# AN ANALYSIS OF OKLAHOMA DIRECT MARKETING OUTLETS: CASE STUDIES OF PRODUCE FARMERS' MARKETS AND WHEAT DIRECT SHIPMENTS TO MEXICO

By

HAERANI NATALI AGUSTINI

Bachelor in Agronomy
Bogor Agricultural University
Bogor, Indonesia
1983

Master of Science
in Experimental Statistics
New Mexico State University
Las Cruces, New Mexico
1993

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
DOCTOR OF PHILOSOPHY
August 2003

AN ANALYSIS OF OKLAHOMA DIRECT MARKETING OUTLETS: CASE STUDIES OF PRODUCE FARMERS' MARKETS AND WHEAT DIRECT SHIPMENTS TO MEXICO

Thesis Approved:

Thesis Advisor

Dean of Graduate College

# ACKNOWLEDGMENTS

I wish to express my sincere appreciation to my major advisor, my teacher, and my friend, Dr. Shida Henneberry for her advises, constructive guidance, and invaluable friendship throughout my study. My appreciation extends to the other committee members for their advice and encouragement: Dr. Art Stoecker, Dr. Phil Kenkel and Dr. William D. Warde. I also wish to appreciate Dr Shida Henneberry and Dr. Stoecker for offering me a research assistantship position, without which the entire degree program would not have been possible. I also thank the Department of Agricultural Economics and the Agricultural Marketing Service of USDA for jointly providing the funding that made this assistantship possible. I would like to thank the National Institute for Commodity Promotion Research and Evaluation, Cornell University and the Oklahoma Wheat Commission (Wheat Export Market Development: A Case Study of Oklahoma Direct Shipments to Mexico) and the Hatch Project 2388 of the Oklahoma Agricultural Experiment Station for providing grant for the second paper. Many thanks are also due to all faculty members that contributed towards upgrading my academic capabilities, through courses, critical evaluation and/or encouragement. I would also like to thank Diana Reddington, Betty Harris, and Norma Caine, for their invaluable friendship and helps on several nonacademic and procedural issues.

My acknowledgements would be incomplete without recognizing all friends in Agricultural Economic Departments (Rosa Escolan, and Lawrence Mapemba) , all

Indonesian friends and family (Mas Arif, Fitry, Mbak Uum, Mbak Nina and Lia), whose love, support and presence created a conducive social environment. Their invaluable friendship and support, both during happiness and otherwise, made my family and me feel at home away from home. I would like to thank all my families in Indonesia for their love and support. I also wish to send my sincere appreciation and love to my children, Novita Arianti and Harianto Putera, for their patience and understanding during these college years.

This work is dedicated to the memory of my late parents (Mr. and Mrs. Ismandar). I will always love you.

TABLE OF CONTENTS

LIST OF FIGURES

Figure Page

Figure Page

Figure Page

LIST OF TABLES

# CHAPTER I

# AN ANALYSIS OF OKLAHOMA DIRECT MARKETING OUTLETS: A CASE STUDY OF PRODUCE FARMERS' MARKETS

## INTRODUCTION

### Background

Recent concerns with food nutrition and personal health have fueled the consumption of fresh produce in the U.S. Per capita consumption of fruit and vegetables show an increasing trend in the U. S. In 1976 per capita consumption of fruit and vegetables was 623.0 lb, increasing to 755.2 lb in 2000 (USDA, 2001), an increase of 0.8 percent on average per year. Today's consumers view fresh produce as a source of fiber and desirable nutrients. This nutritional concern has increased the interest in locally grown produce in general (Brooker, et al.). With this growing demand for fresh produce comes an opportunity for farmers to increase their individual returns, specifically, through the use of direct markets.

Producers' direct marketing is one of the oldest forms of retailing and has played a critical role in helping small to mid-sized growers gain access to consumers.[1] It also provides a very important link between consumers who continue to search for high-quality produce items at low costs and farmers who try to compete in the produce industry. Additionally, direct markets allow farmers to sell fresh produce directly to

[1] Kuches et al, 2000

consumers, completely bypassing the complex distribution network and providing the farmer with a greater profit share.[2]

The 2000 National Farmers Market Directory lists over 2,800 farmers' markets that operate across the United States. The number had increased to over 3,100 farmers' markets in 2002. From 1994 to 2002, the number of farmers' markets increased 79 percent in the U.S., which indicates that farmers' markets are meeting the needs of many farmers with small- to medium-sized operations. The increase in the number of farmers' market is "mostly due to the growing consumer interest in obtaining fresh products directly from the farm" (USDA, 2003).

During the past years, the departments of agriculture in many states have strongly supported and helped promote farmers' markets. The Oklahoma Department of Agriculture has had a key role in the development of farmers' markets in Oklahoma. Moreover, the recent September 11 events have increased consumer interest in wholesome food and foods with known origin.

This study reports the results of a general survey of Oklahoma farmers' market consumers, producers and market managers. The farmers' market consumers' survey questionnaire was designed to assess information on consumer characteristics and preferences toward the direct marketing channel. The farmers' market producers survey questionnaire was designed to obtain general information about farmers' market producers such as those relating to social and demographic information and producer's opinions toward consumers' preferences on some characteristics of farmers' market produce. Specifically, this paper will focus on the links between demographic factors and shopping preferences. Another important factor analyzed in the survey was demand

[2] Kuches et. al, 2000

on specific produce such as vegetables, fruit, and other agricultural items. The results of the analysis will help build an understanding of consumer characteristics that are most likely to influence some of Oklahoma's future marketing programs to increase farmers' return. As a player in the marketing system, it is important for direct market operators to learn how to assess consumer preferences on their products in order to remain successful in that market.

## Objectives

The objectives of this study are: (1) to examine consumer preferences among various marketing channels, including direct marketing in Oklahoma, (2) to analyze the impact of various demographic variables on purchasing decisions. Data from the consumer survey will be used to analyze consumer preferences using an ordered logistic regression method. Additionally, data from farmers' market producers' survey will also be analyzed to identify consumers' characteristics and preferences toward produce at farmers' market from the producers' point of view.

# RECENT STUDIES

There are three common tools in the analysis of surveys of farmers' markets: logistic regression analysis (logit), linear probability model (probit) and censored data analysis (tobit). A Tobit model, or censored regression model, was used in the analysis of the New Jersey's Farmers market consumers' survey. The objective of that analysis was to determine the impact of respondents' demographic characteristics on their purchasing decisions (Kuches, et al.). The explanatory variables used in the New Jersey study included residential status, age, gender, race, income level, county of residence,

state certification, level of satisfaction from previous produce consumption, and whether fruits and vegetables were the main reason for shopping at direct markets. They found that respondents with a college degree or higher and those with income levels greater than $75,000 listed farm-like atmosphere as an important factor on their purchasing decision. As age increased, ranking of importance of locally grown produce also increased. Another finding was that male residents of cities and small towns placed higher importance on produce that is locally grown. Other important result was that respondents with a college degree or higher rated helping farmers more importantly than did respondents without a college degree.

Another variant of the logistic regression method is the multinomial logit, which is used, if the dependent variable has more than two categories; i.e., the dependent variable is not dichotomous. The ordered logistic regression is a multinomial logit in which the categories of the dependent variable are ordered, for example, high, medium, low; all, most, some. Moutou, et. al. used the multinomial logit model to determine the socioeconomic factors affecting the usage of grain-based food and the differences in characteristics of consumers who choose nutritious versus less nutritious grain based foods. The study showed that households with less educated or lower income shoppers tend to consume a narrower selection of grain-based foods. Furthermore, male and lower income shoppers make poorer nutritional choices than other types of consumer.

Kezis et. al. conducted a study of consumers at a small farmers' market in Maine to identify demographic characteristics of consumers at the market and to evaluate consumer attitude toward products they purchased at the market. Their study showed that the typical farmers' market customer was an employed woman, age 35 or older, highly

educated, living in a two-person household, with no children under 18, and with a household income of $30,000 or higher. Their study also revealed that consumers were less sensitive to product prices since they believed farmer's market produce is of higher quality, thus warranting a price premium. Eastwood's study on location and other market attributes affecting farmer's market patronage in Tennessee also supported that quality was one of the reasons consumers patronize farmer's markets.

Govindasamy et. al. used qualitative modeling to determine which market factors and socio-demographic characteristics cause consumers to be more likely to purchase products at farmers' markets. Their findings showed that women who reside in urban areas are more likely to purchase the majority of their fresh produce from farmers' markets. Consumers younger than 36 years of age are less likely to visit farmer's markets and less likely to buy all or most of their household fresh produce from a farmer's market. Moreover, there were various socio-economic factors affecting frequent visitation and quantity of produce bought at farmers markets.

Govindasamy et. al. implemented a logit model to evaluate the Jersey Fresh Program by analyzing consumer awareness of state sponsored marketing programs. The purpose of the program was "to promote locally grown fruits and vegetables with the intention of increasing the profitability of New Jersey farms and the viability of local agriculture." In their logit model, the likelihood of a costumer being aware of Jersey Fresh produce was chosen as a function of a set of predetermined variables: residence location, neighborhood, gender, years, number of people in the household, whether the household had children, existence of a vegetable garden at home, age, education, employment status, and household annual income. Results showed that consumers, who

frequently shopped at direct marketing facilities such as farmers ' market and roadside stands, were more likely to be aware of Jersey Fresh produce, and more likely to have bought Jersey Fresh labeled produce, and more willing to purchase Jersey Fresh produce in the future.

Hinson, et al. used a logit model to evaluate the impact of demographic factors on attitudes toward purchasing food that has been irradiated[3]. The explanatory variables for their study were gender, age, education, race, marital status, number of adults in household, number of children under age of 18 in household, household income, and knowledge of irradiation as a way of preserving food. The main finding of their study was that consumers familiar with irradiated foods were more likely to be willing to buy irradiated products.

## SOURCES OF DATA

Data for this study were collected using farmers' market consumer, producers and market managers' survey questionnaires which included questions related to the study objectives: (1) examination of Oklahoma consumer preferences among various marketing channels, including direct marketing, and (2) analysis of the impact of various demographic variables on purchasing decisions. Farmers' market consumers were asked to provide information regarding their demographic characteristics, their source of information about the market, how often they visited the market, what they usually purchased, how much they spent each time they went to the farmers' market, reasons for shopping at the market, satisfaction with purchased products, how well the market ranked

[3] Irradiation is a method for preserving food.

compared to others that respondents had visited, and relative importance of some items including price and quality of fresh produce when they shop at farmers' market.

On the questionnaire targeted for farmers' market producers, respondents were asked about their primary occupation, length of time they have been selling product through farmers' market, why they choose to sell product through farmers' market, what method they used to promote their product, and their perception of the consumers preferences with regard to specific quality characteristics. The last part of the questionnaire asked about their demographic characteristics.

The Kerr Center for Sustainable Agriculture conducted the surveys in 2002, during the farmers' market season. There were 29 active farmers' markets in Oklahoma during survey periods, and 21 of them were chosen randomly for the survey. The total of 690 questionnaires were distributed randomly to customers at those 21 markets. After completing the survey, respondents had the option of returning it directly to the interviewer or mailing it using pre-paid mailing envelope. Out of 690 questionnaires distributed, 140 of them were sent to farmers' markets managers to pass out to customers and an interviewer at the market handed out the rest. The response rate was 57 percent, which were come from: the customers handed in personally at the market (22 percent) and returned by prepaid mail (35 percent). The farmers' market consumer's questionnaire (see Appendix A) consisted of 31 questions. The last 9 questions pertain to the consumer's demographic profile. The survey used multiple choice, Likert scale, and ranking questions. The multiple-choice questions had a dichotomous choice format (respondents had to answer yes or no to these questions). The Likert scale questions used a three point or four point scale. There was one ranking question, which asked the

respondent to rank seven items. For the purpose of the study only 312 useable questionnaires collected from 6 towns in Oklahoma were analyzed. Not all returned questionnaires were analyzed because of the time constraint. The distribution of the returned questionnaires was: 96 questionnaires from Muskogee, 68 from Oklahoma City, 52 from Tulsa, 45 from Stillwater, 26 from Shawnee, and 25 from Norman.

Farmers' markets producers survey targeted producers at the 21 farmers' markets chosen before. The lists of the producers at the farmers' markets were obtained from the market managers. There were 425 questionnaires distributed among 21 farmers' markets and the response rate of farmers' market producers survey was 15 percent. The farmers' market producers' questionnaire consists of 51 questions (see Appendix B). The type of question asked was similar to the questionnaire for customers. The usable returned producers survey questionnaires were 64; 9 from Muskogee, 11 from Oklahoma City, 5 from Tulsa, 11 from Stillwater, 10 from Norman, 5 from Collinsville, 1 from Creek county, 3 from Pittsburgh county, 2 from Alva, 1 from Elk and 1 from Bartlesville.

