%	
	3	12.07%	
	4	3.45%	
	5 or more	3.45%	
What time of year are you most likely to need cut flowers from a local grower/farmer?	Never	0.00%	NA
	1 or 2 summer months	3.45%	
	All summer long	43.10%	
	All year long	48.28%	
	Other	5.17%	
Has the availability of local flowers benefited your floral business?	No	5.66%	0.00%
	Yes	67.92%	78.05%
	Unsure	26.42%	21.95%

In both survey years, 25% of florists indicated they would like to source more than 75% of their flowers locally in the next year, and another 54% would like to source at least some of their flowers (less than 50%) from local growers in the next year. Overall, the number of florists willing to pay a premium for local flowers increased between 2021 and 2022, as the number not willing to pay a premium decreased from 34% to 23%. The florists willing to pay premiums from 11% to 20% increased from 6% to 10%. Flower quality in terms of vase life and unique selection were the primary reasons florists sourced locally. Lack of inventory (quantity) and lack of the varieties or flowers needed were the main hurdles florists noted in sourcing locally. However, the vast majority (68% in 2022 and 78% in 2021) of respondents felt that the availability of local flowers had benefited their business.

In 2022, additional survey questions found that florists (52%) would primarily need only one flower delivery a week, but 30% would likely need two deliveries weekly. Close to half of the florists would need flowers all year long, and another 43% would need them all summer long. Figure 1 illustrates the flower types/varieties that florists would like to source locally. The larger words indicate higher preferences.

Figure 1. Locally Sourcing Preferred Flower Types/Varieties

Conclusions

Cut flower production has been immensely profitable to small growers thus far, as they are able to use small plots of land to turn a profitable business. Current flower farmers are primarily women who are generally underemployed. These farms provide important and interesting work for these growers and assist them in developing important connections and support networks for others who farm. In turn, their farms have increased family income, which leads to improved quality of life and standard of living, which is especially important in rural areas. The income also leads to increased spending in the local area, which benefits their communities in terms of business expenditures, jobs, social services, etc. (Albrecht, 2014). As growers look to enter and expand their businesses, market information will be vital to their planning and long-term sustainability. It will be important to understand the needs, hurdles, and capacity of these markets to ensure continued profitability of Utah farmers, especially as the number of farmers and acres in cut flower production grows over time.

The surveys conducted as part of this study show a strong and growing demand for local cut flowers in the wholesale florist market in Utah. Additional survey results not discussed in this research report provide growers important information on quantities and varieties needed, colors required, and delivery and communication needs. As the study progresses, a full market assessment will be conducted to look at direct to consumer, agritourism, and other potential markets and obtain a measure of market capacity and the benefits and disadvantages of each.

Acknowledgment

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References

Albrecht, D. 2014. *Rethinking Rural: Global Community and Economic Development in the Small Town West*. Pullman, WA: Washington State University Press.

Columbia, S., and M. Stock. 2021. *Cut Flowers for Community Supported Agriculture Production*. Lexington, KY: University of Kentucky, Center for Crop Diversification, Extension Publication CCD-MT-2.

Rihn, A., C. Yue, B. Behe, and C. Hall. 2011. "Generations X and Y Attitudes toward Fresh Flowers and Gifts: Implications for the Floral Industry." *HortScience* 46(5):736–743.

Ward, R., and M. Stock. 2022. *The Value of Cut Flowers to Utah's Economy*. Logan, UT: Utah State University, Extension Presentation. Available online: https://www.youtube.com/watch?v=iofT_OVfZIY&list=PLMnDQoXFVBEbhN_ZJ5fGZts81Dd2Xftjm&index=25.

Yue, C., and C. Hall. 2010. "Traditional or Specialty Cut Flowers? Estimating US Consumers Choice of Cut Flowers at Noncalendar Occasions." *HortScience* 45(3):382–386.

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Research Report: Innovation among Businesses Across the Agri-Food Supply Chain during COVID-19

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Abstract

Innovation contributes critically to business recovery following major crises. Traditionally, business innovation is characterized by a series of choices and actions over time. During COVID-19, however, businesses throughout the agri-food supply chain were forced to innovate rapidly due to sudden unforeseen policy changes. To understand innovation induced by COVID-19, we analyze 297 usable responses from a survey of agri-food supply chain businesses in two distinct study regions (California and the two-state region of Minnesota-Wisconsin). Results indicate that larger agri-food businesses managed by younger owner-operators were more likely to innovate and adapt during the COVID-19 crisis.

Keywords: innovation, COVID-19, business size, agri-food supply chain

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Introduction

Innovation is considered imperative for businesses to recover following major crises. During the COVID-19 pandemic, movement toward new business models, technologies, and niche products occurred in many industries but were particularly visible in the agri-food sector (de Lucas Ancillo et al., 2020; Galankis et al., 2020; Bellemare and Dusoruth, 2021; Benedek et al., 2021; Gavrilla et al., 2021; Reardon et al., 2021). For example, farmers shifted markets and delivery channels (Richards and Rickard, 2020), food manufacturers reformulated recipes and re-purposed production lines (Nakat and Bou-Mitri, 2021), retail grocers launched or expanded online ordering and home-delivery services (Melton, 2020; Walmart, 2020), and restaurants pivoted to take-out offerings, delivery, and virtual dining (Norris, Taylor Jr., and Taylor, 2021). During the first year of the pandemic, innovation among agri-food businesses were rapid and complex, compressing the traditional innovation and diffusion processes described by Schumpeter (1943) and Rogers (2003), respectively. There was little time for business owners to develop, tool, and test new ideas or for these new ideas to be subsequently adopted by other businesses. Consequently, researchers suggest that a better understanding of innovation among agri-food businesses during the COVID-19 pandemic is needed (Reardon et al., 2021; Charlebois et al., 2022;). Our study explores the impact of COVID-19 on innovation across segments of the agri-food sector.

Background

Innovation is defined as the introduction of new goods, services, or ways of doing business (Wojan and Parker, 2017). Business innovation plays a vital role in short-term recovery and long-term resilience following significant market uncertainty, economic recession, and major crises (Wojan and Paker, 2017; Ulvenblad et al., 2018; Galankis et al., 2021; Ozanne et al., 2022; Wang et al., 2022).

Studies have reported an association between innovation and business size with mixed findings, some suggesting that relative advantages accrue to large firms while others identify small firm advantages (Tether, 1998; Camisón-Zornoza et al., 2004; Verhees and Meulenberg, 2004; Damanpour and Schneider, 2008; Vossen, 2012). According to Vossen (2012), large businesses have the advantage of being able to invest more into research and development (R&D); spread risk over a portfolio of products; hire and train specialized labor; lean on greater economies of scale, market bargaining power, and access to external capital; and erect barriers to entry. On the other hand, small businesses typically benefit from advantages such as limited decision-making bureaucracy, rapid decision making, motivated and committed owner-operator management, rapid and effective communication, quick reaction to changing market requirements, and the ability to learn quickly and adapt routines as needed. We hypothesized that greater innovation during COVID-19 occurred among smaller scale businesses, as their flexibility would allow them to pivot more easily.

The Organization for Economic Cooperation and Development (OECD) developed guidelines for enterprises in the manufacturing sector to measure business size by the number of employees (2022). According to OECD guidelines, the majority of businesses throughout the U.S. agri-food

supply chain (including agricultural production, food wholesaling, food retailing segments) are classified as "micro" and "small" (U.S. Census Bureau, 2019); the only exception is the processing/manufacturing segment, which has an average of 55 employees per business, putting it in the OECD's "medium"-size category. Agri-food businesses in this study represent micro (ag production), small (wholesale grocery and restaurants), and medium (manufacturing and retail grocery) OECD business size categories.

In addition to size, previous research has found that innovation within the agri-food supply chain is statistically associated with business and operator characteristics, such as geographic location, population density, transaction cost, and owner age, gender, and industry experience (King et al., 2010; O'Hara and Low, 2016; Wojan and Parker, 2017; O'Hara and Lin, 2019; Nosratabadi, Mosavi, and Lakner, 2020).

Methods

In this paper, we use an empirical approach to test the hypothesis that innovation throughout the food supply chain differed by business size and type during the COVID-19 pandemic. First, linear regression is used to evaluate the relationship between innovation and business characteristics, such as supply chain segment, business size, operator gender, and operator age. Next, descriptive statistics are applied to determine whether pandemic-related innovations were in line with long-term business strategies.

Data for the regression analysis came from 297 survey responses to 11 questions collected electronically from businesses in the agri-food supply chains in California and the two-state region of Minnesota-Wisconsin. Survey distribution lists (email addresses) were compiled from Data Axel/Reference Solutions and from private and nonprofit membership organizations representing the agri-food supply chain segments included in this study (agricultural production, food manufacturing, wholesale grocery, retail grocery, and restaurants). The survey was fielded electronically using the Qualtrics platform from February 2021–April 2021. Follow-up reminders were emailed every 2 weeks throughout the survey period.

Survey participants were asked about business and operator characteristics as well as adaptations made during the first year of COVID-19. There were 14 possible innovation responses for questions related to business and operator characteristics to determine the innovations and adaptations made during COVID-19 (see Table 1). The 14 innovation responses identified by researchers were based on previous research and anecdotal evidence of changes businesses were making during the pandemic across the United States. For each possible innovation item, a value of 1 was recorded if selected and 0 otherwise if not selected. Researchers originally categorized these 14 items into three categories; however, in post hoc analysis the items were more reliable in a two-category structure. Response choices to the adaptation question included 8 questions in operational innovations ($M = 2.08$, $SD = 1.94$, $\alpha = .69$) and 6 in marketing innovations ($M = 1.76$, $SD = 1.65$, $\alpha = .70$) (see Table 1). Following Camisón-Zornoza et al. (2004), who found there was no statistical reason to distinguish between different types of innovation and because this study was not concerned with indicator rank as with Kamalipoor et al. (2022), the operational and

marketing responses were summed to create a single-dimension innovation score (INS) for each respondent business. Innovation scores ranged from 0 to 14.

Table 1. Summary of responses to the question, "Since the coronavirus situation began to affect your business, how has your business changed? (Check all that apply.)" (*n* = 229)

Innovation Items	Number of Responses % (*n*)
Business Operations	
Changing delivery/shipping practices including packaging	50% (114)
Lay-offs/furloughs	43% (98)
Offering training/education to employees	36% (83)
Hiring new people	34% (79)
Sourcing inputs/products from different suppliers	33% (76)
Changing inventory management practices	32% (74)
Investing in own equipment/facility	19% (44)
Increasing the number of input/product suppliers	17% (38)
Marketing	
Changing marketing strategies/practices	56% (129)
Changing products/services offered	54% (124)
Selling through different sales channels	45% (104)
Changing payment methods	32% (74)
Increasing the number of sales channels	28% (65)
Obtaining new certifications/licenses	7% (15)

Multiple linear regression (IBM SPSS, Version 27) was used to study the relationship between a dependent INS variable and 9 independent variables, which included each of the five supply chain segments (ag production, manufacturing, wholesaling, grocery retailing, and restaurants), as well as the logarithmic transformation of 2019 employee numbers (LG10SIZE), logarithmic transformation of 2019 sales revenue (LG10REV), operator age (AGE), and operator gender (GEN). The supply chain segments (AGPRD, MNF, WHL, RET, and REST) equaled 1 if the business reported any portion of their sales revenue generated from the segment; that is, they are not defined exclusively for each business. For the GEN variable, responses from women-owned businesses were coded 1 and 0 otherwise.

Descriptive statistics were used to further inform our understanding of business decisions made during COVID-19. A second innovation-related question asked, "Which of the changes were in line with the long-term direction of your business and were helped by the coronavirus situation to bring them about?" (see Table 2). There were 175 responses to this question from the business operators whose responses were included in the regression analysis. In the paired responses, we computed the proportion of innovations that were in line with the long-term direction for each item.