The third survey was a market managers' survey targeting market managers from 21 farmers' markets chosen previously. The farmers' marker managers questionnaire consisted of 68 questions with the same form as the previous two surveys (see Appendix C). The response rate was 43 percent.

# SUMMARY OF FARMERS' MARKET CONSUMERS, PRODUCERS AND MARKET MANAGERS' SURVEYS

## Farmers' Market Consumers

The objective of this section is to summarize the results of the survey of farmers' market consumers in Oklahoma. Some of the results in the consumers' survey were used in an analysis of ordered logistics regression model in the next section. The summary of the consumers' survey was categorized into three subjects: respondents' characteristics, shopping and purchasing patterns, and reasons for shopping at farmers' market; whenever necessary a simple comparison between the consumer's responses to the surveys from six cities (Stillwater, Tulsa, Oklahoma City, Shawnee, Muskogee, and Norman) were compared to the result for Oklahoma in total.

### *Respondents' Characteristics*

Out of 312 consumers interviewed, about 7 percent are between 21 and 35 years old, 28 percent are between 36 and 50 years old; 41 percent are between 51 and 65 years old and the remaining 24 percent are above 66 years. This age distribution indicates that most customers (65 percent) of Oklahoma farmers' markets are older than 51 years of age. Customers younger than 20 years old were absent from this survey, which is consistent with previous studies across the U.S. (Eastwood et al.). The age distribution of the respondents of each city (Tulsa, Stillwater, Norman, Shawnee, Oklahoma City, and Muskogee) reflected the same pattern with the 51-65 age group having the highest

representation. The city of Stillwater had a different pattern than that of other locations. Only 16 percent of the respondents were between 51 and 65 years old. The most represented group was customers aged 36 to 50 (Figures 1.1 and 1.2). Most of the customers (67 percent) came from 2-adult households and around 19 percent of respondents have children less than 18-years-old. This finding was almost the same for all cities investigated.

Another characteristic of Oklahoma farmers' market consumers is education. The range of education is distributed widely from grade school level up to doctoral degree. Around 18 percent of the respondents have education up to high school; 30 percent have some college education; 20 percent have undergraduate education, and about 21 percent have a master's degree and above. Among the six cities investigated, the pattern is the same. The only difference is in Shawnee, where the majority of customers have high school education (Figures 1.3 and 1.4).

Thirty five percent of respondents have household annual incomes of $39,999 and below; 25 percent have income between $40,000 and $59,999; 18 percent have income between $60,000 and $79,999 and 22 percent have income $80,000 and above. The household income distribution of Shawnee's consumers was different from that of other locations. Most of Shawnee's consumers fall in the higher income category ($80,000 and above), as can be seen in Figures 1.5 and 1.6.

The survey results showed that 43 percent of the consumers lived in a suburban area, and 18 percent in a rural area and the rest lived in urban area. Similarly to the findings of other studies, most shoppers (around 76 percent) live close proximity to the farmers' market (less than 10 miles). In the Stillwater's farmers' market, about 59

percent of consumers reside within 0.5 to three miles from the market (Figures 1.7 and 1.8).

Around 48.1 percent of the survey respondents grow herbs at home and 44.6 percent normally use their own herbs for fresh cut/culinary use. When respondents were asked how frequently they prepared meals at home, 44.1 percent said they prepared meals more than 7 times a week.

The survey results portray the typical Oklahoma farmers' market customer in a fashion that is consistent with the conclusions of similar studies conducted in other regions of the U.S. The typical customer is a woman, age 36 or older, highly educated, with a household income of $40,000 or higher, and coming from a two-person household. The statistics of the Oklahoma farmers' market's customers are shown in table 1.

*Shopping and Purchasing Patterns*

To get a better description of demand for particular items at the market, shoppers were asked to list products they usually purchased. The results showed that 70 percent of respondents purchased vegetables, and 41 percent purchased fruit regularly at the market. Items that were also purchased regularly were berries and organic produce (Figure 1.9). All cities studied showed a similar pattern.

Respondents also were asked about items that they never purchased. Around 68 percent of respondents said that they never purchased cheese at the farmers' market, 65 percent never purchased meat, and 62 percent never purchased dried herbs. On question 14 of the survey, individuals were asked about items that they would likely buy if such items were regularly available at the farmers' market. Results indicated that 18.6 percent of respondents would likely buy eggs, 18.3 percent would likely buy cheese, and 15.7

percent would likely buy nuts. About 17.6 percent of the Oklahoma City farmers' market shoppers would like to buy more vegetables.

When shoppers were asked about their average monetary expenditure each time they visit the market, 29 percent said they spend $5 to $10, 31 percent spend $10 to $15, and 24 percent spend $15 to $25. All six farmers' markets studied showed the same pattern.

Consumers were asked how often they visited the farmers market during 2001 and how they compared recent visits to the previous year's visits. The aim of these questions was to get a description of consumer' shopping patterns. Generally, farmers' markets operate twice weekly, on Saturday and Wednesday mornings. About 32.1 percent of Saturday's farmers market's respondents visit the market weekly, 22.8 percent visit every other week, and 12.2 percent visit once a month. The visiting pattern was different at the Shawnee's farmer's market, where about 53.8 percent of shoppers visit the market weekly. This was the highest percentage in comparison to other cities investigated (Figures 1.10 and 1.11).

When respondents were asked to compare the frequency of their farmers' market visitation patterns on Saturdays of 2001 with previous year's patterns, 42.9 percent of respondents said that they were the same and 33.0 percent said their visitations had increased; only 23.1 percent said they were decreased. The same question was asked to Wednesday shoppers of farmers' market. Approximately 24 percent of respondents said their visitation pattern was about the same, 23.1 percent said their visitation frequency had decreased and 16.7 percent were visiting the market more frequently.

Among the six cities studied, respondents at the Norman's farmers' market showed a pattern different from respondents in other locations. The majority (72 percent) of Norman shoppers said the number of visitations in 2001 was about the same compared to previous year's number (Figures 1.12 and 1.13).

Shoppers were also asked about how many years they had been visiting the farmers' market (Figures 1.14 and 1.15). About 50 percent of 312 respondents answered they had been visiting the farmers' market for at least 4 years. In Norman, the percentage was even higher: 88 percent of respondents said that they had been visiting the farmers' market for at least 4 years. The answer to the next question on the survey, regarding how many farmers' markets the respondents had visited in the previous year, also supported this finding: 59 percent of customers visited only one farmers' market in the year of 2001.

*Reasons for Shopping at Farmers' Market*

Kezis et al. identified "quality" of produce as the key attraction at some of the farmers' markets of other regions. This type of response was expected given the high education level that characterized the respondents. Similar to the findings in the Maine farmers' market study, shoppers in Oklahoma's farmers market also identify quality as a very important factor affecting their decision to shop at the farmers' market (Figure 1.16). Other factors identified were availability of in season products (53.8 percent) and the fact that the products were grown in Oklahoma (46.5 percent). These factors were common in all the studied farmers' market.

Other questions on the survey asked the respondents to rank from 1 (most important) to 7 (least important) several reasons for shopping at farmers' markets.

Respondents ranked price as having little importance on their decision to shop at the farmer's market. Previous studies (Kezis et al.) had identified price as a critical factor in the decision to shop at the farmers' market. In Oklahoma, the most important reasons for shopping at the farmers' market identified by respondents were product quality and freshness (40 percent), and to support of local farmers and businesses (37.8 percent). The results are illustrated in Figure 1.17.

Oklahoma shoppers were asked about their opinion on what expectations they would have when they buy produce at farmers' markets. Most customers (84.3 percent) said that they would expect the produce would have a higher quality compared to produce at markets other than farmers' markets. Higher product variety was also expected by 46.8 percent of respondents, and respondents expected price to be the same as in other markets (Figure 1.18). These results were consistent among the six farmers' markets studied.

Farmers' Market Producers

The objective of this section is to summarize the results of the survey of farmers' market producers. The summary of farmers' market producers' survey was categorized into three subjects: respondents' characteristics, examination of factors related to production and marketing of products, typical customers at farmers' market from producers' point of view, and directions of change expected by farmers' market producers

*Respondents' Characteristics*

Out of 64 farmers' markets producers, about 6 percent are between 26 and 35 years old, 50 percent are between 36 and 55 years old; 21 percent are between 56 and 65 years old and the remaining 23 percent are above 66 years. This age distribution indicates that most producers (65 percent) of Oklahoma farmers' markets are older than 46 years of age. There were no producers younger than 25 years old in this survey. The age distribution of the respondents of each city (Stillwater, Norman, Oklahoma City, and Muskogee) reflected the same pattern, with the 36 – 55 of age group having the highest representation. Most of the producers (85 percent) came from 2-adult households. This finding was almost the same for all cities investigated.

Another characteristic of Oklahoma farmers' markets' producers is education. The range of education is distributed widely from grade school level up to doctoral degree. Around 20 percent of the respondents have education up to high school; 27 percent have some college education; 23 percent have undergraduate school education, and about 19 percent have a master's degree and above. Among the five cities investigated, the tendency is the same.

The other characteristic of farmers' market producers is annual household income. Forty nine percent of respondents have household annual incomes of $39,999 and below; 24 percent have income between $40,000 and $59,999; 19 percent have income between $60,000 and $79,999 and 8 percent have income at least $80,000. The information on demographic characteristics of farmers' market producers can be seen at Table 2.

Majority of farmers' market producers primary occupations are non-agricultural and vegetable farming (figure 1.19), and the average length of time they have been working on their primary occupation, is about 13.7 year. Furthermore, the average length of time that the producers have been selling products through farmers' market is 4.5 years. The survey also revealed that income from selling product through farmers' market for producers is not a full-time income, around 43 percent of producers said that it is a part-time income (Figure 1.20). This pattern is somewhat the same among farmers' market investigated.

*Examination of Factors Related to Production and Marketing of Products*

One of the questions asked from the farmers' market producers related to the reasons for choosing at farmers' market as outlets for produce sales. Producers were asked to rank 1-7, 1 being the most important reasons: convenience, receive retail value for products sold, customers interaction, to advertise products, to sell excess products not sold through other outlets, and to sell surplus produce from own garden. The results showed that 44 percent of the producers indicated, "to receive retail value for products sold" was the most important reason for producer to sell the products at the farmers' market. Furthermore, 27 percent of respondents said that customer's interaction was an important reason as well (Figure 1.21).

To increase sales of products, farmers' market producers usually advertise their products to attract customers. They were asked to rank from very effective to not effective (rank 1 to 3), the following promotion method used: sign indicating your price, sign for product information, recipes, taste testing/samples, bulk discount and other. The results showed that around 58 percent of the producers said that using a sign indicating

price was a very effective method of promoting sales. About 27 percent also said that using a sign for product information was also a very effective way of promoting sales (Figure 1.22). There were two very effective ways of promoting sales in Norman farmers' market: 'signs indicating product prices' and 'signs for product information' (Figure 1.23). In the Stillwater farmers' market, 73 percent of respondents stated that 'sign indicating product prices' was a very effective way of promotion, and also 55 percent of respondents stated that taste testing/ samples of product was also very effective (Figure 1.24). There were three different methods of promoting product sales that were very effective in Muskogee: 'sign indicating product prices', 'sign for product information', and 'recipes' (Figure 1.25).

Producers were asked to describe how they normally determine prices for the product they sell at farmers' market. The options given were: grocery store comparison, matching other vendors prices, pricing below other vendors, internet, cost of production plus mark up, pricing above other vendors, and charge the same as always. Twenty seven percent of respondents said that the most common method used to determine prices was grocery store comparison, 22 percent said matching other vendors prices and 19 percent said that they determined prices based on cost of production plus mark up (Figure 1.26). Detail results on each market examined also showed a different pattern. In Oklahoma City farmers' market, 37 percent of producers said the most common method to determine product price was based on grocery store comparison, and also the other common method to determine price was matching other vendor's prices. The other farmers' market that showed a difference tendency was Stillwater. In Stillwater farmers'

market, the two most common methods given as determinants of product prices were "grocery store comparison" and "charges the same, as always ".

Most of the farmers' market producers (95 percent) said, "they held the prices the same throughout the day". This response was somewhat similar among the four markets being compared. Price undercutting sometimes became a problem in the market. When the respondents were asked about price undercutting in their farmers' market, about eighty five percent stated it was not a problem.

Level of satisfaction on selling products at farmers' market was also examined in this survey. The answers ranged from not satisfied to totally satisfy. The survey result revealed that 52 percent of respondents were 'mostly satisfied' with the profit from selling at farmers' market, 25 percent said they 'totally satisfied', and only 8 percent said they were not satisfied (Figure 1.27). Eighteen percent of respondents in Stillwater and 11 percent respondents at Oklahoma City farmers' market stated that they were not satisfied with the profit from selling at farmers' market. To measure a success of producers at farmers' market, they were asked a question with the following answers to choose from: gross sales, net sales, selling enough to cover expenses, selling out of enough products to go home early, selling most of the products by the end of the market day, having return customers and others. As expected, most of producers (64 percent) said that 'having return customers" make them a successful farmers' market producers (Figure 1.28). The second largest answer was to have "relatively" good gross sales (39 percent of respondents). Respondents that said having return customers was a success for them were high in Stillwater, Oklahoma City and Muskogee farmers ' market and were 82, 73, and 89 percent of the respondents respectively.

In order to obtain data on the origin of the products sold at farmers' market, respondents were asked, "What percentage of all the products that you sell at farmers' market is grown or prepared by you and your employees (not resold)". Seventy-nine percent of the respondents said that they or their employees prepared the products by themselves. Stillwater farmers' market respondent stated that only 11 percent of their products were grown or prepared by the employees or by themselves.

Products sold at farmers' market can be fresh produce or value added products. In question 28 of farmers' market producers' questionnaire, respondents were asked if they sold value added products such as baked goods, preserves, and dried flowers. The results showed 33 percent of respondents indicated that they sell value added products. Among 33 percent of the respondents that said they sell value added products, most of them (86 percent) have done primarily adding value to items, which they have produced themselves.

Related to business expenses of farmers' market producers, they were asked to rank the listed (in the survey questionnaire) production input expenses from the largest to the smallest. The listed input costs were: seeds/plants, fertilizer, weed control, insect control, disease control, irrigation, machinery, labor, utilities, transportation, land payment, buildings, marketing and other. Twenty eight percent indicated seeds/plants was the largest production input, 19 percent utilities, and 11 percent indicated machinery was the largest expense. One of the production inputs of farmers' market products was labor. The respondents were asked what level of difficulties they experienced on finding reliable employees. The result was very interesting because only 9 percent of the respondents said finding reliable employees are not difficult. In general, 21 percent

indicated it is somewhat difficult to find a reliable employee, 23 percent said it's very difficult, and 47 percent said they have not hired any employees yet (Figure 1.29). The responses were different in each market investigated. In Norman 60 percent of respondents said they have not hired any employees yet, and none of the respondents said it is not difficult to find reliable employee. In Muskogee farmers' market, 57 percent of respondent said it was very difficult to find reliable employees, and 29 percent said they have not hired any employees yet.

*Typical Customers at Farmers' Market from Producers' Point of View*

As for farmers' market customers' survey, producers were asked to define the characteristics of a typical customer that buys their product at the farmers' market. From the customers' survey, the typical consumer at farmers' market was female, age at least 36 years of old, has an annual household income at least $36,000, highly educated, and comes from a two-adult household. The given choices of answers of the question are: high income, medium income, low income, dual income; single, married with children; retired; stay at home parent; career oriented; educated; health conscience; and bargain hunter. Result showed that 66 percent said the customers come from 'medium income', and 'retired'. Other answers were 56 percent said they are 'very health conscience', 55 percent said they are 'educated', and 53 percent they are 'married with children' (Figure 1.30).

The producers were asked to rank quality characteristics that they thought consumers place value on when making their decision to shop at farmers' markets. These characteristics included: product quality, unusual varieties, price, in season produce, chemical residues, organic production methods, grown or made by the vendor and

Oklahoma grown. As above, the same question was asked from farmers' market customers. Around ninety percent of customers said that product quality is very important to their customers (Figure 1.31), and for each market compared, all of them stated that product quality is very important to customers. Another quality characteristic that is very important to customers according to producers were grown or made by the vendor (72 percent of respondents), and Oklahoma grown (65 percent of respondents).

Respondents of the farmers' market producers' survey were asked "how do you see the farmers' market that you attend changing over the next three years". The answers proposed were 'expanding', 'staying the same', and 'decreasing'. Sixty percent of the respondents said that they thought the farmers' market would expand, 26 percent said it would stay the same, and 7 percent said it would decrease. This question had a fill in the blank for respondents to comment, if they had any. The respondents that said the markets would expand gave the reasons such as they will try to advertise more, they will add more products to attract customers, they need some expansion to keep the vendor staying at the same market, and new facilities for the market being build would attract both vendors and customers. The respondents that stated the farmers' market would decrease mostly because of most vendors are old and they do not get enough support from the local community.

In order to identify factors that contribute to a better business environment for producers at farmers' market, the producers were to indicate the directions of change they wish to see occur at the primary farmers' market they attend. The purpose of the question was to have some feedback to improve farmers' market. The answers listed were: increase for better condition, decrease, and if they were satisfied with the state of the

current condition then they could choose no change. This question has to be interpreted independently for each the item being asked: market hours; days open for business; length of market season; market location; availability of shade; stall fee; membership dues; amount of advertising; number of customers; number of produce vendors; number of non-produce vendors; and quality of market management. The results showed that 67 percent of respondents whished the number of customers would increase at the farmers' market, 61 percent were also expected the management would increased the amount of advertisement, and 50 percent expected the numbers of vendors would increase. The result can be seen at Figure 1.32. There were some items that respondents would prefer no change in the future: market hours, days open for business, length of market season, market location, availability of shade, stall fee, membership dues, and quality of market management.

On the fill in the blank for additional respondents comments if any, there were some suggestions on how to improve the market. One of the suggestions was to increase marketing promotion via Internet, and the other suggestion was they would like to see more enforcement of rules and availability of guidelines. One of respondent brought up a problem with imposing a fixed membership fee. They indicated that fixed membership fee might become a barrier to entry for small vendors. To overcome this problem, a suggestion of paying a percentage of sales as a membership fee would be favorable, and would help small vendors. Since the majority of the customers are elderly people, the producers suggested that farmers' market designated a specific rest area for them.

Question 45 on the farmers' market producers survey was asking about what kind of topic they would like to have more information about. The choices available were:

season extension technique, greenhouses, plant propagation, irrigation, post-harvest handling, marketing, weed control, disease control, insect control, cover crops, organic methods, hiring employees, value added products, health regulations, specific crops/ products and other. The result is given in Figure 1.33.

Farmers' Market Managers

*Market Manager's Characteristics*

Out of 9 farmers' market managers interviewed, about 11 percent are between 26 and 35 years old, 45 percent are between 36 and 45 years old; and 44 percent are between 46 and 55 years of age. There were no farmers' market managers younger than 25 years old in this survey

Another characteristic of Oklahoma farmers' markets' managers is education. The range of education is distributed widely from grade school level up to doctoral degree. Around 22 percent of the respondents have education up to high school; 22 percent has some college education; 22 percent have undergraduate school education, and about 34 percent have master's degree.

The other characteristic of farmers' market managers is household annual income. Twenty two percent of respondents have household annual incomes of $39,999 and below; 34 percent have income between $40,000 and $59,999; 22 percent have income between $60,000 and $79,999 and 22 percent have income at least $80,000. The information on demographic characteristics of farmers' market managers can be seen at table 3.

The farmers' market managers were asked, " how would you describe the position as a market manager/coordinator"? The answers listed were: employed by farmers' market organization; employed by the city; employed by the county; volunteer and others. Around 34 percent of the markets managers are volunteers, 11 percent employed by farmers' market organization, 11 percent employed by the city and 11 percent employed by the county. Among the employed farmers' market managers, around 50 percent allocated quarter time for managing/coordinating the farmers' market. When the farmers' market managers were asked "how many years have they been working as a farmers' market manager". Around 63 percent has been working as farmers' market manager for at least 6 years. Another question was "have you received any specialized training as a market manager"? All respondents stated that they have never received any specialized training as a market manager, but most of them have a farming experience background.

*Infrastructure Needed for the Success of Farmers' Market*

Infrastructures on farmers' market location play an important role in the success of farmers' market, because generally, good infrastructures will attract more consumers. On the question of infrastructure, farmers' market managers were asked to give value of 'very important', 'important', and 'not important' the following item: restroom, electric hookups, convenient parking, ample parking, water fountains, hand washing facilities, shade from trees, shade from structures, refrigeration, picnic area, and concessions (food and/or drink items). The result indicated all of the market managers stated, convenient and ample parking is very important infrastructures; 67 percent of market managers

stated shade is very important. Another very important infrastructure was restroom, which was stated by 56 percent of market managers (Figure 1.34).

When choosing sites for farmers' market operation, there are many factors to be considered by market manager. On the question related to factors that were important for farmers' market sites, answered listed were: cost of site, customers access, availability of shade, liability concerns, visibility from road, nearby traffic flow, and provided by community. Around 44 percent of farmers' market managers stated that "site provided by community" was the most important factors to be considered, the other factors was cost of the site (Figure 1.35). Overall, 56 percent of the market manager rank "mostly satisfied" to the current farmers' market location and there were 11 percent of the market manager that stated not satisfied to the current location.

## METHOD OF ANALYSIS

### Ordered Logistic Regression Models

A logistic regression analysis is used in this analysis to get a relationship between certain characteristics of respondents and their preferences. The general logistic regression describes the relationship between a dichotomous response variable and a set of explanatory variables, which may be continuous or discrete (with qualitative or dummy variables). The logit model yields large sample properties of consistency and asymptotic normality of the parameter estimates, allowing conventional tests of significance to be applied (Greene).

The ordered logit used in this study is one of the extensions of the logit model where the dependent variables are in the form of an 'ordinal scale' which means that

measurements represent the ranks of variable values. However, the intervals between the numbers are not necessarily equal. There were two choices of extended logit model that could be used in this paper, ordered logistic regression or multinomial logistic regression. If we use a regular multinomial logit for this type of data, we would fail to account for the ordinal nature of the independent variables. The difference between ordered logistic regression analysis and regular regression analysis that regular linear regression analysis would fail to count the benefit of ordered data. For example, in an opinion survey, where the responses are coded 1 to 4, linear regression would treat the difference between 1 and 2 the same as that between 3 and 4, while in reality the respondent has attached a different value to each of those ranking. The ordered logit model accounts for this problem (Greene).

There are two advantages of ordered logit models. First, the models are easier to interpret, and second, hypothesis tests are more powerful (Allison, p.133). The disadvantage of ordered logistic model is that they impose restrictions on the data, which is 'proportional odds assumption' or in other words the slope of each regression surface are the same in the models. The proportional odds test simply tests whether the parameters are the same across logits, simultaneously for all estimators (Agresti).

Like the logistic regression, ordered logit uses maximum likelihood methods, and finds the best set of regression coefficients to predict the values of the logit-transformed probability that the dependent variable falls into one category rather than another. Using Agresti's approach, logistic regression assumes that if the fitted probability (estimate of probability is plots against certain distribution), $p_{ji}$, is greater than 0.5, the dependent variable should have value 1 rather than 0. Ordered logit does not have such a fixed

assumption. Instead, it fits a set of cutoff points, i.e., if there are $r$ levels of the dependent variable (1 to $r$), it will find $r$-1 cutoff values, $k_1$ to $k_{r-1}$, such that if the fitted value of logit ($p_{ji}$) is below $k_1$, the dependent variable is predicted to take the value 0, if the fitted value of logit ($p$) is between $k_1$ and $k_2$, the dependent variable is predicted to take the value 1, and so on. As with the logistic regression, an overall Chi-Square for the goodness of fit of the entire fitted model can be obtained. In general, the ordered logit model has the form:

$$\text{logit}\,(p_{1i}) = \ln\left(\frac{p_{1i}}{1-p_{1i}}\right) = \alpha_{1i} + \boldsymbol{\beta}'\mathbf{X} \tag{1.1}$$

$$\text{logit}\,(p_{1i} + p_{2i}) = \ln\left(\frac{p_{1i} + p_{2i}}{1-(p_{1i} + p_{2i})}\right) = \alpha_{2i} + \boldsymbol{\beta}'\mathbf{X} \tag{1.2}$$

$$\text{logit}\,(p_{1i} + p_{2i} + \ldots + p_{ki}) = \ln\left(\frac{p_{1i} + p_{2i} + \ldots. + p_{ki}}{1-(p_{1i} + p_{2i} + \ldots. + p_{ki})}\right) = \alpha_{ki} + \boldsymbol{\beta}'\mathbf{X} \tag{1.3}$$

$$0 \leqslant p_{ji} \leqslant 1 \tag{1.4}$$

$$\sum_{j=1}^{k+1} p_{ji} = 1 \tag{1.5}$$

where $p_{ji}$ is the probability that the event $Y_j$ occurs for individual $i$, $\{p_{ji}/(1-p_{ji})\}$ is the "*odds ratio*" which defined as 'the ratio of the expected number of times that an event will occur to the expected number of times it will not occur'; ln $\{p_{ji}/(1-p_{ji})\}$ is the natural log of the odds ratio, or "logit" and $-\infty <$ logit $(p_{ji}) < +\infty$, $\alpha_{ji}$ is the intercept, $\beta$ is the vector of parameters to be estimated, $X_i$ is a vector of explanatory variables with the characteristics of individual $i$.