Table 2. Summary of responses to the question, "Which of the changes were in line with the long-term direction of your business and were helped by the coronavirus situation to bring them about? (Check all that apply.)" (*n* = 175)

Innovation Items	Number of Responses % (*n*)
Business Operations	
Investing in own equipment/facility	75% (33)
Offering training/education to employees	71% (59)
Hiring new people	67% (53)
Changing inventory management practices	62% (46)
Sourcing inputs/products from different suppliers	53% (40)
Lay-offs/furloughs	50% (49)
Changing delivery/shipping practices including packaging	49% (56)
Increasing the number of input/product suppliers	47% (18)
Marketing	
Selling through different sales channels	91% (95)
Increasing the number of sales channels	89% (58)
Changing marketing strategies/practices	80% (103)
Obtaining new certifications/licenses	73% (11)
Changing products/services offered	68% (84)
Changing payment methods	62% (46)

Results

The linear regression model explained 15.9% of variance for the innovation score (see Table 3). The model was significant overall, indicating statistically significant explanatory power for operator age and business size. Through linear regression, we find that all else equal, younger business operators tended to make innovative changes during the COVID-19 crisis (β = -.0.47, p = .011). The results also indicated that business size, measured by employment, was positively correlated with the extent of innovation along the agri-food supply chain. Larger businesses with more employees were more likely to innovate during COVID-19 than smaller businesses (β = 1.471, p = .002). We did not find a significant relationship between innovation and the following factors: supply chain segments, sales revenue, and gender. Moreover, regional difference was found to be statistically insignificant in preliminary analysis. Descriptive statistics suggest that innovations made during COVID-19 were in line with long-term strategies for 59% of businesses throughout the agri-food supply chain (n = 175) (see Table 3).

Table 3. Linear Regression Results

Variables	*B*	*SE*	*t*	*p*
Production_Agriculture	-0.882	-1.493	-1.493	0.137
Manufacturing	0.158	0.273	0.273	0.785
Wholesaling	-0.352	-0.551	-0.551	0.582
Grocery_Retailing	-0.251	-0.524	-0.524	0.601
Restaurants	0.389	0.836	0.836	0.404
Gender	0.684	1.458	1.458	0.146
Age	-0.470	-2.560	-2.560	0.011**
Log_Revenue	0.216	0.643	0.643	0.521
Log_Size	1.471	3.125	3.125	0.002**
R^2	.194			
Adjusted R^2	.159			
F statistic	5.541***			

Note: Single, double, and triple asterisks (*, **, ***) indicate statistical significance at the 10%, 5%, and 1% levels.

Implications

Innovation and adaptation occurred rapidly within the agri-food supply chain during the COVID-19 pandemic, allowing businesses to not only "bounce back but to bounce forward" (Ameen et al., 2022). This rapid innovation is perhaps one of the positive outcomes of the crisis. However, innovation did not occur equally across businesses throughout the agri-food supply chain. Our study suggests that during the first year of the pandemic, only larger businesses and those with relatively young owner operators adopted operational and marketing innovations.

The results challenge our hypothesis that smaller scale businesses would be more flexible than larger businesses and thus able to rapidly innovate during the COVID-19 crisis. The results may be explained by the fact that a large percentage of businesses in our study can be classified as "service oriented." An extensive meta-study by Camisón-Zornoza et al. (2004) explains that size is more positively correlated with innovation among service-oriented businesses compared to manufacturing businesses. The majority of the respondents in our study (65%), representing the upstream supply chain segments of wholesaling, grocery retailing, and restaurants, are classified as service oriented. We suggest that the traditional benefits accruing to larger businesses, such as investments in R&D as well as economies of scale and greater bargaining power, may have better prepared the relatively large, service-oriented agri-food businesses for the COVID-19 pandemic. Moreover, the descriptive statistics comparing innovation with long-term business strategies further support the concepts of strategic and contingency planning afforded by significant R&D investment.

Our original findings make new contributions to the innovation literature while offering insights for policy makers and business owners within the agri-food supply chain. Business owners do not have control over firm size and operator age in the short term. Therefore, policy considerations should include incentive payments for business owners well in advance of crises to support innovative R&D and strategic planning among sectors of the agri-food supply chain that represent

critical foodstuffs. Future research should focus on the relationship between R&D spending and innovation among small and large firms within the agri-food supply chain.

References

Ameen, N., J. Choudrie, P. Jones, and A. Amitabh. 2022. "Innovative Technologies and Small-Medium Sized Enterprises in Times of Crisis." *Information Systems Frontiers* 24:1055–1060.

Bellemare, M.F., and V. Dusorth. 2021. "Who Participates in Urban Agriculture? An Empirical Analysis." *Applied Economic Perspectives and Policy* 43(1):4300–4442.

Benedek, Z., L. Barath, I. Fertó, E. Merino-Gaibor, A. Molnár, É. Orbán, and N. Gusztáv. 2021. "Survival Strategies of Producers Involved in Short Food Supply Chains Following the Outbreak of COVID-19 Pandemic: A Hungarian Case-Study." *Sociologia Ruralis* 62:68–90.

Camisón-Zornoza, C., R. Lapiedra-Alcamí, M. Segarra-Ciprés, and M. Boronat-Navarro. 2004. "A Meta-Analysis of Innovation and Organizational Size." *Organization Studies* 25(3):331–361.

Charlebois, S., A. Hill, J. Vezeau, L. Hunsberger, M. Johnston, and J. Music. 2022. "Assessing a Nation's Competitiveness in Global Food Innovation: Creating a Global Food Innovation Index." *World* 3(1):27–66.

Damanpour, F., and M. Schneider. 2008. "Characteristics of Innovation and Innovation Adoption in Public Organizations: Assessing the Role of Managers." *Journal of Public Administration Research and Theory* 19(3):495–522.

de Lucas Ancillo, A., M.T. del Val Núñez, and S. Gavrila Gavrila. 2020. "Workplace Change within the COVID-19 Context: A Grounded Theory Approach." *Economic Research—Ekonomska Istra Zivanja* 34(1):2297–2316.

Galanakis, C.M. 2020. "The Food Systems in the Era of the Coronavirus (COVID-19) Pandemic Crisis." *Foods* 9(4):523.

Gavrila, S., and A. de Lucas Ancillo. 2021. "Entrepreneurship, Innovation, Digitization and Digital Transformation toward a Sustainable Growth within the Pandemic Environment." *International Journal of Entrepreneurial Behavior & Research* 28(1):45–66.

Kamalipoor, M., M. Akbari, S.R. Hejazi, and A. Nazarian. 2022. "The Vulnerability of Technology-Based Business during COVID-19: An Indicator-Based Conceptual Framework." *Journal of Business & Industrial Marketing,* forthcoming.

King, R.P., M.S. Hand, G. DiGiacomo, K. Clancy, M.I. Gomez, S.D. Hardesty, L. Lev, and E.W. McLaughlin. 2010. *Comparing the Structure, Size and Performance of Local and Mainstream Supply Chains.* Washington, DC: U.S. Department of Agriculture, Economic Research Service.

Melton, J. 2020. "The Coronavirus Pandemic Lifts Global Online Grocery Sales." *Digital Commerce 360*. Available online: https://www.digitalcommerce360.com/2020/07/20/the-coronavirus-pandemic-lifts-global-online-grocery-sales/ [Accessed December 5, 2022.]

Nakat, Z., and C. Bou-Mitri. 2021. "COVID-19 and the Food Industry: Readiness Assessment." *Food Control* 121:1–10.

Norris, C.L., S. Taylor Jr., and D.C. Taylor. 2021. "Pivot! How the Restaurant Industry Adapted during COVID-19 Restrictions." *International Hospitality Review* 35(2):132–155.

Nosratabadi, S., A. Mosavi, and Z. Lakner. 2020. "Food Supply Chain and Business Model Innovation." *Foods* 9(2):2–24.

— OECD. 2022. "Enterprises by Business Size." Available online: https://data.oecd.org/entrepreneur/enterprises-by-business-size.htm [Accessed September 29, 2022].

O'Hara, J.K., and J. Lin. 2019. "Population Density and Local Food Market Channels." *Applied Economic Perspectives and Policy* 42(3):477–496.

O'Hara, J.K., and S.A. Low. 2016. "The Influence of Metropolitan Statistical Areas on Direct-to-Consumer Agricultural Sales of Local Food in the Northeast." *Agricultural and Resource Economics Review* 45(3):539–562.

Ozanne, L.K., M. Chowdhury, G. Prayag, and D.A. Mollenkopf. 2022. "SMEs Navigating COVID-19: The Influence of Social Capital and Dynamic Capabilities on Organizational Resilience." *Industrial Marketing Management* 104:116–135.

Reardon, T., A. Heiman, L. Lu, C. Nuthalapati Sr., R. Vos, and D. Zilberman. 2021. "Pivoting' by Food Industry Firms to Cope with COVID-19 in Developing Regions: E-commerce and 'Co-pivoting' Delivery-Intermediaries." *Agricultural Economics* 52:459–475.

Richards, J., and B. Rickard. 2020. "COVID-19 Impact on Fruit and Vegetable Markets." *Canadian Journal of Agricultural Economics* 68(2):189–194.

Rogers, E.M. 2003. *Diffusion of Innovations*, 5th ed. New York, NY: Free Press.

Schumpeter, J. 1943. *Capitalism, Socialism and Democracy,* 1st ed. London, England: Routledge.

Tether, B. 1998. "Small and Large Firms: Sources of Unequal Innovations?" *Research Policy* 27(7):725–745.

Ulvenlad, P., H. Barth, J.C. Bjrklund, M. Hoveskog, P.-O. Ulvenblad, and J. Staahl. 2018. "Barriers to Business Model Innovation in the Agri-Food Industry: A Systematic Literature Review." *Outlook Agriculture* 47(4):308–314.

United States Census Bureau. 2019. "Statistics of US Businesses." Available online: https://www.census.gov/programs-surveys/susb.html [Accessed October 7, 2022].

Verhees, J., and M. Meulenberg. 2004. "Market Orientation and Innovativeness, Product Innovation and Performance in Small Firms." *Journal of Small Business Management* 42(2):134–154.

Vossen, R.W. 2012. "Relative Strengths and Weaknesses of Small Firms in Innovation." *International Small Business Journal* 16(3):88–94.

Walmart. 2020. "Walmart Introduces Express Delivery." *eCommerce.* Available online: https://corporate.walmart.com/newsroom/2020/04/30/walmart-introduces-express-delivery.

Wang, X., Q. Yong, X. Zeshui, and Š. Marinko. 2022. "A Look at the Focus Shift in Innovation Literature Due to COVID-19 Pandemic." *Journal of Business Research* 145:1–20.

Wojan, T., and T. Parker. 2017. *Innovation in the Rural Nonfarm Economy: Its Effect on Job and Earnings Growth, 2010-2014*. Washington, DC: U.S. Department of Agriculture, Economic Research Service, Report No. 238.

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Research Report: Do Consumer Beliefs Impact Their Preferences for Organic Specialty Baked Goods?

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Abstract

Past studies found that organic labels may influence consumer taste perceptions either positively or negatively, and the latter may be an issue for products consumed for pleasure. We compared taste beliefs associated with organic and conventional specialty baked goods and conducted choice experiments to examine the impact of taste beliefs on choice. Results show that respondents feel organic specialty baked goods taste worse than conventional, which impacts their willingness to pay. Offering product taste information reduced the negative impact of taste beliefs. Providing organic labeling information did not eliminate negative taste associations but did reduce the impact of taste beliefs on choice.

Keywords: baked goods, choice experiment, organic, taste information, taste beliefs, willingness to pay

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Introduction

Past studies found that organic labels may affect consumer taste perceptions and ratings, regardless of whether the consumer has tasted the product or not. For some products, the organic label induced positive taste associations, possibly related to the organic halo effect (Apaolaza et al., 2017). However, in other cases organic-labeled products were perceived to have inferior taste, particularly for those products where good taste is typically more important than healthiness (Van Doorn and Verhoef, 2011; Ellison et al., 2016; Nadricka, Millet, and Verlegh, 2020).

Taste is one of the most important attributes for bakery/pastry products (Sajdakowska et al., 2019; Drugova, Curtis, and Akhundjanov, 2020; Kuhar et al., 2020) and likely even more so for specialty baked goods, which are consumed as treats and/or for special occasions. In general, consumers have high-quality expectations for specialty baked goods, but they are also willing to pay more for them. Thus, specialty baked goods have the potential to absorb the higher cost of organic wheat flour. However, the organic label may induce negative taste connotations for these products, negatively impacting consumer demand and willingness to pay. Thus, the first objective of this study is to examine and compare respondent taste ratings for selected organic and conventional specialty baked goods. Second, we examine consumer preferences and willingness to pay for these products, focusing on the effect of elicited (*subjective*) taste beliefs and provided (*objective*) taste information. Finally, we examine the impact of organic label knowledge on the taste beliefs and preferences for organic products.