The interpretation of the coefficients of the logistic regression differs from that of the ordinary linear regression. The marginal effects in the ordinary linear regression model are the coefficients of the explanatory variables, i.e., the explanatory variables coefficient measure the change in the dependent variable induced by a one-unit increase of the independent variable. This does not hold in the logistic regression model.

There are two separate sets of ordered logit models that were used to evaluate each objective of this paper. The first set of models evaluated one question from the survey (question 8, which corresponds to the first objective of this study: examination of consumer preferences among various marketing channels. Specifically, the model was used to predict the likelihood of a consumer obtaining most, or some, or none of their fruits and vegetables during the market season, from each of six different direct marketing channels (own garden, friend's garden, farmers' market, roadside stand, grocery store, and discount super-store), given certain characteristics of the respondents.

The second set of the models evaluated the second objective (analysis of the impact of various demographic variables on purchasing decisions) and was based on consumer's responses to question 9 of the survey. The model was used to predict the likelihood of a consumer identifying certain items as very important, somewhat important, or not important on the consumer's decision to purchase fresh produce, given the consumer's characteristics. The items set as dependent variables were: convenience, quality, unusual varieties, quantities from which to choose, price, in season, chemical residues, farming methods used, grown by the vendor, grown in Oklahoma, and free of genetic modification. The explanatory variables were: age, gender, have children under 18 years of age, neighborhood, education, income, and number of years they have been

visiting the farmers market. The following gives the model specification for estimating variables in question 8:

$$\text{logit}(F_{ijk}) = \alpha_{jk} + \sum_{g} \beta_{jg} X_{ijg} \tag{1.6}$$

$i = 1, 2,.., 312$ (number of samples);

$j = 1, 2,.., 6$ ( number of dependent variables);

$k = 1,2$ (order at dependent variable);

$g = 1, 2,..,6$ (number of independent variables).

Where

$$F_{ijk} = \sum_{j} p_{ik} \tag{1.7}$$

$$\sum_{g} \beta_{jg} X_{ijg} = \beta_{j1} X_{ij_1} + \beta_{j2} X_{ij2} + ..... + \beta_{j6} X_{ij6} \tag{1.8}$$

$$\text{logit}(F_{ijk}) = \log\left(\frac{F_{ijk}}{(1 - F_{ijk})}\right) \tag{1.9}$$

Where Fijk is the cumulative probability that individual i obtain most of his/her produce from specific source (j), where j is own garden, friend's garden, farmer's market, roadside stand, grocery store, or discount super-store, and k refers to the quantity of produce obtained from each source (most, some, or none), and i is the individual being observed. For each dependent variable we would have two models with the same parameters estimates of β's and two distinct intercepts (α's).

The second set of models regresses Logit (Film) against the same explanatory variables as the first set, where l refers to the motives behind fresh produce purchases (convenience, quality, unusual varieties, quantity choice, price, in-season, chemical residues, farming methods used, grown by the vendor, grown in Oklahoma, and free of

genetic modification) and m refers to how important these quality characteristics are for each consumer (very important, somewhat important, or not important).

Since all independent variables were in discrete values, dummy variables were created to accommodate the models. The dummy variables were as follows: *Ages 1, 2, 3,4 and 5* are set to 1 if the respondent's age is below 20, 21-35, 36-50, 51-65, 66-75 respectively; and zero otherwise; *Gender* is set to 1 if respondent is male, and 0 otherwise; *Children* is set to 1 if respondent has kids under 18 years of age, and zero otherwise; *Suburb 1 and 2* are set to 1 if respondent lives in suburban and urban areas respectively, and 0 otherwise; *Education 1, 2, 3, 4,* 5, and 6 are set to 1 if respondent's had a grade school education, a high school education, some college education, undergraduate education, some graduate school, had a master degree, respectively; and 0 otherwise; *Income 1*, 2, 3, 4, and 5 if the household's annual income is less than $ 20,000, $20,000 - $39,999, $40,000 -$59,999, $60,000 -$79,999, $80,000- $99,999, respectively; and 0 otherwise; *Visits 1, 2, 3, and 4 are set to 1* if the number of visits are 1 year, 2 - 3 years, 4 - 5 years, 6 - 10 years, respectively; and 0 otherwise. For estimation purposes, one classification was eliminated from each group of variables to prevent perfect co-linearity. The models were analyzed using the SAS procedure logistic.

Missing data

From the three surveys (customers, producers, and markets managers' survey), only data for customers survey is used for the following logistic regression analysis. One of the problems encounter was blank response on the questionnaire, which created missing data problems. For the variables that were used on the equations, the missing data were estimated to complete the data set for the analysis purposes. The estimation

method used was imputation, which uses the general mean of the data for each variable. Following Warde's (1990, p. 134) procedural suggestions, a general mean of the set of similar answers was computed and then imputed to the missing data.

Violation of Assumptions in the Ordered Logistic Model

In this section, the assumptions underlying ordered logistic regression is evaluated in comparison to the assumption of ordinary linear regression and the consequences if the assumption is violated. Basically, the assumption that underlies Ordinary Linear Regression would also apply to ordered logistic regression. The standard assumptions of ordinary linear regression are: (1) y is a linear function of x plus a random disturbance term $\varepsilon$ for all samples, (2) $E(\varepsilon_i)=0$, (3) $Var(\varepsilon_i) = \sigma^2$, (4) $Cov(\varepsilon_i, \varepsilon_j) = 0$, and (5) $\varepsilon_i \sim$ Normal. If all five assumptions are satisfied, ordinary least squares estimates of the parameters estimates are unbiased and have minimum sampling variance.

The logistic regression does not require some restrictive assumptions that need to be made when using regular Ordinary Least Squares (OLS). The logistic regression does not assume a linear relationship between the dependent variable and the explanatory variables (independent variables) and the dependent variable do not need to be normally distributed (but does assume its distribution is within the range of the exponential family of distributions). Furthermore, the dependent variable does not need to be homoskedastic for each level of the independent variable(s), the error terms are not assumed to be normal, and the logistic regression does not require that the independent variables be continuous.

Violation of assumptions on homoscedasticity and normality of error term would have some consequences on the parameters being estimated. Violation on

homoscedasticity assumption will result in two undesirable consequences. First, the coefficients of the estimates are no longer efficient. It means that we could find other alternative methods of estimation that would give smaller variance. Second, the standard errors are no longer consistent estimates of the true standard errors (Allison, p. 10; Greene). Since the standard errors are no longer consistent, then the test statistics could also be biased.

The violation of the normality of error terms in small samples could result in poor estimation, but in a large sample case the consequences are not so serious (Allison, Greene). The central limit theorem assured as that coefficient estimates would have a distribution that is approximately normal. Since we do not need normality assumption to get unbiased estimates ordinary least squares will produce unbiased parameter estimates.

One of the unpleasant features of linear regression analysis that also carry out to logit analysis is multicollinearity. The basic point is if there are two or more variables that are highly correlated with one another, then it is difficult to get estimates of their distinct effects. There are many causes of multicollinearity in the regression analysis such as: improper use of dummy variables, an inclusion of a variable that is computed from other variables in the equation or just simply the variables is correlated. Consequences of multicollinearity basically only makes the parameter estimates unstable, and the consequences only apply to those variables in the models that are collinear. When high multicollinearity is present, confidence intervals for coefficients tend to be very wide and t-statistics tend to be very small (Allison).

In this paper, multicollinearity in the models was diagnosed using VIF (*Variance Inflation Factor*) and *Tolerance*. The formula for VIF and Tolerance are as follows:

$$VIF(\hat{\beta}_i) = \frac{1}{1-R^2_i} \tag{1.10}$$

$$Tolerance(\hat{\beta}_i) = \frac{1}{VIF} = 1-R^2_i \tag{1.11}$$

Where R square is unadjusted R square resulted from regression of dependent and independent variables in the model. A tolerance close to 1 means there is little multicollinearity, whereas a value close to 0 means multicollinearity maybe present. The VIF is the reciprocal of the tolerance and it measures how much the variance of the coefficient estimate is being inflated by multicollinearity (Greene).

The diagnostic of multicollinearity on all of models resulted on numbers above 0.8 for tolerance, which means that multicollinearity was not a problem. As a rule of thumb if tolerance below 0.4 then multicollinearity might be present. VIF diagnostic on the models were also supported these results, the value of VIF were between 1.02 to 1.2.

Another assumption on ordered logistic regression is proportional odds, which is in this case the ratio of two odds. The assumption needs to be held; otherwise the model is not valid. In this analysis, the proportional odds assumption tests were accomplish using PROC LOGISTIC. The proportional odds test simply tests whether the parameters are the same across logits, simultaneously for all predictors. The results of proportional odds assumption indicated that for the first set of the models, out of 6 models tested: own garden, friends' garden, farmers' market, roadside stand, grocery store and discount superstore; the assumption held for only 5 models. Discount superstore model rejected the assumption of proportional odds ratio (Pr> Chi-square = 0.07).

The proportional odds test was applied to the second sets of the models. There were two models (quantities to choose, Pr> Chi-square <. 0001; and free of genetic

modification, Pr>Chi-square = 0.01) that rejected the proportional odds assumption. As a result those two models were taken off from the analysis.

## ORDERED LOGIT RESULTS

The first set of the models

The first set of models as explained before, were constructed using variables that profiled the demographic characteristics of respondents. All of the explanatory variables were binary with a discrete value of zero or one generated from categorical questions of the consumer survey. Pindyck and Rubinfeld suggested an approach of using corresponding dummy variables for the regression, because most of the questions on the survey were qualitative by nature.

The likelihood ratio statistic was employed as an alternative measure of goodness-of-fit for the models because ordered logit does not produce an adjusted $R^2$ statistic (Pindyk and Rubinfeld). Goodness of fit is commonly used to evaluate the overall model performance, i.e. the overall significance of the model. This is a test of the significance of the overall relationship between the explanatory variables in the model and the response variable (dependent variable). This is a likelihood based test of the null hypothesis that the coefficients for all regressors are zero, and compares the log-likelihood for this null model with that of the fitted model. The difference between these two Log-Likelihood values, multiplied by negative two, is distributed like a Chi-Squared with degrees of freedom equal to the number of estimated coefficients in the model, and so can be used to test the overall significance of the model. PROC LOGISTIC was used to obtain the maximum likelihood estimator, and by construction the model used the

cumulative logit model (ordered logit). To select the independent variables for each model, stepwise selection was used with level of significant of one variable to enter and stay in the model was 0.3. The following are results from the logistic regressions.

*Own Garden model*

The dependent variable defined as Own Garden was obtained from the survey question that asked " Please identify the following places from which you normally obtain your fruits and vegetables during the farmers' market season." The possible answers listed were All, Most, Some, and None. To make the model estimable[4], two categories were combined into one category, thus "All" and "Most" became "Most." This was applied for all dependent variables for the first set of models. Agresti (p 215) stated, "when the proportional odds model holds for a given response scale, it also holds with the same effects for any collapsing of the response categories." Based on this statement, the results from four-ordered or three-ordered ordinal response, as is the case with the present study, would yield similar conclusions. Agresti calls this feature "invariance to the choice of response categories." The results reported not only the coefficient on parameters being estimate but also the odds ratio of the correspond variables. Each reported odds ratio could be interpreted as " the effect of the variable on the odds of being in a lower rather then in a higher category, without regard to how we dichotomize the outcome" (Allison, p140).

The objective of Own Garden Model is to figure the likelihood of the consumers, with certain characteristics as independent variables, to obtain portion of their fruit and

[4] The model could not be estimated using four different categories due to insufficiency of degrees of freedom.

vegetables from their own garden (own garden as dependent variable). There were two independent variables that were considered statistically significant in explaining the variability of the dependent variable. Those variables were age, and neighborhood (suburb). The log likelihood test for goodness of fit of the model for this independent variable was 0.0012, which was statistically significant at the 1 percent. This model explained that respondents with age between 66 and 75 years old are more likely to obtain most of their fresh produce from their own garden. This probability tend to decreased for the consumers younger than 65-years-old. Odds ratio finding also supported the results. Between Age's range, the odds of category 21-35, 36-50, and 51-65 are 0.7, 0.7,and 0.9 times the odds of >75 respectively. The odds of category 66-75 is almost twice the odds of being in >75 years of age. Finally respondents that come from urban and suburban areas are also less likely to obtain most of their produce from their own garden. The odds of respondents from urban and suburban neighborhood are 0.2 and 0.3 times the odds of respondents coming from rural area (Table 4).