Literature Review

Not surprisingly, past studies found differences in taste ratings between organic and conventional products under "blind" tasting scenarios (Hemmerling et al., 2013; Bi et al., 2015; Teuber, Dolgopolova, and Nordström, 2016). The taste of organic foods was rated higher in some studies (Annett et al., 2008; Costanigro et al., 2014) and inferior in others (Hemmerling et al., 2013; Bi et al., 2015; Teuber, Dolgopolova, and Nordström, 2016). However, when consumers are given information indicating the product was made using organic methods or ingredients, their taste ratings may improve significantly in comparison to conventional products (Hemmerling et al., 2013; Teuber, Dolgopolova, and Nordström, 2016). Interestingly, past studies also found differences in taste ratings between organic products and the same but unlabeled organic products following product tasting (Lee et al., 2013; Apaolaza et al., 2017; Bernard and Liu, 2017; Schouteten, Gellynck, and Slabbinck, 2019), as well as changes in taste ratings of organic products after the organic label was revealed (Napolitano et al., 2013; Teuber, Dolgopolova, and Nordström, 2016; Gross, Waldrop, and Roosen, 2021). These studies provide evidence that organic labeling may indeed influence consumer taste perceptions and that taste ratings are more dependent on the labeling information than on actual product sensory properties. In this study, we examine the impact of organic labelling on taste ratings for three selected specialty baked goods—bread loaf, croissant, and large cookies.

Food choice studies have begun to incorporate consumer beliefs about product attributes in utility functions (Malone and Lusk, 2017; Gross, Waldrop, and Roosen, 2021; Neuhofer and Lusk, 2021).

These studies found that beliefs, including taste beliefs, helped explain consumer choice and influenced WTP significantly. In the present study, we examine the impact of taste beliefs on choice in the context of specialty baked goods. We hypothesize that taste beliefs are influential in the choice of specialty baked goods because they are consumed for hedonistic purposes, so it is important to understand the effect of the taste beliefs to determine the success of these products. Specifically, we examine whether perceived taste ratings—either positive or negative—influence WTP for organic specialty baked goods.

Finally, several studies also provided information about organic production practices while investigating taste ratings of organic products (Napolitano et al., 2013; Gross, Waldrop, and Roosen, 2021). In these studies, the organic label—paired with information about organic production systems—positively impacted rating scores compared to those for the same products under a blind tasting scenario. However, it is not clear whether the rating scores were affected by the provided organic labelling information or by simply stating that the products were organic. The present study aims to explore this question using specialty baked goods.

Methods

Data for the study were collected through an online survey using Qualtrics in fall 2021. The survey included hypothetical choice experiments for three specialty baked goods—a bread loaf, croissant, and large cookie—and questions about taste beliefs after the choice experiments. The alternatives in the choice experiments varied in organic and local labels (present or absent), provided taste information (poor, fair, good, or unknown taste), and four price levels which were based on market prices in summer 2021. We employed efficient design with Bayesian priors to build the choice experiments. The final design contained 12 choice tasks per product, which were divided into two blocks. In total, each respondent evaluated 18 choice tasks. Further, we developed two versions of the survey, which differed in whether information about organic labeling standards was provided (before the choice experiments) or not, and respondents were randomly assigned to each. In total, we received 721 responses, of which 359 received information about organic labeling standards (treatment group), and 362 did not receive the information (control group).

We analyzed the data using a random parameter logit model. The utility function of respondent *n* associated with alternative *i* in choice scenario *t* for a given bakery product is specified as

$$U_{nit} = ASC_{n,NoBuy} + \beta_{price} Price_{nit} + \beta_{n,organic} Organic_{nit} + \beta_{n,local} Local_{nit} \quad (1)$$
$$+\beta_{n,poor} TastePoor_{nit} + \beta_{n,fair} TasteFair_{nit} + \beta_{n,good} TasteGood_{nit} +$$
$$\beta_{n,belief} TasteBelief_{ni} + \varepsilon_{nit},$$

where $ASC_{n,NoBuy}$ is alternative-specific constant for the no-purchase alternative; $Price_{nit}$ is price of the product; $Organic_{nit}$ and $Local_{nit}$ are dummy variables equal to 1 when the labels are present and 0 otherwise; $TastePoor_{nit}$, $TasteFair_{nit}$, and $TasteGood_{nit}$ are dummy variables indicating taste information; and ε_{nit} is unobserved utility, assumed to be *i.i.d.* type I extreme value. $TasteBelief_{ni}$ ranges from 1 ("very poor") to 5 ("very good") and represents perceived

taste rating for the given bakery product. β coefficients measure marginal effects on overall utility. Except for the price, all β coefficients were allowed to vary across respondents following a normal distribution $f(\beta_n \mid \Theta)$, and its parameters were estimated.

Results

Table 1 summarizes the socio-demographics of the control group and treatment group. The proportion of Caucasians is significantly higher in the control group, but otherwise the two groups are comparable. Table 2 reports average taste ratings for the organic and conventional specialty baked goods. On average, respondents in both groups rated the taste of the organic products significantly lower than the conventional. This confirms the hypothesis that consumers may rate organic versions of products consumed for hedonistic purposes as less tasty compared to conventional products.

Table 1. Sample Demographics

Characteristic		Control (C)	Treatment (T)	Diff. (C–T)
Age	2 = 18–24, 3 = 25–44, 4 = 45–64, 5 = above 64	3.61	3.69	-0.08
Female	1 = female, 0 = male	0.52	0.48	0.04
Children under 18	1 = yes, 0 = no	0.35	0.32	0.03
Education	1 = middle school, 2 = high school, 3 = some college, 4 = 2-year college, 5 = 4-year college, 6 = graduate school	3.69	3.74	-0.05
Employed	1 = yes (full- or part-time), 0 = no	0.66	0.65	0.01
Income	1 = < $10,000, … 6 = $50,000–$59,999, … 12 = $150,000 or more	5.98	5.99	0.00
Caucasian	1 = yes, 0 = no	0.81	0.74	0.07**
N		362	359	-

Notes: Double asterisk (**) denotes significance of difference in means at 5%.

Table 3 shows results of the estimated random parameter logit (RPL) models. First, price coefficients are negative and significant. Compared to a product with no taste information, poor taste information has a negative and significant effect on utility, while fair taste and good taste information has a positive and significant effect, as expected. The organic label is valued positively for each group and product when there is no difference in taste ratings (i.e., subjective taste beliefs) between organic and conventional bakery products. If the taste ratings are different, the utility from the organic product relative to the conventional product needs to be adjusted by the utility associated with the difference in the taste rating. Overall, the results show that taste beliefs have a large and significant impact on utility, as hypothesized. Finally, the local label also has a positive and significant effect on consumer utility in all categories, except cookies for the information group.

Table 2. Taste Ratings for Organic and Conventional Bakery Products

Product	Control (C)	Treatment (T)
Bread loaf		
Organic (O)	3.64	3.55
Conventional (C)	3.99	3.84
Diff. (O–C)	-0.35***	-0.29***
Croissant		
Organic (O)	3.66	3.56
Conventional (C)	4.12	3.93
Diff. (O–C)	-0.46***	-0.36***
Large cookie		
Organic (O)	3.61	3.53
Conventional (C)	4.20	4.03
Diff. (O–C)	-0.59***	-0.50***

Notes: Triple asterisk (***) denotes significance at the 1% level. Respondents were asked to rate the taste of each product from "very poor" = 1 to "very good" = 5. The question was asked after the choice experiment.

Table 3. RPL Models

	Control			Treatment		
	Bread Loaf	**Croissant**	**Large Cookie**	**Bread Loaf**	**Croissant**	**Large Cookie**
Price	-0.41***	-0.91***	-1.05***	-0.50***	-0.90***	-1.08***
Taste, poor	-3.28***	-5.37***	-3.44***	-4.26***	-4.32***	-3.83***
	(1.74***)	(3.75***)	(1.41***)	(2.60***)	(2.67***)	(1.90***)
Taste, fair	0.69***	0.70***	0.62***	0.73***	0.42***	0.56***
	(0.41)	(0.62*)	(1.17***)	(0.88***)	(0.35)	(1.01***)
Taste, good	2.43***	3.32***	3.43***	2.91***	2.98***	3.73***
	(1.40***)	(2.28***)	(1.86***)	(1.72***)	(2.11***)	(2.57***)
Organic	0.26**	0.90***	0.38***	0.45***	0.59***	0.29*
	(0.97***)	(1.50***)	(1.11***)	(0.96***)	(1.48***)	(1.25***)
Local	0.25***	0.34***	0.27***	0.38***	0.28***	0.14
	(0.05)	(0.03)	(0.52***)	(0.52**)	(0.14)	(0.54**)
None	-0.59	-0.43	-0.05	-1.12**	-1.90***	-0.44
	(2.47***)	(2.67***)	(2.75***)	(2.97***)	(3.08***)	(2.94***)
Taste belief	0.38***	0.51***	0.63***	0.29**	0.19*	0.49***
	(0.13)	(0.06)	(0.19)	(0.06)	(0.06)	(0.03)
Log-likelihood	-1,715.95	-1,528.97	-1,696.68	-1,607.78	-1,561.11	-1,648.30
AIC	3,461.91	3,087.94	3,423.37	3,245.57	3,152.21	3,326.60
BIC	3,563.64	3,189.67	3,525.10	3,347.17	3,253.82	3,428.21
No. of obs.	6,516	6,515	6,516	6,462	6,462	6,462

Notes: Single, double, and triple asterisks (*, **, ***) denote significance at the 10%, 5%, and 1% levels, respectively. Standard deviations for normally distributed coefficients in parentheses (all except price).

Table 4 reports mean WTP values, calculated using the Krinsky and Robb (1986) procedure. WTP for the organic label is positive for every product and group when not considering the difference in taste ratings between the organic and conventional products. However, the results show that taste beliefs contribute significantly to total WTP and when accounting for the difference in average taste beliefs, the significant premium for organic bakery products disappears. This illustrates the importance of taste beliefs when evaluating consumer WTP for organic products. However, provided taste information may compensate for the negative effects of taste beliefs on WTP for organic baked goods if the information is positive (fair or good taste). We also compared WTP values between the groups, finding that WTP tends to be smaller for the treatment group when the differences in taste ratings are considered, but it is significantly smaller for croissants only. However, this result suggests that providing information about organic labeling standards may diminish the importance of taste beliefs and their effect on choice. In line with the findings of RPL models, consumers are willing to pay extra for the local label, except for large cookies in the treatment group. Finally, consumers require a discount when taste is poor, and they prefer fair and good taste to unknown taste.

Table 4. WTP Values

	Control			**Treatment**		
	Bread Loaf	**Croissant**	**Large Cookie**	**Bread Loaf**	**Croissant**	**Large Cookie**
Organic, base utility	0.63**	0.98***	0.36***	0.89***	0.66***	0.26*
Organic, taste belief	3.33***	2.03***,[a]	2.17***	2.07***	0.73*,[a]	1.63***
Conventional, taste belief	3.65***	2.29***,[a]	2.53***	2.24***	0.81*,[a]	1.86***
Organic minus conventional	0.31	0.73	0.00	0.72	0.58	0.03
Local	0.61***	0.38***	0.26***	0.77***	0.32***	0.13
Poor taste	-7.91***	-5.87***,[a]	-3.28***	-8.46***	-4.79***,[a]	-3.56***
Fair taste	1.68***	0.77***	0.59***	1.47***	0.47***	0.53***
Good taste	5.89***	3.64***	3.28***	5.79***	3.30***	3.47***

Notes: Single, double, and triple asterisks (*, **, ***) denote significance at the 10%, 5%, and 1% levels, respectively. WTP associated with taste beliefs for organic and conventional products were evaluated at the group mean taste beliefs.

Superscript [a] denotes significant differences in estimated WTP between the control and the treatment groups for a given bakery product at 10% or better, based on the combinatorial test (Poe, Giraud, and Loomis, 2005).

Conclusions

We compared the taste ratings of organic and conventional versions of selected specialty baked goods and examined the impact of taste beliefs, provided taste information, and respondent knowledge of organic labeling standards on consumer choice and WTP for these products. We found that the examined organic specialty baked goods are perceived as less tasty than their conventional counterparts, which suggests that the "healthy = less tasty" bias holds for more hedonistic food items. Further, we found that taste beliefs explain a significant portion of utility and determine consumer WTP for these products, confirming findings of previous studies that taste beliefs play an important role in consumer food choice.

Providing organic labeling information does not appear to eliminate the negative taste bias associated with organic specialty baked goods, given that we found no significant differences in taste ratings between the control and treatment groups. It appears that taste beliefs are influenced more by what consumers believe organic means, rather than by their actual knowledge or information available. However, taste beliefs seem to have a greater effect on utility for the control group, which suggests that provision of the organic standards information may have reduced the importance of the respondents' subjective taste beliefs on their choice. Nevertheless, educating consumers about organic labelling standards may diminish the importance of taste beliefs in food choice only slightly and thus should not be a priority. Instead, consumers should be given the opportunity to sample the products, and marketing efforts should be targeted toward the smaller consumer segment with positive taste beliefs associated with the organic bakery products when compared to the conventional ones.

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References

Annett, L.E., V. Muralidharan, P.C. Boxall, S.B. Cash, and W.V. Wismer. 2008. "Influence of Health and Environmental Information on Hedonic Evaluation of Organic and Conventional Bread." *Journal of Food Science* 73(4):H50–H57.

Apaolaza, V., P. Hartmann, C. Echebarria, and J.M. Barrutia. 2017. "Organic Label's Halo Effect on Sensory and Hedonic Experience of Wine: A Pilot Study." *Journal of Sensory Studies* 32(1):e12243.

Bernard, J.C., and Y. Liu. 2017. "Are Beliefs Stronger Than Taste? A Field Experiment on Organic and Local Apples." *Food Quality and Preference* 61:55–62.

Bi, X., Z. Gao, L.A. House, and D.S. Hausmann. 2015. "Tradeoffs between Sensory Attributes and Organic Labels: The Case of Orange Juice." *International Journal of Consumer Studies* 39(2):162–171.

Costanigro, M., S. Kroll, D. Thilmany, and M. Bunning. 2014. "Is It Love for Local/Organic or Hate for Conventional? Asymmetric Effects of Information and Taste on Label Preferences in an Experimental Auction." *Food Quality and Preference* 31:94–105.

Drugova, T., K.R. Curtis, and S.B. Akhundjanov. 2020. "Organic Wheat Products and Consumer Choice: A Market Segmentation Analysis." *British Food Journal* 122(7):2341–2358.

Ellison, B., B.R. Duff, Z. Wang, and T.B. White. 2016. "Putting the Organic Label in Context: Examining the Interactions between the Organic Label, Product Type, and Retail Outlet." *Food Quality and Preference* 49:140–150.

Gross, S., M.E. Waldrop, and J. Roosen. 2021. "How Does Animal Welfare Taste? Combining Sensory and Choice Experiments to Evaluate Willingness to Pay for Animal Welfare Pork." *Food Quality and Preference* 87:104055.

Hemmerling, S., T. Obermowe, M. Canavari, K.L. Sidali, H. Stolz, and A. Spiller. 2013. "Organic Food Labels As a Signal of Sensory Quality—Insights from a Cross-Cultural Consumer Survey." *Organic Agriculture* 3(1):57–69.

Krinsky, I., and A.L. Robb. 1986. "On Approximating the Statistical Properties of Elasticities." *The Review of Economics and Statistics* 68(4):715–719.

Kuhar, A., M. Korošec, A. Bolha, I. Pravst, and H. Hristov. 2020. "Is a Consumer Perception of Salt Modification a Sensory or a Behavioural Phenomenon? Insights from a Bread Study." *Foods* 9(9):1172.

Lee, W.C.J., M. Shimizu, K.M. Kniffin, and B. Wansink. 2013. "You Taste What You See: Do Organic Labels Bias Taste Perceptions?" *Food Quality and Preference* 29(1):33–39.

Malone, T., and J.L. Lusk. 2017. "Taste Trumps Health and Safety: Incorporating Consumer Perceptions into a Discrete Choice Experiment for Meat." *Journal of Agricultural and Applied Economics* 49(1):139–157.

Nadricka, K., K. Millet, and P.W. Verlegh. 2020. "When Organic Products Are Tasty: Taste Inferences from an Organic = Healthy Association." *Food Quality and Preference* 83:103896.

Napolitano, F., C. Castellini, S. Naspetti, E. Piasentier, A. Girolami, and A. Braghieri. 2013. "Consumer Preference for Chicken Breast May Be More Affected by Information on Organic Production Than by Product Sensory Properties." *Poultry Science* 92(3):820–826.

Neuhofer, Z.T., and J.L. Lusk. 2021. "Decomposing the Value of Food Labels on Chicken." *Journal of Agricultural and Applied Economics* 53(2):229–245.

Poe, G.L., K.L. Giraud, and J.B. Loomis. 2005. "Computational Methods for Measuring the Difference of Empirical Distributions." *American Journal of Agricultural Economics* 87(2):353–365.

Sajdakowska, M., J. Gębski, S. Żakowska-Biemans, and M. Jeżewska-Zychowicz. 2019. "Willingness to Eat Bread with Health Benefits: Habits, Taste and Health in Bread Choice." *Public Health* 167:78–87.

Schouteten, J.J., X. Gellynck, and H. Slabbinck. 2019. "Influence of Organic Labels on Consumer's Flavor Perception and Emotional Profiling: Comparison between a Central Location Test and Home-Use-Test." *Food Research International* 116:1000–1009.

Teuber, R., I. Dolgopolova, and J. Nordström. 2016. "Some Like It Organic, Some Like It Purple and Some Like it Ancient: Consumer Preferences and WTP for Value-Added Attributes in Whole Grain Bread." *Food Quality and Preference* 52:244–254.

Van Doorn, J., and P.C. Verhoef. 2011. "Willingness to Pay for Organic Products: Differences between Virtue and Vice Foods." *International Journal of Research in Marketing* 28(3):167–180.

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Research Report: Factors Affecting Sales of Selected Agricultural Products in Network Marketing

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Abstract

The goal of this research was to investigate factors affecting the purchase of selected agricultural products, including honey, rice, and tea, through network marketing in the city of Mashhad, Iran, in 2020. The results of a multinomial logit model showed that price of the product, product brand recognition, gender, age, and household income had a significant effect on the probability of buying selected agricultural products through network marketing. We conclude that offering lower prices, offering products with brand recognition and consumer loyalty, and distribution of products in network marketing with a focus on economic and demographic characteristics of customers incentivize buying from network marketing.

Keywords: network marketing, sales, marketing margins, multinomial Logit, selected agricultural products

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Introduction

Network marketing is a direct person-to-person selling method in which sellers work independently to promote products and services, with customers playing the role of intermediaries. With the rapid growth of the internet, more consumers choose to shop online (Rai, 2021). Agricultural product e-commerce has resulted in more consumers relying on e-commerce platforms to buy agricultural products (Tzeng et al., 2021). The rapid growth of e-commerce and the development of online shopping has had a great impact on traditional business activities (Xiang, 2019) and has changed consumers' lifestyles (Guo et al., 2022). Progress in science and technology has also changed human food consumption habits (Saghaian and Mohammadi, 2018). In the era of the internet and e-commerce, it is beneficial for enterprises and farmers to construct agricultural product network marketing systems to enjoy the benefits of using agricultural product e-commerce. They must identify its influencing factors and create an application system with the support of policy makers to promote agricultural products e-commerce marketing (Chao, 2022).

Nielsen and Montemari (2012) investigated the role of employees in the success of network marketing and showed how the interpersonal relationships of network colleagues inside and outside the network are effective in creating value added for the company. Nasehifar, Dehdashti Shahrokh, and Moghadam (2015) prioritized the factors affecting the willingness of people to work in network marketing. Their results showed that trust in the company, the company's support (commercial and psychological), and the company's training have a significant effect on the willingness of employees to engage and work; among those, trust in the company had the greatest effect.

A difference between farm gate price and retail price is expected and exists everywhere, but in developed countries, the price difference is mostly related to marketing services, such as packaging, grading, transformation, branding, and other marketing services, while in developing countries, such marketing services with high marketing margins are lacking. One of the ways to reduce the marketing margin and create more income for the producer and less cost for the consumer is to use network marketing. The primary purpose of this study is to investigate factors affecting consumers' willingness to buy selected agricultural products through network marketing.

Methodology

To achieve the primary goal of this research, a multinomial logit model was used. Multinomial logit is a linked set of binary logit models that can efficiently use data and create logical relationships between parameters (Long and Freese, 2001).

Formally, the multinomial logit model can be written as:

$$\ln \Omega_{m|b}(x_i) = \frac{\Pr(y_i = m \mid x_i)}{\Pr(y_i = b \mid x_i)} = x_i \beta_{m|b} \quad for\ m = 1\ to\ 4 \tag{1}$$

where b is considered as the base or comparison group for (i) buying from wholesale or retail, (ii) buying directly from the producer, (iii) buying from online store, and (iv) buying from network marketing.

An important assumption that must be tested in the multinomial logit model is the independence of irrelevant alternatives (IIA). This assumption means that adding or deleting an outcome does not affect the odds ratio of the remaining outcomes. To consider the effect of explanatory variables on the purchasing method of consumers, the multinomial logit model was applied, and STATA 15 software was used to estimate the models. The research model was:

$$\begin{aligned} \ln \Omega_{4|1}(x_i) = \ln \frac{\Pr(y_i = 4 \mid x_i)}{\Pr(y_i = 1 \mid x_i)} = \\ = \beta_{0,4|1} + \beta_{1,4|1} gender + \beta_{2,4|1} edu + \beta_{3,4|1} price \\ + \beta_{4,4|1} brand + \beta_{5,4|1} adv + \beta_{6,4|1} job + \beta_{7,4|1} age + u_i \end{aligned} \quad (2)$$

Equation (2) indicates the odds ratio of outcome 4 versus outcome 1 (Yi = 1 is the base group and Yi = 4 is the network marketing group). The independent variables included were age, gender, education of the head of the household, household income, job of the head of the household, having a product with a reputable brand, and the existence of ads for the product (see Table 2). u_i in equation (2) is the error term that has a logistic distribution.

Data Description

Data required for this research were obtained from the households of Mashhad city, Iran, in 2020. Mashhad is the capital city of Khorasan Razavi province in Iran with about 914,146 households in 2015, from which a sample of 280 households were selected by a simple random method, and the heads of those households were questioned about the methods of purchasing selected agricultural products. Buying methods included buying from wholesalers and retailers, buying from producers, buying from online stores, and buying from network marketing, and a description is shown in Table 1. The selected agricultural products in this study included honey, rice, and tea, commonly used in different countries through online stores and network marketing. These products, offered through different sales channels including network marketing, are bought by most families and usually have characteristics like high shelf-life, ability to be stored, and different prices and weights.

Results

The information related to the research variables are shown in Tables 1 and 2. In Table 1, the dependent variable or purchasing method of households is divided into four categories.

Table 1: Frequency of Consumer Purchasing Methods (N = 280)

Purchasing Method	Frequency (%)	Cumulative Frequency
Buying from wholesale or retail	40	40
Buying directly from the producer	20	60
Buying from online stores	12	72
Buying from network marketing	28	100

The independent variables selected that may affect the dependent variable, that is, the buying method of agricultural products in network marketing are listed in Table 2.

Table 2: Description of Study Variables

Variable	Type	Description
Purchasing method	Dependent	4 Category
Price of the product	Independent	Continuous
Income	Independent	Continuous
Advertising	Independent	1 if ad influences purchasing method and 0 otherwise
Brand	Independent	1 if brand influences purchasing method and 0 otherwise
Education	Independent	Continuous
Gender	Independent	Gender of respondents: 1 for men, 0 for women
Type of job	Independent	Freelance job =0 and government job=1
Age	Independent	Continuous

The results of estimating the multinomial logit model using STATA 15 software are presented in Table 3. In the multinomial logit model, the group of the dependent variable that has the highest frequency is considered the base group, and other categories are compared with that. In this study, the first category, buying from wholesalers and retailers, has the highest frequency, considered as the base group, and other dependent variables are compared with that base category.