*Friend's Garden model*

The objective of Friend's Garden Model is to figure the likelihood of the consumers, with certain characteristics as independent variables, to obtain portion of their fruit and vegetables from their Friend's garden (friend's garden as dependent variable). There were four independent variables that were statistically significant in explaining the likelihood that customers obtain most of their fresh produce from a friend's garden. The variables are consumers with children under 18, neighborhood, income, and number of years that customers had been visiting the market. The model explained that respondents

with children under age of 18 are less likely to obtain most of their fruit and vegetables from a friend's garden. The odds of respondents with children under 18 are 0.4 times the odds of respondents without children under 18. Respondents coming from urban and suburban area are also less likely to obtain most of their fruit and vegetables from a friend's garden. The odds of respondents from urban and suburban are 0.4 and 0.3 times the odds of respondents from rural area respectively.

The number of years that customers have been visiting a farmers' market was also significant in predicting the likelihood that they obtained most of their fruit and vegetables from a friend's garden. More specifically, new customers and customers that come to the market for more than 10 years were less likely to obtain their fruit and vegetables from a friend's garden. The results supported by the odds ratio, where the odds of respondents that has been visiting farmers' market for less than 1 year is 0.3 times the odds of respondents that has been visiting farmers' market for 10 years. The Chi-Square p-value for the model was 0.0226 and it was statistically significant at 3 percent level of significant (Table 5).

*Farmers' Market model*

The objective of Farmers' Market model is to figure the likelihood of the consumers, with certain characteristics as independent variables, to obtain portion of their fruit and vegetables from farmers' market (farmers' market as dependent variable). Among the seven independent variables that entered in the model, four of them were significant at explaining the variability of the dependent variable. The variables were consumers' age, neighborhood, education, and income. The variable age in this model is significant toward predicting the likelihood of the customers obtaining most of their fruit

and vegetables from a farmers' market. Among six age categories, only age 51-65 has a positive sign which means that respondent of age between 51-65 are more likely to obtain most of their fruit and vegetables from farmers' market. Results also showed that respondents who live in urban and suburban areas are most likely to obtain most of their fruit and vegetables from a farmers' market. The odds of respondents from urban areas is twice as the odds of respondents from rural area, and the odds of respondents from suburban areas is 1.5 times the odds of respondents from rural areas. Furthermore, customers that have high school education, some college education are most likely to obtain most of their fruit and vegetables from farmers' market. The Chi-Square test p-value for the model was 0.0012, which was statistically significant at 1 percent level (Table 6).

*Roadside Stand model*

The objective of Roadside Stand Model is to figure the likelihood of the consumers, with certain characteristics as independent variables, to obtain a portion of their fruit and vegetables from a roadside stand (roadside stand as dependent variable). In the Roadside stand model, only age and gender were statistically significant. Among 6 age categories, age range 21-35 and 66-75 are more likely to obtain most of their produce from roadside stand and age 36-50 and 51-65 are less likely to obtain most of their produce from roadside stand. The odds are 1.7, 2.1, 0.8, and 0.8 respectively. The logistic regression results showed that male customers were less likely to obtain their fruit and vegetables from a roadside stand. The odds of male is 0.7 the odds of female.

The Chi–square p-value test for the model was 0.0331, which was significant at 4 percent level (Table 7).

*Grocery Store model*

The objective of Grocery Store model is to figure the likelihood of the consumers, with certain characteristics as independent variables, to obtain portion of their fruit and vegetables from the grocery store (grocery store as dependent variable). There were only two significant demographic variables for the grocery store dependent variable model. Those variables are income and number of visitation to farmers' market. Respondents with income < $20,000 and between $20,000-$39,999 are more likely to obtain most of their produce from a grocery store. The odds of respondents in the income category < $20,000 is 2.3 times the odds of respondents in income categories >$100,000, and the odds of respondents in income category $20,000-$39,999 is 1.1 of that in categories >$100,000. Respondents with incomes above $40,000 are less likely to obtain most of their produce from grocery store. The Chi-Square test p-value for the model was 0.0807 (Table 8)

The Second Sets of the Model

*Convenience model:*

The objective of Convenience Model is to figure the likelihood of the consumers, with given characteristics as independent variables, to rate convenience as an important factor when they shop for fresh produce in Oklahoma. In this case, convenience is the dependent variable and certain consumer's characteristics are the independent variables. The ordered logistic regression result indicated that shoppers' education and income influenced their rating of convenience. Variable education 6 or having a master's degree is statistically significant at the 10 percent level. Another variable that was significant was income 5, or shoppers with income between $80,000 and $99,999. The p-value for the model was statistically significant at the 5 percent level (Table 9).

*Quality model*

The objective of the Quality model is to figure the likelihood of the consumers, with given characteristics as independent variables, to rate quality as an important factor when they shop for fresh produce in Oklahoma. In this case, quality is the dependent variable and certain consumer's characteristics are the independent variables. Quality is a very important factor to most Oklahoma farmers' market shoppers based on this survey. The result similar to the finding of Rhodus et. al. in the study of Ohio consumers opinion of roadside markets and farmers' market. In their study, they found that about 88 percent of the Ohio households believe that they receive higher quality produce directly from farmers. In this study, the ordered logit regression for quality dependent variable, showed 'gender' and 'neighborhood where respondents reside' are significant in

predicting the likelihood that respondents value quality is 'very important' when shops for fresh produce at farmers' market. Furthermore, the results showed that male is less likely to rate quality as a very important factor when shops for produce at farmers' market. This result was also supported by the odds ratio estimates. The odds of male is 0.4 the odds of female. Respondents from urban areas are more likely to rate quality as a very important factor when shopping for fresh produce at farmers' market. The odds of respondents from urban areas are nearly three times the odds of respondents from rural areas. The p-value for the model was 0.11 (Table 10).

*Unusual varieties model*

Question 19 on the survey revealed that shopper's expectations were also high regarding the 'variety of produce' bought at Oklahoma farmers' market. The objective of Unusual varieties model is to figure the likelihood of the consumers, with given characteristics as independent variables, to rate unusual varieties as an important factor when they shop for fresh produce in Oklahoma. In this case, an unusual variety is the dependent variable and certain consumer's characteristics are the independent variables. Model for 'unusual variety' indicated that the only statistically significant variable was age. Respondents aged 21-35 and 66-75 are less likely to rate unusual varieties as very important when shopping for fresh produce at farmers' market. The odds of consumers aged 21-35 is 0.9 times the odds of consumers age >75; and the odds of consumers age 66-75 is 0.6 times the odds of age > 75. Respondents aged 36-50 and 51-65 are more likely to rate unusual varieties as very important when shopping for fresh produce at

farmers' market. The odds of age 36-50 is 1.6 the odds of age >75 and the odds of age 51-65 is 1.5 the odds of age >75. The p-value for the model was 0.07 (Table 11).

*Price model*

Price was less important than quality when shoppers have to decide to purchase produce at farmers' market. The objective of Price model is to figure the likelihood of the consumers, with given characteristics as independent variables, to rate price as an important factor when they shop for fresh produce in Oklahoma. In this case, price is the dependent variable and certain consumer's characteristics are the independent variables. There were four variables that influenced the likelihood that shoppers identified price as very important when they purchased produce at a farmers' market: respondents with children under 18, shopper's neighborhood, education, and income. Respondents with children under 18 were less likely to rate price as very important when shops for produce at farmers' market. The odds of respondents with kids under 18 is 0.5 the odds of respondents without kids under 18. Respondents who reside in urban areas were less likely to rate price as a very important factor when they shop for fresh produce at a farmers' market. The odds of urban respondents are 0.8 times the odds of rural areas. Respondents education was also important in determine of importance of price when shopping at farmers' market. The more educated the respondents the less importance was the price. The odds of respondents with only grade school education were 7 times the odds of respondents with doctoral degree education to rate price as important. The Chi-square p-value for this model was 0.0002 (Table 12)

*In-season model*

The objective of In-season Model is to figure the likelihood of the consumers, with given characteristics as independent variables, to rate in-season as an important factor when they shop for fresh produce in Oklahoma. In this case, in-season is the dependent variable and certain consumer's characteristics are the independent variables. There are four variables affecting the likelihood that shoppers would say in-season is very important, when shopping for produce at a farmers' market: age, gender, respondents' neighborhood, and education. Males were less likely to rate in-season as very important factor when shopping fresh produce at farmers' market. The odds of male were about 0.6 the odds of female. Respondents coming from urban and suburban area were more likely to rate in-season as very important compared to respondents from rural areas. The odds were 1.6 and 0.6 respectively. There seems to be a pattern for education variable, with regard to how respondents rated in season as a very important variable on purchasing decision. Respondents with only high school education were more likely to include in-season as a very important factor on purchasing decision compared to respondents with a doctoral education background. Fjeld and Sommer (p.114) affirmed "farmers' market customers are more likely to eat fresh fruits and vegetables during the growing season and less likely to eat them off season". The education variable was significant in the model and it could be used in practical situations to identify a group of well-educated customers who consume in season produce and would adjust their intake for off-season. The chi-square p-value for the model was 0.003 (Table 13).

*Chemical residues model*

The increased use of chemical substances in the form of pesticides has increased concerns on residues at agricultural product. The objective of Chemical Residues Model is to estimate the likelihood of the consumers, with given characteristics as independent variables, to rate chemical residues as an important factor when they shop for fresh produce in Oklahoma. In this case, a chemical residue is the dependent variable and certain consumer's characteristics are the independent variables. There were four significant independent variables in the model: gender, education, income and number of visitations at farmers' market. Male respondents were less likely to rate chemical residues at the produce as most important. The odds of male consumers were 0.5 the odds of female. There were no specific patterns in the education variable related to how respondents rated chemical residues when they shopping for fresh produce at farmers' market. The p-value for the model was 0.0003, which was significant at 1 percent level (Table 14).

*Farming methods used model*

The objective of Farming Methods Used Model is to figure the likelihood of the consumers, with given characteristics as independent variables, to rate farming methods used as an important factor when they shop for fresh produce in Oklahoma. In this case, farming methods used is the dependent variable and certain consumer's characteristics are the independent variables. There are five significant variables to explain the probability that customers would likely to say that farming methods used for the produce

is important to them. The variables are age, gender, education, respondents' income and numbers of visitation to farmers' market. There was a pattern in the responses of this variable based on the age of respondents. The younger the respondents the more concerned the respondents towards farming methods used to produce fruit and vegetable for farmers' market sales. The odds of respondents in the age range 21-35 were 4.7 times the odds of respondents above 75 years of age. Respondents with grade school education were less likely to rate farming methods used as a very important factor when shopping for fresh produce at farmers' market. The odds of respondents with only high school education was only 0.2 the odds of respondents with doctoral degree education. The p-value for the model was 0.01, which is statistically significant at 1 percent level (Table 15).

*Grown by the vendor model*

The objective of the "Grown by the Vendor Model" is to estimate the likelihood of the consumers, with given characteristics as independent variables, to rate grown by the vendor as an important factor when they shop for fresh produce in Oklahoma. In this case, grown by the vendor is the dependent variable and certain consumer's characteristics are the independent variables. There are three variables significant in explaining the probability that customers would likely to say that grown by vendor for the produce is important to them. The variables are age, gender, and respondents' income. Respondents younger than 50 years of age were less likely to include grown by the vendor as a very important factors when shopping for fresh produce at farmers market. Male respondents were also less likely to rated grown by the vendors as very important.

The odds of male were 0.6 the odds of female. The p-value for the model was 0.0001, which is statistically significant at 1 percent level (Table 16).

*Grown in Oklahoma model*

The objective of the "Grown in Oklahoma Model" is to estimate the likelihood of the consumers, with given characteristics as independent variables, to rate Grown in Oklahoma as an important factor when they shop for fresh produce in Oklahoma. In this case, grown in Oklahoma is the dependent variable and certain consumer's characteristics are the independent variables. There are four significant variables in explaining the probability that customers would likely to say it is very important to them to buy produce grown in Oklahoma. The variables are age, gender, neighborhood and numbers of visitation to farmers' market. There was a pattern on the age variable towards their responses on importance of produce grown in Oklahoma. The younger the respondents the less likely that grown in Oklahoma was very important to them. Male respondents were also less likely to say that grown in Oklahoma was important to them when shopped for produce at farmers' market. The odds of male were about 0.4 the odds of female. Respondents from urban and suburban areas were also less likely to consider produce grown in Oklahoma as a very important factor. The odds were 0.4 and 0.4 for both urban and suburban areas compare to rural areas. The p-value for the model was 0.0001(Table 17).

# CONCLUSION

The survey results portray the typical Oklahoma farmers' markets consumers in a fashion that is consistent with the conclusions of similar studies conducted in other regions of the U.S. (Maine, and Tennessee). The typical consumer is a woman, age 36 or older, highly educated, with a household income of $40,000 or higher, and coming from a two-person household.