Table 3. The Results of the Multinomial Logit Model

Variable	Dep. Variable Categories	Coefficient	Standard Deviation	Z stat.	Prob.
Price	Y = 2	0.47**	0.22	2.14	0.03
	Y = 3	-0.61**	0.27	-2.25	0.02
	Y = 4	-0.78*	0.27	-2.89	0.00
Income	Y = 2	0.13	0.20	0.66	0.51
	Y = 3	-0.59**	0.29	-2.04	0.04
	Y = 4	0.81*	0.28	2.86	0.00
Advertising	Y = 2	0.18	0.17	1.03	0.30
	Y = 3	0.38	0.28	1.38	0.16
	Y = 4	0.05	0.30	0.20	0.84

Table 3. (cont)

Variable	Dep. Variable Categories	Coefficient	Standard Deviation	Z stat.	Prob.
Brand	Y = 2	0.84*	0.21	4	0.00
	Y = 3	-0.12	0.27	-0.45	0.65
	Y = 4	0.64*	0.27	2.38	0.1
Education	Y = 2	1.14*	0.28	4	0.00
	Y = 3	0.15	0.40	0.38	0.70
	Y = 4	0.28	0.27	1.03	0.44
Type of job	Y = 2	0.13	0.20	0.63	0.52
	Y = 3	0.49*	0.30	1.63	10.0
	Y = 4	0.61	0.78	0.78	0.45
Gender	**Y = 2**	**0.01**	**0.23**	**0.04**	**0.95**
	Y = 3	-0.12	0.39	-0.31	0.74
	Y = 4	0.48**	0.18	2.6	0.02
Age	Y = 2	0.2	0.23	0.87	0.55
	Y = 3	-0.69	0.42	-1.62	0.11
	Y = 4	-0.49**	0.25	-1.96	0.05
Goodness of fit measures	LR		71.31		
	LR (*p*-value)		0.00		
	R2 McFadden's		0.28		
	R2 ML (Cox-Snell)		0.40		
	Deviance		189.6		

Note: Single, double, and triple asterisks (*, **, ***) indicate statistical significance at the 10%, 5%, and 1% levels.

The results of Table 3 show that with an increase in the price, the probability of buying directly from the producer (group Y = 2) increases, and the probability of buying from online stores or network marketing (groups 3 and 4) decreases relative to the base group. Therefore, reducing the price in network marketing can have a positive effect on increasing sales. Examining the income variable shows that with the increase in household income, the probability of buying from online stores decreases compared to buying from retailers and wholesalers, and the probability of buying from network marketing increases. Also, advertising has had an insignificant effect on the probability of buying from different sales methods.

Having a reputable brand increases the probability of buying from the producer compared to buying from retailers and wholesalers and increases the probability of buying from network marketing. Education has an insignificant effect on the probability of buying from network marketing, while it increases the probability of buying from the producer compared to the base category (i.e., buying from retailers and wholesalers). The gender variable indicates that men are more likely to buy from network marketing than women, compared to buying from retailers and wholesalers. Finally, as the buyer's age increases, the probability of buying from network marketing decreases, and buying from wholesale and retail methods of sales increases. These results show most young people are willing to buy from the network marketing method.

Since the equations estimated in the multinomial logit regression model are nonlinear, the values of the coefficients cannot be directly interpreted, and only the sign of variables can be interpreted. For the numerical interpretation of the variables, the marginal effects of the variables must be obtained. In summary, the estimation results of Table 3 show that the variables affecting consumers' willingness to buy selected farmers' products through network marketing include the product price, consumer income, product brand, and buyer's gender and age. Therefore, these items should be considered when targeting consumers and market segmentation.

Discussions and Suggestions

The main purpose of the current research was to investigate the factors influencing the willingness of people to buy selected agricultural products in four ways, including buying from retail and wholesale, buying from the producer, buying from online stores, and buying through network marketing. To achieve this goal, a sample of buyers of selected agricultural products, including honey, rice, and tea from city of Mashhad, Iran, was selected by a simple random method. The effect of variables such as buyer's gender, age, education, product brand, product advertisement, product price, and household income was investigated by a multinomial logit regression method. The results showed that factors such as product price, product brand, household income, gender of the product buyer, and the age of the buyer had significant effects on the probability of buying selected agricultural products through network marketing.

Considering the negative and significant effects of price on the possibility of buying from network marketing, we suggest that the products that are sold in the network should be offered at a suitable price for consumers to create more incentives for buyers, given the reduction of the marketing margins. Considering the positive effect of product brand recognition on the possibility of buying agricultural products through network marketing, we suggest that appropriate product branding efforts should be conducted for agricultural products that are offered in this network. Finally, considering the effect of the buyer's gender, age, and income on the probability of sales in network marketing, we recommend that the distribution of products in this method should be done in a targeted manner, considering the demographic and economic characteristics of each region.

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References

Chao, S. 2022. "Construction Model of E-Commerce Agricultural Product Online Marketing System Based on Block chain and Improved Genetic Algorithm." *Security and Communication Networks*.

Guo, J., H. Hao, M. Wang, and Z. Liu. 2022. "An Empirical Study on Consumers' Willingness to Buy Agricultural Products Online and Its Influencing Factors." *Journal of Cleaner Production* 336:130403.

Long, S.J., and J. Freese. 2001. "Regression Models for Categorical Dependent Variables Using Stata." College Station, TX: Stata Press.

Nasehifar, V., Z. Dehdashti Shahrokh, and A. Moghadam. 2015. "Prioritizing the Factors Affecting the Willingness of People Working in Network Marketing." Presented at the 5th International Conference on Accounting and Management and the 2nd Conference on Entrepreneurship and Open Innovations, Tehran, Mehr Eshraq Conferences.

Nielsen, C., and M. Montemari. 2012. "The Role of Human Resources in Business Model Performance: The Case of Network-based Companies." *Journal of Human Resource Costing & Accounting* 16(2):142–164.

Rai, H.B. 2021. "The Net Environmental Impact of Online Shopping, beyond the Substitution Bias." *Journal of Transport Geography* 93:103058.

Saghaian, S., and H. Mohammadi. 2018. "Factors Affecting Frequency of Fast-food Consumption." *Journal of Food Distribution Research* 49(856-2018-3106): 22–29.

Tzeng, S.Y., M. Ertz, M.S. Jo, and E. Sarigöllü. 2021. "Factors Affecting Customer Satisfaction on Online Shopping Holiday." *Marketing Intelligence & Planning*. Available online: https://www.emerald.com/insight/search?q=Factors+Affecting+Customer+Satisfaction+on+Online+Shopping+Holiday&showAll=true.

Xiang, Y. 2019. "Set Self-service Sales and Online Customization in One of the Product Network Marketing System Construction and Management Research." *Cluster Computer* 22:8803–8809.

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Research Report: Are State Branded Products Local? A Case in Missouri

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Abstract

This study aims to analyze consumer perceptions and preferences for local and state-sponsored labels and how consumers' familiarity with the state brand affects their willingness to pay for the labeled products using the case of Missouri. We found that the local label and state brand differ from the consumer perspective. Consumers familiar with the Missouri Grown brand and who support farms in Missouri were willing to pay a higher premium for the state brand than the local label.

Keywords: state brand, local food, consumer preferences, choice experiment

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Introduction

Local food has received significant interest from consumers, producers, and communities. Under this trend, all U.S. states have launched state-sponsored marketing programs to promote local food to benefit agribusinesses, consumers, and state economies (Witzling, 2021). Many states also established state-sponsored brands and treated them as local food (e.g., Jersey Fresh, Go Texan, and Colorado Grown), differentiating products from other origins (Patterson, 2006). The effectiveness of state-sponsored food promotion programs depends on consumers' definition of local food, awareness of the state labels, and willingness to pay for the labeled products. Compared to typical local products, those certified by the state promotion programs are well defined. However, few studies have compared consumer preferences among state-branded products and local food. This study fills the research gap and answers the following questions using the case of Missouri: (i) how do consumers define local food; (ii) do consumers treat local and state-branded products the same; and (iii) do consumers' familiarity with the state brand and attitudes toward the state affect their willingness to pay (WTP) for local and state-branded products?

Background: Missouri Grown Program

The Missouri Department of Agriculture launched the Ag Missouri program in 1985 and rebranded it to Missouri Grown (Brown, 2003). The program's website (missourigrownusa.com) provides a searchable list of members who offer products in five categories: baked goods, fruits and vegetables, meat, dairy and eggs, snacks and beverages, and everything else. Producers can be listed on the website for free and use the Missouri Grown logo with a minimum $50 annual membership fee. There are more than 1,000 members in the Missouri Grown program, including producers, food manufacturers, retailers, etc. This program also offers events to help members market their products.

Data and Empirical Model

Data

An online Missouri consumer survey was conducted through Amazon Mechanical Turk (MTurk) from December 2021 to January 2022.[1] Consumer preferences for local and Missouri Grown food were examined in a nine-scenario choice experiment for fresh tomatoes. Four attributes, price, origin, producer type, and production method, were selected (see Table 1). Each choice set has three alternatives and an opt-out option. An example of choice questions is shown in Table 2. Fresh tomatoes were used because they are one of the most common produce items purchased by consumers as well as their popularity in multiple marketing channels in Missouri (Piñero and Keay, 2018). Demographics and consumer definitions for local were also elicited. The valid respondents were at least 18 years old, residents of Missouri, primary grocery shoppers, and fresh tomato consumers in the past 12 months. The sample consisted of 343 valid respondents, including 151

[1] The survey was approved by the Lincoln University IRB board.

males and 192 females, with an average age of 41 and an average income of $58,000 (see Table 3). A majority of them were Caucasian (79%).

Table 1. Attributes and Levels of Choice Experiment

Attributes	Level 1	Level 2	Level 3
Production method	Organic	50% reduced pesticide*	Conventional
Origin	Local	Missouri Grown	
Farm type	Small and medium family	Large family	Large corporation
Price of tomatoes	$1.99/lb.	$2.99/lb.	$3.99/lb.

Notes: *The 50% reduced pesticide technique can be defined as the methods farmers use to reduce by half the pesticide amounts usually used in tomato cultivation.

Table 2. A Sample Scenario for the Choice Experiment

Option A	Option B	Option C
Organic	Conventional	50% reduced pesticide
Not local or Missouri Grown	Local	Missouri Grown
Large family	Large corporation	Large family
$2.99/lb	$3.99/lb	$1.99/lb

Note: Options for answer to the question, "Which choice for buying tomatoes would you prefer: Option A, Option B, Option C, None of them?"

Table 3. Characteristics of Local and Missouri Grown Consumers

Demographic Characteristics	Sample	Local Consumers	Missouri Grown Consumers
No. of observations	343	294	133
Gender			
Male	43.2%	44.2%	50.4%
Female	56.0%	54.8%	49.6%
Age			
18–24	5.2%	4.8%	7.5%
25–34	31.5%	31.3%	33.1%
35–44	28.6%	29.3%	27.8%
45–54	16.9%	16.3%	12.8%
55–64	14.0%	14.3%	15.0%
65 or older	3.8%	4.1%	3.8%
Education			
High school and less	21.0%	20.8%	15.8%
2-year/associate's degree	13.1%	12.9%	6.8%
4-year /bachelor's degree	41.7%	41.8%	52.6%
Graduate or professional degree	24.2%	24.5%	24.8%

Table 3. (cont)

Demographic Characteristics	Sample	Local Consumers	Missouri Grown Consumers
Race			
Caucasian	78.7%	80.5%	72.7%
Others	21.3%	19.5%	27.3%
Income			
Less than $25,000	12.0%	10.9%	9.1%
$25,000–$50,000	32.7%	32.4%	30.3%
$50,000–$75,000	21.9%	22.5%	25.0%
$75,000–$100,000	16.1%	16.4%	19.7%
$100,000 and above	17.3%	17.7%	15.9%
House location			
Rural	25.1%	25.2%	21.1%
Suburban	41.7%	41.5%	35.3%
Urban	33.2%	32.3%	42.9%
Children			
No children	51.5%	49.0%	43.1%
At least 1 child	48.5%	51.0%	56.9%

Empirical Model

Following McFadden (1974), Cameron and James (1987), Train and Weeks (2005), and Train (2016), we developed an empirical model to measure WTP for tomato attributes:

$$Utility\,(choice) = b_0 OptOut + b_1 Price + b_2 Local + b_3 MissouriGrown + b_4 Organic + b_5 50\%ReducedPesticide + b_6 SmallFamily + b_7 LargeFamily \quad (1)$$[2]

Where the consumer utility is represented by part-worth utilities for conjoint attributes of the selected option, all variables (except price) enter the model as dummy variables, b_0 captures the utility of the opt-out alternative, b_1 represents the marginal utility of price, and b_k $(k = 2, \ldots, 7)$ indicates the estimated WTPs for non-price attributes, which are implied by the ratio of marginal utility of non-price attributes to marginal utility of price. The WTP measures are expressed in $/lb.[3]

[2] Details of the formula are provided in Figure 1.
[3] Details of the calculation are provided in Figure 1.

Willingness-to-pay (WTP) for attributes in a discrete choice experiment is analyzed on the basis of Random Utility Models (McFadden 1974). Typically, the random utility of a choice or alternative "j" in choice scenario "t" is often specified as a linear function of price "p" and non-price attributes "x" of the alternative "j" and their corresponding weights: "α" and "β" respectively, plus stochastic component "ε" of the utility:

$$Utility_j(choice = \mathrm{j}) = -\alpha * \mathrm{p_{jt}} + \beta' x_{jt} + \varepsilon_{jt} \qquad \text{(i)}$$

In the standard practice for application of choice models, WTP for non-price attributes are implied by the ratio of estimated utility coefficients to the estimated price coefficient from the model (i) (known as estimating WTP in "preference space"). However, this approach is limited considering impacts of correlated attributes on their WTP and unreasonably large standard deviations (SDs) of the implied WTPs (Train and Weeks, 2005).

Seminal works of Cameron and James (1987), Train and Weeks (2005) indicate practitioners can overcome these limitations by estimating WTP from a parameterized model where the distributional assumptions and restrictions are placed on the WTP instead of the coefficients (referred as estimating WTP in "willingness-to-pay space"):

$$Utility_j(choice = \mathrm{j}) = -\gamma(\mathrm{p_{jt}} + wtp' * x_{jt}) + \varepsilon_{jt} \quad \text{(ii)}$$

where γ is a scalar parameter and wtp represents vector of WTP for non-price attributes. Model (ii) is equivalent to (i) but allows random scalar that would be helpful to address different correlation patterns in utility coefficients, leads to small variance of WTP estimates, and offers directly interpretable measurments in terms of currency (a detailed explanation for this parameterization can be found in Train and Weeks (2005), Helveston et al. (2018)).

To account for potential correlations between pairs of attributes like "local" and "organic," "local" and "small&medium family farms" and pay attention to accuracy of WTP estimates, we adopt the approach "WTP space" in this paper. This is also particularly convenient when the goal of the study is to compare the value of attributes like "local" and "Missouri Grown". In this regard, we assume normal distributions for price and WTP of non-price attributes. Further, we incorporate a fixed effect of alternative specific constant (ASC) into (ii) to resolve endogeneity issues when repeating choice experiment over nine scenarios (Helveston et al. 2018). Following Train (2016), a logit form of the probability that individual "i" chooses alternative "j" in scenario "t" conditional on β_i in the WTP space becomes:

$$P_{ijt}(\beta_\mathrm{i}) = \frac{e^{-\gamma_i(\mathrm{ASC} + \mathrm{p}_{ijt} + wtp_i' * x_{ijt})}}{\sum_{k \epsilon T} e^{-\gamma_i(\mathrm{ASC} + \mathrm{p}_{ikt} + wtp_i' * x_{ikt})}} \qquad \text{(iii)}$$

Noting that $\beta_\mathrm{i} = \gamma_i wtp_i'$ and the random parameters in the logit model (iii) can be estimated by maximizing a simulated log-likelihood function (Train 2016).

Given attributes and attribute levels of alternatives, and ASC represents the opt-out option in the experiment, the baseline model is specified as model (1). Also, to explore heterogeneity in WTP for origin labels in terms of Missouri Grown's awareness and state supporting attitude, an extended model (iv) is developed by adding interaction terms between local, Missouri Grown labels and these factors to model (1) (e.g., Bazzani et al., 2017).

$$\begin{aligned} Utility\,(choice) = {} & b_0 OptOut + b_1 Price + b_2 Local + b_3 MissouriGrown + b_4 Organic \\ & + b_5 50\%ReducedPesticide + b_6 SmallFamily + b_7 LargeFamily \\ & + b_8 Local * MG\_awareness + b_9 MissouriGrown * MG\_awareness \\ & + \beta_{10} Local * SupportMissouri + \beta_{11} MissouriGrown * SupportMissouri \end{aligned} \qquad \text{(iv)}$$

where b_0 captures the portion of the utility associated with the opt-out option, b_1 represents estimate of price coefficient, b_k $(k = 2, \dots, 7)$ indicate the estimated WTPs for non-price attributes, b_k $(k = 8, \dots, 11)$ indicate marginal effects of Missouri Grown awareness and "supporting farms in Missouri" attitude on the WTP for local and Missouri Grown label, respectively. All the variables (except price) enter the model as dummy variables, for example Local, MissouriGrown as opposed to neither local nor Missouri Grown label, Organic, 50%ReducedPesticide as opposed to conventional method, and SmallFamily, LargeFamily as opposed to large corporation producer.

Figure 1. Willingness-to-pay Estimation in the Willingness-to-pay Space

Results

Definitions of Local Food

Local food was defined by two dimensions, geographic distance and producer type. About 56% of respondents defined local using geographic distance, 9% by producer type, and 34% defined by a combination of the two. Geographically, 33% of consumers considered food grown in Missouri as local, and the remainder proposed distance matters (see Figure 2). The most common distance was 100 miles from their home. Regarding producers, as long as family farmers produced the food, most respondents did not care about their size. Among the respondents, 87% have purchased local food in the past 12 months based on their definition of local. Grocery stores/supermarkets and farmers' markets were the most popular shopping channels for local food, representing 70% of the choices. The most important reason to purchase local food was to support local small farmers, followed by support local community, local food is healthier, local food is more environmentally friendly, the origin of local food is clear, and others (see Figure 3). The number one reason for not purchasing local food was not being aware of local food, and the second was that it is too expensive.

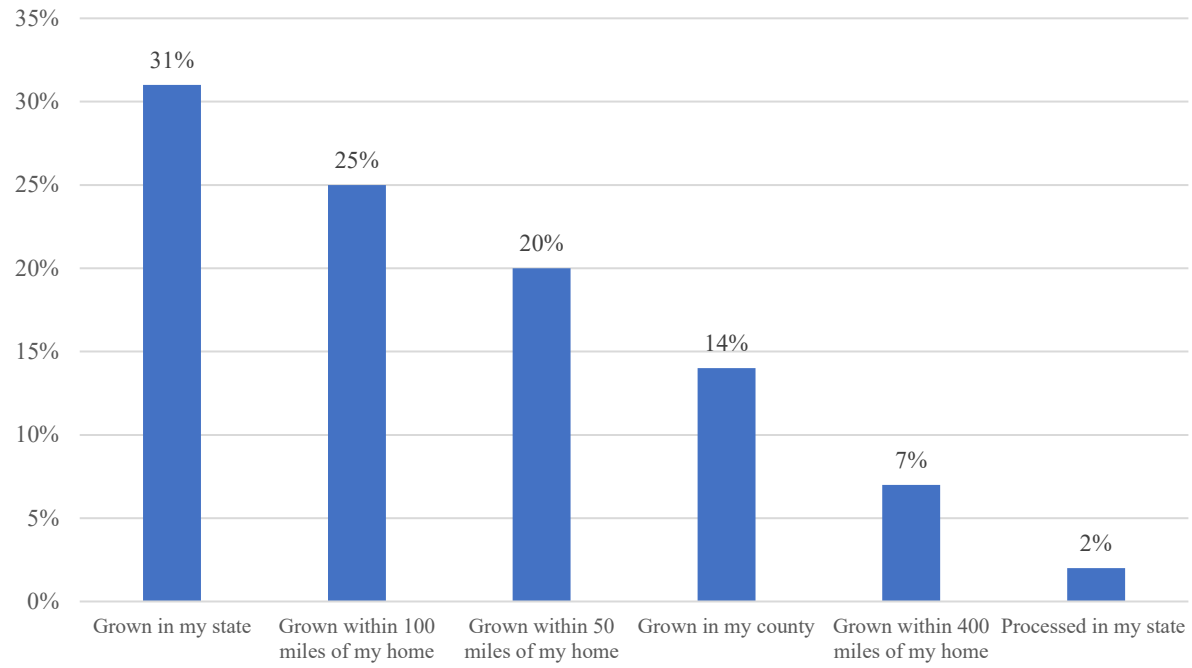

Figure 2. How Local Is Defined by Geographic Perspective

Figure 3. Reasons for Buying Local Food (Percentage of Responses)

Awareness of Missouri Grown Label

The survey showed that less than half of the sample (47%) had seen the Missouri Grown logo, most often in grocery stores or farmers' markets. Within this group, about 83% had purchased products labeled with Missouri Grown. Of those who had not seen the label before, 80% would like to buy products with the label if they see them. Some reasons to purchase Missouri Grown products reported by the participants were supporting Missouri farms (87%), supporting communities (63%), Missouri Grown products have better quality (32%), and familiarity with Missouri Grown products (31%) (see Figure 4). Regarding the reasons for not buying Missouri Grown products, too expensive and not different from other products were most common (94% and 84%, respectively), followed by not being familiar with Missouri Grown products (66%).

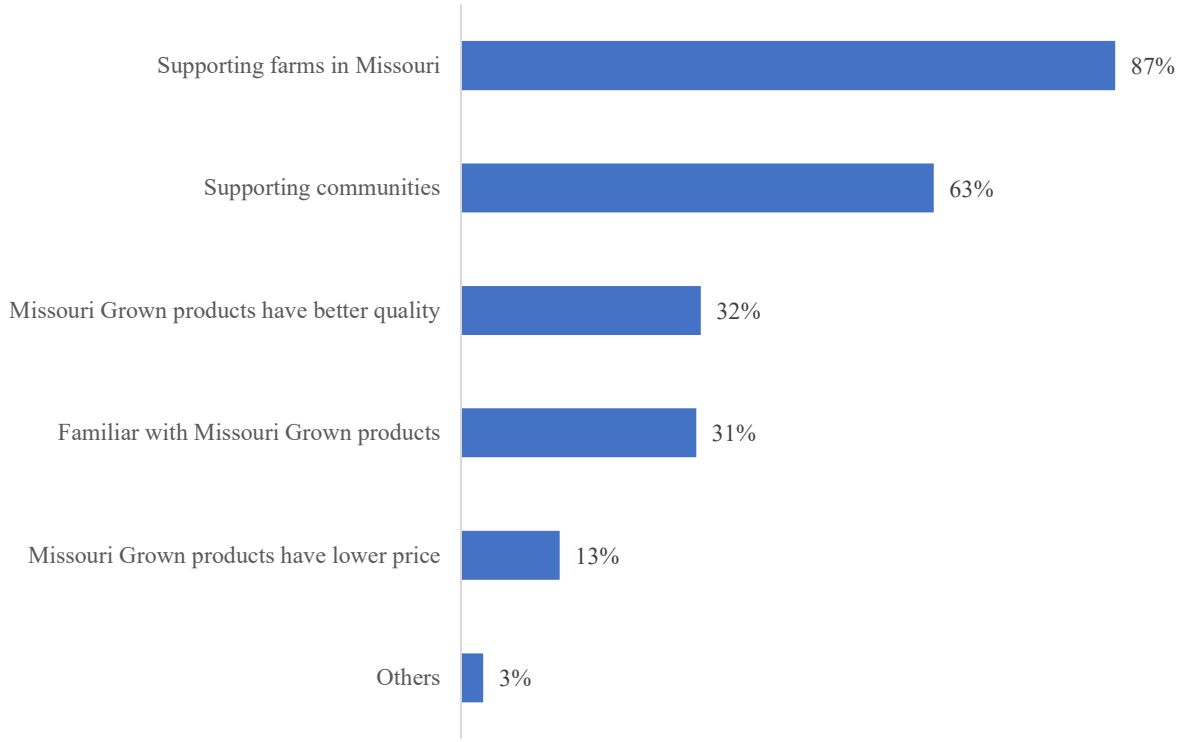

Figure 4. Reasons for Buying Missouri Grown Food (Percentage of Responses)