Related to the consumers shopping pattern, most of the consumers came to farmers' market to buy fresh fruit and vegetables because of the expectation of the quality of fresh produce at farmers' market is higher compare to other outlets. The most important consumers' reason to shop at farmers' market are 'product quality and freshness', and to 'support local farmers and businesses'. Consumers mostly came on Saturday's farmers' market and spend at least $10.00 on per visit. The length of time consumers has been visiting the farmers' market is an indication of a unique characteristic of farmers' market consumers. About fifty percent of the consumers have visited farmers 'market for 'at least 4 years', and they have visited the market every week.

The characteristics of Oklahoma farmers' market producer are: age between 46-65 years old with an undergraduate education and have a household's annual income between $20,000-$39,999. The producers' primary occupation mostly is 'non-agricultural', and they have been in the farmers' market for 4.5 years. The reasons of

'why they sell at farmers' market' are mostly for 'convenience', and some of producers indicated to 'received a retail value' on their products. The most common method for producer to determine retail price of the product is ' a grocery store comparison', and the producers measure the success by 'having a returned customers'. The question related to 'what characteristic is the most important on their products'; most of the producers indicated that product quality is the most important on the products.

Farmers' market producers were asked to identify the characteristics of the consumers that shopped at farmers' market. The producers identified that most customers come from medium income households, retired, educated and very health conscience.

The characteristics of farmers' market manager are: age between 36-45, having a master education, and having a households annual income between $40,000-$59,999, and mostly have been in the position for at least 10 years.

The finding of this research suggested that various demographic factors affect customers' preferences toward direct marketing outlet. In Farmers' market model, they were four variables significant in determining the quantity of fresh produce consumers obtained from farmers' market. The variables were consumers 'age, the neighborhood where the consumers reside, education and income.

Quality is a very important factor to most Oklahoma farmers' market shoppers based on this survey. The ordered logit regression indicated that consumer's gender and neighborhood where the respondents reside are significant in predicting the likelihood that respondents said quality is very important when shops for fresh produce at farmers' market. There were four variables that influenced the likelihood that shoppers identified

price as very important when they purchased produce at a farmers' market: respondents with children under 18, shopper's neighborhood, education, and number of visits to farmers' market.

# REFERENCES


Agresti, A.,1984. Analysis of Ordinal Categorical Data. New York: Wiley

Allison, Paul D. 1999. Logistic Regression Using The SAS System, Theory and Application. SAS Institute Inc, Cary, NC, USA.

Bacon, R., R. Dean Shippy, U. C. Toensmeyer. Consumer Shopping Patterns and Preferences for Package Sizes. Journal of Food Distribution Research, February 87:87 – 98.

Brooker, J., David B. Eastwood, and Robert H. Orr. Customers' Perceptions of Locally Grown Produce at Retail Outlets. Journal of Food Distribution Research, February 87: 99 – 107.

Eastwood, D. B., John R. Brooker, and Morgan D. Gray. Location and Other Market Attributes Affecting Farmer's Market Patronage: The Case of Tennesee. Journal of Food Distribution Research, March 1999:63 – 72.

Fjeld, C. R., and Robert Sommer. Regional – Seasonal Patterns in Produce Consumption at Markets and Supermarkets. Ecology of Food and Nutrition, 1982. Vol 12 pp. 109 – 115.

Govindasamu, R., John Italia, Daymon Thatch. Consumers Awareness of State Sponsored Marketing Programs: An evaluation of the Jersey Fresh Program. Journal of Food Distribution, 2000: 7 – 15.

Govindasamu, R. , John Italia, Daymon Thatch. Direct Market Retailer Perceptions of State Sponsored Marketing Programs. Review of Agricultural Economics v22, n1 (Spring –Summer 2000):77 – 88.

Greene, W. H. (1990). Econometrics Analysis. New York University: Prentice Hall.

Hinson, A. H.; R. Wes Harrison, and Linda Andrew. Impact on Attitudes Toward Food Irradiation. Journal of Food Distribution, 1998: 26 – 34.

Hossain, F., and Adesoji O. Adelaja. Consumers' Interest in Alternative Food Delivery Systems: Results from a Consumer Survey in New Jersey. *Journal of Food Distribution Research*, July 2000: 49 – 67.

Kezis, A., T. Gwebu, S. Peavey and H. Cheng. A Study of Consumers at a Small Farmers' Market in Maine: Results from a 1995 Survey. Journal of Food Distribution Research, February 1998: 91 – 99.

Kuches, K., Ulriech C. Toensmeyer, Carl L. German, and Jaime Kuklish. The Impact of Respondents' Characteristics on Purchasing Decisions. Journal of Food Distribution Research, March 2000:131 – 138.

Moutou, C., Gary W. Brester and John A. Fox. U.S. Consumers' Socioeconomic Characteristics and Consumption of Grain – Based Foods. Agribusiness, Vol. 14, No. 1, 63 – 72 (1998).

Kezis, A., T. Gwebu, S. Peavey and H. Cheng. A Study of Consumers at a Small Farmers' Market in Maine: Results from a 1995 Survey. Journal of Food Distribution Research, February 1998: 91 – 99.

Pindyck, R, and D. Rubinfeld (1991). Econometrics Models and Economic Forecasts. New York, NY: Mc Graw Hill.

Rhodus, Tim. Janet Schwartz, and James Haskins. Ohio Consumers Opinions of Roadside and Farmers' Markets. Ohio State University, Department of Horticulture, May, 1994, pp 1-7.

USDA (2001). Fruit and Tree Nuts Situation and Outlook Yearbook, October 2001 and Vegetable Situation and Outlook Yearbook, July 2001.

USDA (2003). Farmers' Market Fact.http://www.ams.usda.gov/farmersmarkets/facts.htm

Warde, W. D. (1990). Sampling Methods. Statistics Department, Oklahoma State University, Stillwater. Oklahoma (unpublished).

TABLE 1. DEMOGRAPHIC CHARACTERISTICS OF OKLAHOMA FARMERS' MARKET CONSUMERS (N=312)

| Characteristics | | Respondents (%) |
|---|---|---|
| Sex: | Male | 21.0 |
| | Female | 79.0 |
| Percent households with children Under 18 years | | 18.60 |
| Age: | < 20 | 0.00 |
| | 21 - 35 | 6.40 |
| | 36 - 50 | 27.60 |
| | 51 - 65 | 40.10 |
| | 66 - 75 | 13.80 |
| | > 75 | 9.60 |
| Education: | Grade School | 2.00 |
| | High School | 16.00 |
| | Some College | 30.00 |
| | Undergraduate | 20.00 |
| | Some Grad School | 11.00 |
| | Masters | 16.00 |
| | Doctoral | 5.00 |
| Annual Household Income: | < $ 20000 | 13.00 |
| | $ 20000 - $ 39999 | 22.00 |
| | $ 40000 - $ 59999 | 25.00 |
| | $ 60000 - $ 79999 | 18.00 |
| | $ 80000 - $ 99999 | 10.00 |
| | > $100000 | 12.00 |
| Neighborhood: | Urban | 39.00 |
| | Suburban | 43.00 |
| | Rural | 18.00 |
| Ethnicity: | African American | 3.00 |
| | American Indian | 7.00 |
| | Asian / Pacific Islander | 0.00 |
| | Middle Eastern | 1.00 |
| | Caucasian | 88.00 |
| | Hispanic | 1.00 |
| | Others | 0.00 |

Source: Oklahoma Farmers' Markets Consumers' Survey, 2002

TABLE 2. DEMOGRAPHICS CHARACTERISTIC OF OKLAHOMA FARMERS' MARKET PRODUCERS (N=64).

| Characteristics | | Respondents (%) |
|---|---|---|
| Sex: | Male | 33.85 |
| | Female | 61.53 |
| Percent households with children under 18 years | | 24.62 |
| Age: | < 25 | 0.00 |
| | 26 - 35 | 6.00 |
| | 36 - 55 | 50.00 |
| | 56 - 65 | 21.00 |
| | 66 - 75 | 15.00 |
| | > 75 | 8.00 |
| Education: | Grade School | 5.00 |
| | High School | 15.00 |
| | Some College | 27.00 |
| | Undergraduate | 23.00 |
| | Some Grad School | 11.00 |
| | Masters | 16.00 |
| | Doctoral | 3.00 |
| Annual Household Income: | < $ 20000 | 19.00 |
| | $ 20000 - $ 39999 | 30.00 |
| | $ 40000 - $ 59999 | 24.00 |
| | $ 60000 - $ 79999 | 19.00 |
| | $ 80000 - $ 99999 | 5.00 |
| | > $100000 | 3.00 |
| Neighborhood: | Urban | 8.00 |
| | Suburban | 10.00 |
| | Rural | 82.00 |
| Ethnicity: | African American | 0.00 |
| | American Indian | 2.00 |
| | Asian / Pacific Islander | 3.00 |
| | Middle Eastern | 2.00 |
| | Caucasian | 88.00 |
| | Hispanic | 2.00 |
| | Other | 3.00 |

Source: Oklahoma Farmers' Markets Producers' Survey, 2002

TABLE 3. DEMOGRAPHIC CHARACTERISTICS OF OKLAHOMA FARMERS' MARKET MANAGERS (N=9).

| Characteristics | | Respondents (%) |
|---|---|---|
| Sex: | Male | 33 |
| | Female | 67 |
| Age: | < 25 | 0 |
| | 26 - 35 | 11 |
| | 36 - 45 | 44 |
| | 46 - 55 | 44 |
| | 56 - 75 | 0 |
| | > 75 | 0 |
| Education: | Grade School | 0 |
| | High School | 22 |
| | Some College | 22 |
| | Undergraduate | 22 |
| | Some Grad School | 0 |
| | Masters | 34 |
| | Doctoral | 0 |
| Annual Household Income: | < $ 20000 | 0 |
| | $ 20000 - $ 39999 | 22 |
| | $ 40000 - $ 59999 | 34 |
| | $ 60000 - $ 79999 | 22 |
| | $ 80000 and above | 22 |
| Ethnicity: | African American | 0 |
| | American Indian | 0 |
| | Asian / Pacific Islander | 0 |
| | Middle Eastern | 0 |
| | Caucasian | 100 |
| | Hispanic | 0 |
| | Others | 0 |

Source: Oklahoma Farmers' Market Managers' Survey, 2002

TABLE 4. ORDERED LOGISTIC REGRESSION RESULT FOR OWN GARDEN MODEL

| Independent Variables | | Dependent Variable Own Garden | P-Value | Odds Ratio | 95% Confidence Limits Lower | Upper |
|---|---|---|---|---|---|---|
| | Intercept1 | -2.243 | <.0001** | - | - | - |
| | Intercept2 | 1.089 | <.0001** | - | - | - |
| Age: | 21 - 35 | -0.302 | 0.420 | 0.733 | 0.236 | 2.274 |
| | 36 - 50 | -0.349 | 0.118 | 0.700 | 0.301 | 1.624 |
| | 51 - 65 | -0.016 | 0.938 | 0.976 | 0.436 | 2.185 |
| | 66 - 75 | 0.657 | 0.022** | 1.913 | 0.735 | 4.974 |
| Suburbs: | Suburban | -0.485 | 0.005** | 0.269 | 0.135 | 0.536 |
| | Urban | -0.345 | 0.033** | 0.309 | 0.159 | 0.599 |
| Pr > Chi-square1 | | 0.7699 | | | | |
| Pr > Chi-square2 | | 0.0012** | | | | |

Note: Pr> Chi-square1 testing the proportional odds assumption
Pr> Chi-square2 testing global null hypothesis $\beta = 0$.
** Statistically significant at $\alpha = 5$ percent

TABLE 5. ORDERED LOGISTIC REGRESSION RESULT FOR FRIENDS' GARDEN MODEL

| Independent Variables | | Dependent Variable Friend's Garden | P-Value | Odds Ratio | 95% Confidence Limits Lower | Upper |
|---|---|---|---|---|---|---|
| | Intercept1 | -3.349 | <.0001** | - | - | - |
| | Intercept2 | 1.538 | <.0001** | - | - | - |
| Children: | Children1 | -0.394 | 0.027** | 0.455 | 0.225 | 0.917 |
| Suburbs: | Suburban | -0.158 | 0.413 | 0.460 | 0.208 | 1.017 |
| | Urban | -0.461 | 0.015** | 0.340 | 0.155 | 0.746 |
| Income: | < $20,000 | 0.334 | 0.341 | 2.752 | 0.936 | 8.091 |
| | $ 20,000 - $ 39,999 | 0.312 | 0.279 | 2.693 | 1.029 | 7.048 |
| | $ 40,000 - $ 59,999 | 0.110 | 0.635 | 2.199 | 0.927 | 2.217 |
| | $ 60,000 - $ 79,999 | -0.448 | 0.135 | 1.259 | 0.478 | 3.319 |
| | $ 80,000 - $ 99,999 | 0.370 | 0.366 | 2.854 | 0.874 | 9.320 |
| Visits: | 1 Year | -0.451 | 0.098* | 0.321 | 0.107 | 0.960 |
| | 2 - 3 Years | 0.287 | 0.249 | 0.671 | 0.235 | 1.920 |
| | 4 - 5 Years | 0.003 | 0.990 | 0.505 | 0.182 | 1.400 |
| | 6 - 10 Years | -0.524 | 0.070* | 0.298 | 0.097 | 0.912 |
| Pr > Chi-square1 | | 0.177 | | | | |
| Pr > Chi-square2 | | 0.022** | | | | |

Note: Pr> Chi-square1 testing the proportional odds assumption

Pr> Chi-square1 testing global null hypothesis $\beta = 0$.