Consumer Preferences for Missouri Grown and Local Food

Using the estimated results of model 1, we found that respondents preferred tomatoes with local and Missouri Grown labels produced by family farmers rather than their counterparts, non-local, non-Missouri Grown, or non-family farms (see Table 4). Consumers would pay a premium of 41 cents/lb for Missouri Grown and 11 cents/lb for local tomatoes compared to non-labeled products, equivalent to a premium of 21% for Missouri Grown and 6% for local. The premium for the Missouri Grown label is comparable with the 27.5% premium for state-branded fresh produce found by Carpio and Isengildina-Massa (2009). However, the premium for local was small compared to the 41.4%–52.2% premium obtained from a meta-regression in Printezis, Grebitus, and Hirsch (2019). One possible explanation is that local is a loosely defined label and can vary significantly across individuals and products (Printezis et al., 2019). The Missouri Grown label may attract the attention of consumers who are seeking a more clearly defined concept of local, who are aware of the logo, or who are familiar with and support activities and policies of the Missouri Grown program. In our survey, more than 30% of consumers considered state-grown products local, indicating Missouri Grown products include not only local characteristics but also possibly additional features, such as state loyalty, pride, and benefits of the program. One evidence for additional benefits is that consumers would pay an extra 26 cents/lb for tomatoes produced by family farms rather than large corporations in this study. It is understandable because the two most important reasons to purchase local or Missouri Grown products were to support farmers and local communities, also suggested by Meas et al. (2015).

Table 4. Estimation Results of the Willingness-to-Pay Model

	Baseline Model	
Attribute-specific Variables	**Coefficient**	**Std.Error**
Opt-out	-7.231***	0.523
Price	-0.991***	0.058
Local	0.107*	0.057
Missouri Grown	0.411***	0.047
Organic	0.368***	0.050
50% reduced pesticide use	0.178**	0.049
Small, medium family farm	0.258***	0.065
Large family farm	0.260***	0.068
Heterogeneity (Standard Deviation)		
Price	2.389***	0.212
Local	0.038	0.113
Missouri Grown	0.595***	0.070
Organic	0.738***	0.058
Reduced 50% pesticide use	0.272***	0.076
Small, medium family farm	0.610***	0.062
Large family farm	0.109	0.224

To explore why consumers were willing to pay premiums for Missouri Grown and local tomatoes, we examined the estimated WTPs of different consumer groups: (i) consumers who were familiar with the Missouri Grown logo vs. those who were not, and (ii) consumers who supported Missouri farms vs. those who did not. For this purpose, we included interactions between the origin labels (local and Missouri Grown) and two dummy variables in model 1. One variable is awareness of Missouri Grown, and the other is supporting Missouri's farms. We found that the estimated WTP for local and Missouri Grown are significantly different across these consumer groups in the model with interactions (see Table 5). In particular, the two dummy variables, awareness of the Missouri Grown logo and supporting Missouri farms, both have positive effects on the premiums for Missouri Grown but negative effects for local tomatoes. Familiarity with the Missouri Grown logo influenced consumers' willingness to pay a premium of 29 cents/lb for Missouri Grown tomatoes but discounted local products by 15 cents/lb. Consumers supporting farms in Missouri would pay a premium of 19 cents/lb for Missouri Grown tomatoes but discounted local tomatoes by 72 cents/lb. Overall, the premium for the Missouri Grown tomatoes would be 48 cents/lb when consumers were familiar with the Missouri Grown logo, 38 cents/lb if consumers supported farms in Missouri, and 67 cents/lb if consumers knew the Missouri Grown logo and supported Missouri farmers (see Table 6). Table 6 shows changes in WTP for local and Missouri Grown tomatoes across consumer segments based on their familiarity with the Missouri Grown logo and supporting attitudes toward farms in Missouri. The premiums for Missouri Grown increased when consumers were aware of the state logo, supported farms in the state, or had both characteristics. However, consumers' WTP to pay for local decreased when they knew the Missouri Grown logo or supported Missouri farms. The findings support the state investments in local food marketing promotion programs and indicate that local producers can improve their sales using state brands.

Table 5. Estimation Results of Willingness-to-Pay Model with Interactions

	Extended Model	
Attribute-Specific Variables	**Coefficient**	**Std.Error**
Opt-out	-6.940***	0.490
Price	-1.079***	0.065
Local	0.675***	0.114
Missouri Grown	0.193**	0.093
Organic	0.314***	0.046
50% reduced pesticide use	0.191***	0.046
Small, medium family farm	0.361***	0.049
Large family farm	0.202***	0.045
Interaction terms		
Local * Missouri Grown awareness	-0.148*	0.080
Missouri Grown * Missouri Grown awareness	0.288***	0.101
Local * Support Missouri farmers	-0.721***	0.121
Missouri Grown * Support Missouri farmers	0.192**	0.098

Table 6. WTP for Local and Missouri Grown Labels ($/lb) with Interaction

	Consumers Who Are Not Familiar with Missouri Grown Logo and Not Supporting Farms in Missouri	**Consumers Who Are Familiar with Missouri Grown Logo**	**Consumers Who Are Supporting Farms in Missouri**	**Consumers Who Are Familiar with Missouri Grown Logo and Supporting Farms in Missouri**
No. of consumers	46	161	260	124
WTP for local	0.68	0.53	-0.04	-0.19
WTP for Missouri Grown	0.19	0.48	0.38	0.67

Conclusions and Policy Implications

In this research, we examined whether consumers treated local food and state-branded products differently using the case of Missouri. We found that 30% of consumers defined products grown in Missouri as local geographically, but the rest defined local based on different distances from their location. About 87% of consumers have purchased local food in the past 12 months. Almost half of the consumers have seen the Missouri Grown label before, and more than 80% of them have purchased Missouri Grown products. Supporting farms in Missouri and supporting local communities were the two most important reasons consumers purchased local or Missouri Grown products. Supermarkets and farmers' markets were the most important shopping channels for local

and Missouri Grown products. Familiarity with the Missouri Grown Program and logo and supporting farms in Missouri can increase consumers' WTP for Missouri Grown products but decrease their WTP for local food.

The higher premium for the Missouri Grown label implies that Missouri Grown members can increase their sales by using the Missouri Grown logo and targeting the consumers who know the state logo and those supporting Missouri farms. Missouri Grown and other similar state-sponsored programs can improve the effectiveness of these programs by raising familiarity with the state logo among their residents and expanding the consumer segment. This would be helpful not only for Missouri Grown products but also generally local promotion in terms of competition with products from other states or other countries.

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References

Bazzani, C., V. Caputo, R.M. Nayga, and M. Canavari, M. 2017. "Revisiting Consumers' Valuation for Local versus Organic Food Using a Non-hypothetical Choice Experiment: Does Personality Matter?" *Food Quality and Preference* 62:144–154.

Brown, C. 2003. "Consumers' Preferences for Locally Produced Food: A Study in Southeast Missouri." *American Journal of Alternative Agriculture* 18(4):213–224.

Cameron, T.A., and M.D. James, M.D. 1987. "Efficient Estimation Methods for 'Closed-ended' Contingent Valuation Surveys." *The Review of Economics and Statistics* 69:269–276.

Carpio, C.E., and O. Isengildina-Massa. 2009. "Consumer Willingness to Pay for Locally Grown Products: The Case of South Carolina." *Agribusiness: An International Journal* 25(3):412–426.

Helveston, J.P., E.M. Feita, and J.J. Michalek. 2018. "Pooling Stated and Revealed Preference Data in the Presence of RP Endogeneity." *Transportation Research Part B-Methodological* 109:70–89.

Meas, T., W. Hu, M.T. Batte, T.A. Woods, and S. Ernst. 2015. "Substitutes or Complements? Consumer Preference for Local and Organic Food Attributes." *American Journal of Agricultural Economics* 97(4):1044–1071.

McFadden, D. 1974. "Conditional Logit Analysis of Qualitative Choice Behavior." In P. Zarembka, ed. *Frontiers in Econometrics*. New York: Academic Press.

Patterson, P.M. 2006. "State-Grown Promotion Programs: Fresher, Better?" American Agricultural Economics Association. *Choices.*

Printezis, I., C. Grebitus, and S. Hirsch. 2019. "The Price Is Right? A Meta-regression Analysis on Willingness to Pay for Local Food." *PLoS ONE* 14.

Train, K., and M. Weeks. 2005. "Discrete Choice Models in Preference Space and Willingness-to-Pay Space." In R. Scarpa and A. Alberini, eds. *Applications of Simulation Methods in Environmental and Resource Economics. The Economics of Non-Market Goods and Resources*, vol 6. Dordrecht, Netherlands: Springer.

Train, K. 2016. "Mixed Logit with a Flexible Mixing Distribution." *Journal of Choice Modelling* 19:40–53.

Witzling, L. 2021. "Fresh, Grown, Made, and Proud: How State Governments Use Stewardship to Collectively Promote Their State's Food Products." *Journal of Applied Communications* 105(4):Cov6–Cov6.

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Research Update: Developing a Consumer Profile for Value-added Products in North Carolina

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Extended Abstract

Although small family farms make up about 89% of the farms in the United States, they only hold about 20% of the value of production (Kassel, 2022). With the number of farms decreasing on a yearly basis, it is imperative for small farmers to attract and retain consumers to remain economically viable. Value-added products give farmers the opportunity to sell beyond their produced commodities by adding value (e.g., milling wheat into flour or making jam from

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strawberries). Value-added products are a possible solution for a lack of revenue for small farmers (Straughter, 2021). With the demographic diversity of consumers in North Carolina, it is important to understand what drives them to purchase value-added products.

This study specifically focuses on consumers' preferences for value-added products in North Carolina, with an objective to develop a consumer profile for targeting those purchasing value-added products within the state.

The primary data collection process consisted of an internet-based survey administered by Qualtrics XM. More than 1,000 participants responded, with 884 usable surveys, who were randomly selected to provide demographic, home gardening, and consumption information. Our survey was conducted from August 2022 to September 2022. The average survey participant was a white female, aged 46, with some college education (i.e., taken college courses without receiving a degree) and a household income of $20,000–$29,999. XLSTAT, a statistical software often used in market research, was used to analyze the data. Descriptive statistics including mean, median, and mode for each variable were analyzed, in addition to cross tabulations of two corresponding variables.

We asked our participants about their thoughts on purchasing, about their willingness to purchase more, and about their willingness to purchase locally sourced, produced, and trusted value-added products. Most responded, "yes," to the questions. We were able to construct our consumer profile by asking participants, "Would you purchase any of the commodity-food product combinations such as milk-cheese and strawberries-jams, apple-pies?" With the data from this question, we were able to create a consumer profile that reflects the preferences of consumers who are interested in purchasing value-added products in North Carolina. Preliminary results illustrate the demographics of those who are interested in value-added products are 22-year-old females with some college education and a household income of $30,000–$39,999; however, the age and income range of the consumer profile is lower than expected as indicated in Shi, Halstead, and Huang (2016). By increasing their marketing efforts and knowing their target audience, farmers can better understand how to effectively promote their value-added products and services. This study will also provide policy makers with information on the prospective marketing gaps that exist in support of value-added agriculture and its respective programming.

References

Kassel, K. 2022. *Farming and Farm Income*. Washington, DC: U.S. Department of Agriculture, Economic Research Service. Available online: https://www.ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/farming-and-farm-income/.

Shi, W., J. Halstead, and J. Huang. 2016. "Consumers' Willingness to Pay for Locally Grown Produce: Comparison of New Hampshire and Massachusetts Results." Annual Meeting of the Agricultural and Applied Economics Association, Boston, MA, July 31–August 2, 2016.

Straughter, M. 2021. "A Qualitative Analysis of Consumer Preferences for Local Value-Added Products." Master's thesis, North Carolina Agricultural and Technical State University.

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Research Update: Engaging School Food Authorities in Local Procurement Economic Impact Study

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Extended Abstract

Farm-to-school (F2S) programs are initiatives in which schools participate with the intent to promote healthy lifestyle choices among children and introduce agricultural lessons into school curriculums (Becot et al., 2017; Christensen et al., 2019). Program activities include local food procurement, educational activities, and school gardens (Besse, 2021). Based on F2S Census data, schools engaging in F2S activities in Louisiana public school districts increased from 152 in 2015 to 606 in 2019 (McKinzie and Bampasidou, 2022). This change can be attributed to increased efforts from local food coordinators and directors, increased legislative support, interest in local foods, and the Louisiana Farm to School Program, which began in 2016. Engaging in F2S activities offers opportunities for farmers to access new markets, expand their production, and diversify their

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revenue stream. With a growing interest from program coordinators and farmers alike, this study aimed to quantify the economic footprint from local procurement in Louisiana.

Few studies have attempted to examine the economic impact of F2S programs, as most of them have been conducted at a regional or state level (see Becot et al., 2017, for a summary of studies). Fewer studies examined scenarios of substitution and attempted to customize their economic model. One exception is Christensen et al. (2019), who collected information from producers on local procurement and/or CFOs. Yet, no studies make direct reference to collecting information from School Food Authorities (SFAs). SFAs are responsible for purchasing food products served to students in school cafeterias and ensuring that these products meet the nutritional value requirements of meals served in the National School Lunch Program and School Breakfast Program (USDA FNS, 2018).

In summer 2021, SFAs were interviewed from a number of public school districts in Louisiana, representative of metropolitan areas. SFAs were asked a series of questions pertaining to their respective school district's food bid solicitation items and processes. In addition, they were asked to identify traditionally sourced food items that could potentially be substituted by locally sourced food products and at what rate they could be substituted. The focus was on two districts, each serving 30,000–45,000 students and spending approximately $4–$6 million on their primary food expenditure budget per year. School food procurement primarily consists of commercial food purchases through formal procurement processes, such as competitive sealed bids and requests for proposals (USDA FNS, 2018; Besse, 2021). In Louisiana, formal procurement processes are used when the food expenditure total is greater than $30,000 (Besse, 2021).

An input-output (IO) model was used to analyze the economic impact to the local economy due to potential increases in local food product purchases based on SFA responses. The data collected from these interviews provide information that allows for customization of the IO model to obtain the most accurate results for the specified metropolitan regions of Louisiana. For example, in a substitution scenario, the SFA indicated that they would be willing to substitute 100% of their rice, smoked sausage, lettuce, sweet potato, Cajun seasoning, and cabbage purchases and 50% of their strawberry and orange purchases for locally sourced alternatives. Results show that for every $1 spent in these food categories on local procurement, an additional $0.48 is generated in economic benefits (output) in the Louisiana economy.

This is the first local food procurement economic study to our knowledge that interviewed SFAs. It is important to engage these individuals in local procurement studies, as they provide a novel perspective, particularly in examining net zero effect scenarios (i.e., substituting with local foods while keeping the same budget and ensuring nutrition requirements). Moreover, discussions with SFAs revealed challenges related to local procurement, including regulations, school processing and kitchen capacities, and local produce availability. This information could bridge the gap between producers and schools, potentially increasing future F2S activities and overcoming the barriers to increase local procurement.

Keywords: farm to school, economic impact, local procurement, school food authorities, Louisiana

References

Becot, F., J. Kolodinsky, E. Roche, A. Zipparo, A. Berlin, E. Buckwalter, and J. McLaughlin. 2017. "Do Farm to School Programs Create Local Economic Impacts?" *Choices* 32(1).

Besse, C. 2021. *School Guide for Local Food Purchasing*. Baton Rouge, LA: LSU Agricultural Center. Available online: https://www.lsuagcenter.com/articles/page1633969411997.

Christensen, L., B. Jablonski, L. Stephens, and A. Joshi. 2019. "Evaluating the Economic Impacts of Farm to School Procurement: An Approach for Primary and Secondary Financial Data Collection of Producers Selling to Schools." *Journal of Agriculture, Food Systems, and Community Development* 8(3).

McKinzie, W.R., and M. Bampasidou. 2022. *Farm to School Programs in Public School Districts: A Growing Interest with Challenges*. Available online: https://lsuagcenter.com/articles/page1661887704641

United States Department of Agriculture Food and Nutrition Service. 2018. "Agency Information Collection Activities: Proposed Collection; Common Request—Study of School Food Authority (SFA) Procurement Practices." *Federal Resister* 83(161).

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Research Update: Qualitative Analysis of Specialized Supply Chain Relationships in Wagyu-influenced Beef

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Extended Abstract

Wagyu beef is highly marbled with a reputation for unique taste and tenderness. However, Wagyu cattle have significantly longer production cycles than conventional breeds, resulting in higher costs (Radunz et al., 2009). Wagyu-Angus cross breeding, with offspring known as Wangus, is a potential solution to the relative inefficiency of Wagyu cattle. Given the unique nature of Wangus production, producers may benefit from direct relationships with feedyards, processors, and buyers, helping ensure financial rewards for additional costs of Wagyu beef (Schroeder, Coffey, and Tonsor, 2021).

We conducted a customer survey for a Midwestern specialty cattle ranch focused on Wangus cattle. The ranch operates in the seedstock, cow-calf, and feedlot stages of the beef supply chain. It initially created a calf buy-back agreement to purchase bull customers' Wangus cattle for their feedlot, which ended in 2019. This survey examines fed-cattle buyers' and Wangus bull customers' supply chain relationships with the feedlot. Email and phone surveys were conducted with both customer groups.

All bull customers were cow-calf producers. Half participated in the calf buy-back program, securing a market for their calves. Annual calf crops ranged from 30 to 850 head with varied percentages of Wagyu-influenced calves. Two-thirds reported no additional production costs (excluding bulls), though these customers primarily sold Wangus calves and additional costs are

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likely during the later feeding stage. Forty percent reported market premiums, averaging 27.5%. After the buy-back program ended, one-third of producers fed calves to harvest weight to market Wangus freezer beef, while two-thirds sold calves at local auctions, reporting little to no marketing, an indication of the importance the buy-back program had for those producers.

The feedlot's two primary fed-cattle customers individually comprise 75% and 23% of sales, leaving 2% purchased by smaller buyers. Customers procured 10%–50% of their annual fed-cattle purchases from the feedlot. Supply chains do differ between larger and smaller-scale customers. Larger buyers procure fed Wangus cattle weekly or biweekly, process cattle in their own packing plant, and distribute branded beef products to retail entities. Smaller-fed cattle buyers only procure Wangus cattle annually or biannually, secure custom slaughter, and distribute the beef to butcher shops, consumers, or small-scale retailers. Both are paying 15% premiums to the feedlot and selling Wangus beef for 50% premiums on average. Feedlot customers view Wangus beef as part of a portfolio mainly composed of Angus beef, local and natural claims, prime quality grades, or a combination of attributes. Both customer groups are utilizing Wangus to also increase the proportion of prime grading cattle rather than marketing only the Wagyu name.

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References

Radunz, A.E., S.C. Loerch, G.D. Lowe, F.L. Fluharty, and H.N. Zerby. 2009. "Effect of Wagyu- versus Angus-sired Calves on Feedlot Performance, Carcass Characteristics, and Tenderness." *Journal of Animal Science* 87:2971-2976.

Schroeder, T.C., B.K. Coffey, and G.T. Tonsor. 2021. "Enhancing Supply Chain Coordination through Marketing Agreements: Incentives, Impacts, and Implications." In B.L. Fischer, J.L. Outlaw, and D.P. Anderson, eds. *The U.S. Beef Supply Chain: Issues and Challenges, Proceedings of a Workshop on Cattle Markets.* College Station, TX: Texas A&M University, Agricultural and Food Policy Center, pp. 81–101.

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Research Update: The Economic Viability of Tomato Production Using Single- versus Double-Layer High Tunnels

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Extended Abstract

More than 70% of low-sale family farms are operating on a profit margin of less than 10%, which signals a critical concern for the economic sustainability of limited-resourced farms. It is also important to note that most low-income farmers combine off- and on-farm income. More than 80% of low-sale farmers work off the farm, as well as 62% of their spouses (Hoppe, 2015). High tunnels (akin to greenhouses) are versatile in production location, seasonality, quantity, quality, and length of cropping season, and appear to be promising for small-scale farmer economic viability (USDA, 2022). Research shows that single-layer (SL) high tunnels yield higher premiums, which can increase profits for small-scale farmers (Belasco et al., 2013; Foust-Meyer and O'Rourke, 2015). However, there is insufficient research on the usage of double-layer (DL) high tunnels. In this study, we explore the economic viability of using SL versus DL high tunnel production systems.

Tomato production is used as a case with consideration of North Carolina ranking ninth in the United States, producing 96 million pounds in 2018 (Conners, 2020). The objectives of this study

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are threefold: (i) to develop enterprise budgets of SL and DL high tunnels, (ii) to conduct a cost-benefit analysis of SL and DL high tunnels, and (iii) to provide recommendations on the economic viability of SL and DL high tunnel tomato production in the Piedmont region of North Carolina. The data for this study were gathered through a two-part approach—field research of tomato production using high tunnels and quantitative data collection using primary and secondary sources. The field research was conducted in the spring of 2021 and 2022 at the North Carolina A&T State University Research Farm. The economic data collection occurred during January to August of both years. During the field research period, the phenology of the plants, plant growth, and yield were all recorded. The economic data collected highlighted the labor work, including planting seeds, pruning, weeding, and harvest. Once harvested, the fruit was weighed into two groups: marketable or cull yields. Secondary data were obtained from the USDA National Agricultural Statistics Service and the North Carolina Department of Agriculture and Consumer Services weekly market prices of tomatoes between 2021 and 2022. Enterprise budgets were developed using the two approaches to be used to conduct a cost-benefit analysis for low-income, small-scale, and underrepresented farmers within the Southeastern Piedmont region of North Carolina.

The cost-benefit analysis compared the profit potential of organic and conventional SL- and DL-grown tomatoes under different high tunnel structures. The Net Present Value (NPV), the Internal Rate of Return (IRR), and the Payback Period (PBP) methods were utilized in the cost-benefit analysis to gain a better understanding of the economic viability of the high tunnels. Although the DL high tunnels had higher yields, the preliminary results revealed SL to be more economically viable due to higher and acceptable NPV and IRR and lower PBP. Limitations of the study included the variation of access to sunlight, the unpredictability of natural occurrences impacting the number of committed to labor, the availability of labor, and the accessibility to resources.

References

Belasco, E., S. Galinato, T. Marsh, C. Miles, and R. Wallace. 2013. "High Tunnels Are My Crop Insurance: An Assessment of Risk Management Tools for Small-Scale Specialty Crop Producers." *Agricultural and Resource Economics Review* 42:403–418.

Conners, K. (2020). "It Is the Season for Tomatoes." *Goldsboro Daily News*. Available online: https://www.goldsborodailynews.com/2020/07/11/it-is-the-season-for-tomatoes/.

Foust-Meyer, N., and M. O'Rourke. 2015. "High Tunnels for Local Food Systems: Subsidies, Equity, and Profitability." *Journal of Agriculture, Food Systems, and Community Development* 1–12.

Hoppe, R. (2015). *Profit Margin Increases with Farm Size*. Washington, DC: U.S. Department of Agriculture, Economic Research Service. Available online: https://www.ers.usda.gov/amber-waves/2015/januaryfebruary/profit-margin-increases-with-farm-size/.

U.S. Department of Agriculture. 2022. *High Tunnel Initiative*. Washington, DC: U.S. Department of Agriculture, Natural Resources Conservation Service. Available online: https://www.nrcs.usda.gov/programs-initiatives/eqip-high-tunnel-initiative.