* Statistically significant at $\alpha = 10$ percent

** Statistically significant at $\alpha = 5$ percent

TABLE 6. ORDERED LOGISTIC REGRESSION RESULT FOR FARMERS' MARKET MODEL

| Independent Variable | | Dependent Variable Farmers' Market | P-value | Odds Ratio | 95% Confidence Limits Lower | Upper |
|---|---|---|---|---|---|---|
| | Intercept1 | -0.349 | 0.113 | - | - | - |
| | Intercept2 | 3.320 | <.0001** | - | - | - |
| Age: | 21 - 35 | -0.494 | 0.229 | 0.244 | 0.068 | 0.879 |
| | 36 - 50 | -0.319 | 0.193 | 0.290 | 0.110 | 0.766 |
| | 51 - 65 | 0.236 | 0.276 | 0.506 | 0.202 | 1.264 |
| | 66 - 75 | -0.340 | 0.244 | 0.284 | 0.101 | 0.803 |
| Suburbs: | Suburban | 0.332 | 0.059* | 2.077 | 1.033 | 4.174 |
| | Urban | 0.067 | 0.691 | 1.593 | 0.812 | 3.123 |
| Education: | Grade School | -0.252 | 0.756 | 0.746 | 0.088 | 6.320 |
| | High School | 0.664 | 0.045** | 1.865 | 0.535 | 6.496 |
| | Some College | 0.581 | 0.027** | 1.716 | 0.556 | 5.297 |
| | Undergraduate | -0.140 | 0.613 | 0.835 | 0.269 | 2.592 |
| | Graduate School | -0.244 | 0.490 | 0.752 | 0.218 | 2.587 |
| | Masters | -0.649 | 0.041** | 0.502 | 0.153 | 1.645 |
| Income: | < $20,000 | -0.167 | 0.621 | 0.868 | 0.296 | 2.542 |
| | $ 20,000 - $ 39,999 | 0.714 | 0.010** | 2.095 | 0.804 | 5.460 |
| | $ 40,000 - $ 59,999 | -0.245 | 0.253 | 0.803 | 0.345 | 1.869 |
| | $ 60,000 - $ 79,999 | 0.188 | 0.507 | 1.238 | 0.482 | 3.178 |
| | $ 80,000 - $ 99,999 | -0.465 | 0.197 | 0.644 | 0.223 | 1.861 |
| Pr > Chi-square1 | | 0.544 | | | | |
| Pr > Chi-square2 | | 0.001** | | | | |

Note: Pr> Chi-square1 testing the proportional odds assumption

Pr> Chi-square2 testing global null hypothesis $\beta = 0$.

* Statistically significant at $\alpha$ = 10 percent

** Statistically significant at $\alpha$ = 5 percent

TABLE 7. ORDERED LOGISTIC REGRESSION RESULT FOR ROADSIDE STAND MODEL

| Independent Variables | | Dependent Variable Roadside Stand | P-Value | Odds Ratio | 95% Confidence Limits Lower | Upper |
|---|---|---|---|---|---|---|
| | Intercept1 | 0.006 | 0.970 | - | - | - |
| | Intercept2 | 1.261 | <.0001** | - | - | - |
| Age: | 21 - 35 | 0.356 | 0.328 | 1.728 | 0.587 | 5.094 |
| | 36 - 50 | -0.376 | 0.070* | 0.832 | 0.384 | 1.802 |
| | 51 - 65 | -0.363 | 0.047** | 0.842 | 0.405 | 1.752 |
| | 66 - 75 | 0.575 | 0.035** | 2.152 | 0.880 | 5.262 |
| Gender: | Male | 0.189 | 0.159 | 1.459 | 0.863 | 2.468 |
| Pr > Chi-square1 | | 0.455 | | | | |
| Pr > Chi-square2 | | 0.033** | | | | |

Note: Pr> Chi-square1 testing the proportional odds assumption

Pr> Chi-square2 testing global null hypothesis $\beta = 0$.

* Statistically significant at $\alpha = 10$ percent

** Statistically significant at $\alpha = 5$ percent

TABLE 8. ORDERED LOGISTIC REGRESSION RESULT FOR GROCERY STORE MODEL

| Independent Variables | | Dependent Variable Grocery Store | P-Value | Odds Ratio | 95% Confidence Limits Lower | Upper |
|---|---|---|---|---|---|---|
| | Intercept1 | 0.318 | 0.027 | - | - | - |
| | Intercept2 | 3.791 | <.0001 | - | - | - |
| Income: | | | | | | |
| | < $20,000 | 0.912 | 0.347 | 2.344 | 0.823 | 6.681 |
| | $ 20,000 - $ 39,999 | 0.068 | 0.258 | 1.008 | 0.418 | 2.429 |
| | $ 40,000 - $ 59,999 | -0.240 | 0.205 | 0.741 | 0.331 | 1.661 |
| | $ 60,000 - $ 79,999 | -0.257 | 0.269 | 0.728 | 0.294 | 1.805 |
| | $ 80,000 - $ 99,999 | -0.544 | 0.344 | 0.547 | 0.192 | 1.555 |
| Visits: | 1 Year | 0.184 | 0.247 | 0.884 | 0.345 | 2.262 |
| | 2 - 3 Years | 0.338 | 0.219 | 1.030 | 0.419 | 2.532 |
| | 4 - 5 Years | -0.286 | 0.206 | 0.552 | 0.230 | 1.329 |
| | 6 - 10 Years | -0.543 | 0.272 | 0.427 | 0.159 | 0.427 |
| Pr > Chi-square1 | | 0.619 | | | | |
| Pr > Chi-square2 | | 0.081* | | | | |

Note: Pr> Chi-square1 testing the proportional odds assumption

Pr> Chi-square2 testing global null hypothesis $\beta = 0$.

* Statistically significant at $\alpha = 10$ percent

** Statistically significant at $\alpha = 5$ percent

TABLE 9. ORDERED LOGISTIC REGRESSION RESULT FOR CONVENIENCE MODEL

| Independent Variables | | Dependent variable Convenience | P-Value | Odds Ratio | 95% Confidence Limits Lower | Upper |
|---|---|---|---|---|---|---|
| Intercept1 | | -0.734 | <.0001** | - | - | - |
| Intercept2 | | 2.394 | <.0001** | - | - | - |
| Education: | Grade School | 0.439 | 0.574 | 1.227 | 0.159 | 6.496 |
| | High School | 0.141 | 0.639 | 0.911 | 0.281 | 2.954 |
| | Some College | -0.131 | 0.601 | 0.694 | 0.232 | 2.073 |
| | Undergraduate | 0.353 | 0.181 | 1.126 | 0.374 | 3.385 |
| | Graduate School | -0.469 | 0.178 | 0.495 | 0.148 | 1.652 |
| | Masters | -0.565 | 0.064* | 0.450 | 0.143 | 1.413 |
| Income: | < $20,000 | -0.074 | 0.815 | 2.231 | 0.789 | 6.312 |
| | $ 20,000 - $ 39,999 | 0.100 | 0.685 | 2.656 | 1.067 | 6.612 |
| | $ 40,000 - $ 59,999 | 0.202 | 0.323 | 2.942 | 1.264 | 6.848 |
| | $ 60,000 - $ 79,999 | 0.058 | 0.828 | 2.546 | 1.005 | 6.455 |
| | $ 80,000 - $ 99,999 | 0.591 | 0.084* | 4.340 | 1.520 | 5.389 |
| Pr > ChiSquare1 | | 0.1984 | | | | |
| Pr > ChiSquare2 | | 0.057* | | | | |

Note: Pr> Chi-square1 testing the proportional odds assumption

Pr> Chi-square2 testing global null hypothesis $\beta = 0$.

* Statistically significant at $\alpha = 10$ percent

** Statistically significant at $\alpha = 5$ percent

TABLE 10. LOGISTIC REGRESSION RESULT FOR QUALITY MODEL

| Independent Variables | | Dependent variable Quality | p-Value | Odds Ratio | 95% Confidence Limits Lower | Upper |
|---|---|---|---|---|---|---|
| Intercept1 | | -2.5056 | <.0001** | - | - | - |
| Gender: | | | | | | |
| | Male | -0.363 | 0.144 | 0.484 | 0.183 | 1.281 |
| Suburbs: | | | | | | |
| | Suburban | -0.5893 | 0.1279 | 2.958 | 0.791 | 11.056 |
| | Urban | 0.0942 | 0.063* | 1.493 | 0.513 | 4.348 |
| Pr > ChiSquare2 | | 0.1101 | | | | |

Note: Pr> Chi-square2 testing global null hypothesis $\beta = 0$.

* Statistically significant at $\alpha$ = 10 percent

** Statistically significant at $\alpha$ = 5 percent

TABLE 11. ORDERED LOGISTIC REGRESSION RESULT FOR UNUSUAL VARIETY MODEL

| Independent Variables | | Dependent variable Unusual Varieties | P-Value | Odds Ratio | 95% Confidence Limits Lower | Upper |
|---|---|---|---|---|---|---|
| Intercept1 | | 1.138 | <.0001** | - | - | - |
| Intercept2 | | -1.465 | <.0001** | - | - | - |
| Age: | 21 - 35 | 0.163 | 0.654 | 0.902 | 0.300 | 2.710 |
| | 36 - 50 | -0.431 | 0.0462* | 1.634 | 0.725 | 3.681 |
| | 51 - 65 | -0.325 | 0.0868* | 1.469 | 0.681 | 3.172 |
| | 66 - 75 | 0.532 | 0.0703* | 0.624 | 0.252 | 1.546 |
| Pr > ChiSquare1 | | 0.117 | | | | |
| Pr > ChiSquare2 | | 0.030** | | | | |

Note: Pr> Chi-square1 testing the proportional odds assumption

Pr> Chi-square2 testing global null hypothesis $\beta = 0$.

* Statistically significant at $\alpha = 10$ percent

** Statistically significant at $\alpha = 5$ percent

TABLE 12. ORDERED LOGISTIC REGRESSION RESULT FOR PRICE MODEL

| Independent Variables | | Dependent variable Price | P-value | Odds Ratio | 95% Confidence Limits Lower | Upper |
|---|---|---|---|---|---|---|
| Intercept1 | | -0.238 | 0.301 | - | - | - |
| Intercept2 | | -2.973 | <.0001** | - | - | - |
| Children: | | -0.276 | 0.072* | 0.575 | 0.315 | 1.052 |
| Suburbs | Suburban | 0.179 | 0.285 | 0.877 | 0.448 | 1.716 |
| | Urban | -0.227 | 0.168 | 1.317 | 0.679 | 2.556 |
| Education | Grade School | -1.430 | 0.148 | 7.123 | 0.602 | 8.243 |
| | High School | -0.639 | 0.064* | 3.230 | 0.964 | 10.817 |
| | Some College | -0.027 | 0.920 | 1.752 | 0.592 | 5.181 |
| | Undergraduate | 0.517 | 0.068* | 1.017 | 0.342 | 3.023 |
| | Graduate School | 0.612 | 0.085* | 0.925 | 0.283 | 3.022 |
| | Masters | 0.434 | 0.171 | 1.104 | 0.359 | 3.401 |
| Income: | < $20,000 | -0.088 | 0.788 | 3.660 | 1.281 | 10.456 |
| | $ 20,000 - $ 39,999 | -0.457 | 0.073* | 5.292 | 2.113 | 13.255 |
| | $ 40,000 - $ 59,999 | 0.091 | 0.662 | 3.060 | 1.335 | 7.012 |
| | $ 60,000 - $ 79,999 | -0.422 | 0.124 | 5.107 | 2.014 | 12.951 |
| | $ 80,000 - $ 99,999 | -0.333 | 0.338 | 4.672 | 1.651 | 13.226 |
| Pr > ChiSquare1 | | 0.920 | | | | |
| Pr > ChiSquare2 | | 0.0002** | | | | |

Note: Pr> Chi-square1 testing the proportional odds assumption

Pr> Chi-square2 testing global null hypothesis $\beta = 0$.

* Statistically significant at $\alpha = 10$ percent

** Statistically significant at $\alpha = 5$ percent

TABLE 13. ORDERED LOGISTIC REGRESSION RESULT FOR IN SEASON MODEL

| Independent Variables | | Dependent variable In Season | P-Value | Odds Ratio | 95% Confidence Limits Lower | Upper |
|---|---|---|---|---|---|---|
| Intercept1 | | 0.331 | 0.172 | - | - | - |
| Intercept2 | | 2.881 | <.0001** | - | - | - |
| Age: | 21 - 35 | -1.105 | 0.0034** | 0.272 | 0.082 | 0.896 |
| | 36 - 50 | 0.393 | 0.102 | 1.215 | 0.476 | 3.105 |
| | 51 - 65 | 0.158 | 0.454 | 0.960 | 0.395 | 2.334 |
| | 66 - 75 | 0.355 | 0.241 | 1.170 | 0.416 | 3.290 |
| Gender: | Male | -0.260 | 0.078* | 0.595 | 0.334 | 1.061 |
| Suburbs: | Suburban | 0.143 | 0.432 | 0.595 | 0.334 | 1.061 |
| | Urban | 0.205 | 0.235 | 1.634 | 0.795 | 3.357 |
| Education: | Grade School | 0.702 | 0.474 | 2.189 | 0.188 | 5.524 |
| | High School | 0.990 | 0.013** | 2.920 | 0.786 | 7.845 |
| | Some College | -0.053 | 0.850 | 1.029 | 0.334 | 3.172 |
| | Undergraduate | -0.233 | 0.434 | 0.860 | 0.273 | 2.706 |
| | Graduate School | -0.532 | 0.138 | 0.638 | 0.183 | 2.220 |
| | Masters | -0.792 | 0.013** | 0.491 | 0.149 | 1.616 |
| Pr > Chi-Square1 | | 0.210 | | | | |
| Pr > Chi-Square2 | | 0.003** | | | | |

Note: Pr> Chi-square1 testing the proportional odds assumption

Pr> Chi-square2 testing global null hypothesis $\beta = 0$.

* Statistically significant at $\alpha = 10$ percent

** Statistically significant at $\alpha = 5$ percent

TABLE 14. ORDERED LOGISTIC REGRESSION RESULT FOR CHEMICAL RESIDUE MODEL

| Independent Variables | | Dependent variable Chemical Residues | P-Value | Odds Ratio | 95% Confidence Limits Lower | Upper |
|---|---|---|---|---|---|---|
| Intercept1 | | 0.026 | 0.899 | - | - | - |
| Intercept2 | | -1.960 | <.0001** | - | - | - |
| Gender: | Male | 0.269 | 0.066* | 0.584 | 0.329 | 1.036 |
| Education: | Grade School | 0.905 | 0.265 | 0.576 | 0.071 | 4.648 |
| | High School | 0.739 | 0.035** | 2.982 | 0.869 | 10.233 |
| | Some College | 0.489 | 0.066* | 2.322 | 0.783 | 6.887 |
| | Undergraduate | -0.330 | 0.217 | 1.023 | 0.345 | 3.034 |
| | Graduate School | 0.036 | 0.918 | 1.475 | 0.451 | 4.822 |
| | Masters | 0.324 | 0.299 | 1.967 | 0.683 | 6.062 |
| Income: | < $20,000 | -1.032 | 0.0129** | 3.917 | 1.196 | 12.825 |
| | $ 20,000 - $ 39,999 | -0.137 | 0.607 | 1.600 | 0.654 | 3.913 |
| | $ 40,000 - $ 59,999 | 0.144 | 0.501 | 1.209 | 0.538 | 2.714 |
| | $ 60,000 - $ 79,999 | -0.104 | 0.714 | 1.548 | 0.620 | 3.864 |
| | $ 80,000 - $ 99,999 | 0.795 | 0.022** | 0.631 | 0.229 | 1.733 |
| Visits: | 1 Year | 0.091 | 0.714 | 1.782 | 0.726 | 4.375 |
| | 2 - 3 Years | -0.697 | 0.003** | 3.916 | 1.614 | 9.500 |
| | 4 - 5 Years | 0.103 | 0.625 | 1.761 | 0.767 | 4.044 |
| | 6 - 10 Years | -0.166 | 0.569 | 2.303 | 0.868 | 6.115 |
| Pr > Chi-Square1 | | 0.197 | | | | |
| Pr > Chi-Square2 | | 0.0003** | | | | |

Note: Pr> Chi-square1 testing the proportional odds assumption

Pr> Chi-square2 testing global null hypothesis $\beta = 0$.

* Statistically significant at $\alpha = 10$ percent

** Statistically significant at $\alpha = 5$ percent

TABLE 15. ORDERED LOGISTIC REGRESSION RESULT FOR FARMING METHOD USED MODEL

| Independent Variables | | Dependent variable Farming Method Used | P-Value | Odds Ratio | 95% Confidence Limits Lower | Upper |
|---|---|---|---|---|---|---|
| Intercept1 | | -1.621 | <.0001* | - | - | - |
| Intercept2 | | 0.785 | 0.0004** | - | - | - |
| Age: | 21 - 35 | 0.945 | 0.0167** | 4.704 | 1.449 | 15.269 |
| | 36 - 50 | 0.085 | 0.711 | 1.991 | 0.849 | 4.668 |
| | 51 - 65 | 0.028 | 0.891 | 1.880 | 0.850 | 4.156 |
| | 66 - 75 | -0.454 | 0.100 | 1.162 | 0.467 | 2.893 |
| Gender: | Male | -0.303 | 0.031** | 0.546 | 0.314 | 0.949 |
| Education: | Grade School | -1.435 | 0.067* | 0.179 | 0.023 | 1.392 |
| | High School | 0.519 | 0.086* | 1.266 | 0.384 | 4.174 |
| | Some College | 0.352 | 0.151 | 1.071 | 0.364 | 3.149 |
| | Undergraduate | -0.193 | 0.465 | 0.621 | 0.208 | 1.855 |
| | Graduate School | 0.206 | 0.542 | 0.926 | 0.282 | 3.035 |
| | Masters | 0.267 | 0.368 | 0.984 | 0.319 | 3.038 |
| Income: | < $20,000 | 0.582 | 0.071* | 1.743 | 0.626 | 4.852 |
| | $ 20,000 - $ 39,999 | 0.057 | 0.823 | 1.031 | 0.423 | 2.515 |
| | $ 40,000 - $ 59,999 | 0.255 | 0.202 | 1.258 | 0.566 | 2.795 |
| | $ 60,000 - $ 79,999 | -0.410 | 0.121 | 0.647 | 0.267 | 1.570 |
| | $ 80,000 - $ 99,999 | -0.509 | 0.141 | 0.586 | 0.213 | 1.611 |
| Visits: | 1 Year | 0.111 | 0.647 | 2.429 | 0.970 | 6.078 |
| | 2 - 3 Years | 0.224 | 0.278 | 2.719 | 1.032 | 6.510 |
| | 4 - 5 Years | -0.010 | 0.959 | 5.151 | 0.913 | 5.068 |
| | 6 - 10 Years | 0.451 | 0.092* | 3.413 | 1.303 | 8.941 |
| Pr > Chi-Square1 | | 0.639 | | | | |
| Pr > Chi-Square2 | | 0.0163** | | | | |

Note: Pr> Chi-square1 testing the proportional odds assumption

Pr> Chi-square2 testing global null hypothesis $\beta = 0$.

* Statistically significant at $\alpha = 10$ percent

** Statistically significant at $\alpha = 5$ percent

TABLE 16. ORDERED LOGISTIC REGRESSION RESULT FOR GROWN BY THE VENDOR MODEL

| Independent Variables | | Dependent variable Grown by The Vendor | P-Value | Odds Ratio | 95% Confidence Limits Lower | Upper |
|---|---|---|---|---|---|---|
| Intercept1 | | 1.997 | <.0001** | - | - | - |
| Intercept2 | | -0.026 | 0.884 | - | - | - |
| Age: | 21 - 35 | -1.425 | 0.0001** | 0.147 | 0.046 | 0.466 |
| | 36 - 50 | -0.134 | 0.562 | 0.533 | 0.217 | 1.306 |
| | 51 - 65 | 0.595 | 0.004** | 1.105 | 0.469 | 2.603 |
| | 66 - 75 | 0.468 | 0.114 | 0.973 | 0.355 | 2.665 |
| Gender: | Male | -0.229 | 0.108 | 0.632 | 0.362 | 1.105 |
| Income: | < $20,000 | 0.899 | 0.012** | 3.355 | 1.159 | 9.707 |
| | $ 20,000 - $ 39,999 | 0.480 | 0.083* | 2.206 | 0.894 | 5.446 |
| | $ 40,000 - $ 59,999 | -0.258 | 0.211 | 1.055 | 0.482 | 2.308 |
| | $ 60,000 - $ 79,999 | -0.454 | 0.089* | 0.867 | 0.360 | 2.088 |
| | $ 80,000 - $ 99,999 | -0.356 | 0.296 | 0.956 | 0.348 | 2.629 |
| Pr > Chi-Square1 | | 0.1126 | | | | |
| Pr > Chi-Square2 | | <.0001** | | | | |

Note: Pr> Chi-square1 testing the proportional odds assumption

Pr> Chi-square2 testing global null hypothesis $\beta = 0$.

* Statistically significant at $\alpha = 10$ percent

** Statistically significant at $\alpha = 5$ percent

TABLE 17. ORDERED LOGISTIC REGRESSION RESULT FOR GROWN IN OKLAHOMA MODEL

| Independent Variables | | Dependent variable Grown In OK | p-value | Odds Ratio | 95% Confidence Limits Lower | Upper |
|---|---|---|---|---|---|---|
| Intercept1 | | 1.951 | <.0001** | - | - | - |
| Intercept2 | | -0.372 | 0.0415** | - | - | - |
| Age: | 21 - 35 | -1.326 | 0.0004** | 0.158 | 0.051 | 0.492 |
| | 36 - 50 | 0.073 | 0.738 | 0.639 | 0.277 | 1.474 |
| | 51 - 65 | 0.457 | 0.022** | 0.938 | 0.422 | 2.084 |
| | 66 - 75 | 0.276 | 0.316 | 0.783 | 0.312 | 1.966 |
| Gender: | Male | -0.409 | 0.003** | 0.441 | 0.255 | 0.762 |
| Suburbs: | Suburban | -0.315 | 0.059* | 0.398 | 0.204 | 0.776 |
| | Urban | -0.290 | 0.066* | 0.409 | 0.215 | 0.775 |
| Visits | 1 Year | -0.016 | 0.949 | 0.749 | 0.299 | 1.875 |
| | 2 - 3 Years | -0.268 | 0.198 | 0.582 | 0.243 | 1.392 |
| | 4 - 5 Years | -0.543 | 0.007** | 0.442 | 0.187 | 1.045 |
| | 6 - 10 Years | 0.553 | 0.046** | 1.323 | 0.499 | 3.505 |
| Pr > Chi-Square1 | | 0.466 | | | | |
| Pr > Chi-Square2 | | <.0001** | | | | |

Note: Pr> Chi-square1 testing the proportional odds assumption

Pr> Chi-square2 testing global null hypothesis $\beta = 0$.

* Statistically significant at $\alpha = 10$ percent

** Statistically significant at $\alpha = 5$ percent

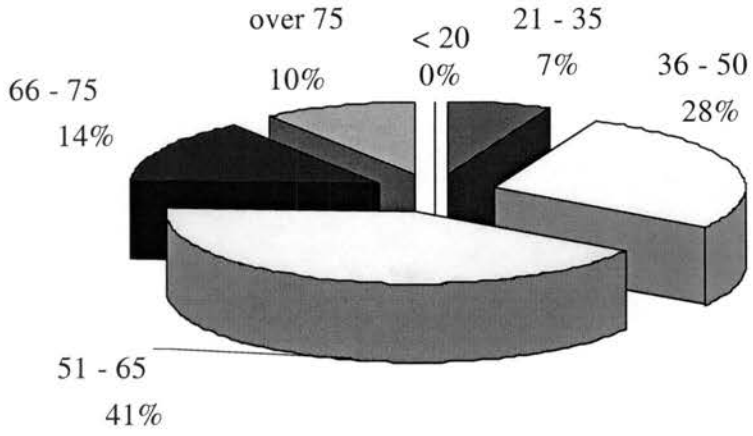



Figure 1.1. Distribution of Percentage of Oklahoma Farmers' Market Consumers' Age
Source: Oklahoma Farmers' Market Consumers Survey, 2002

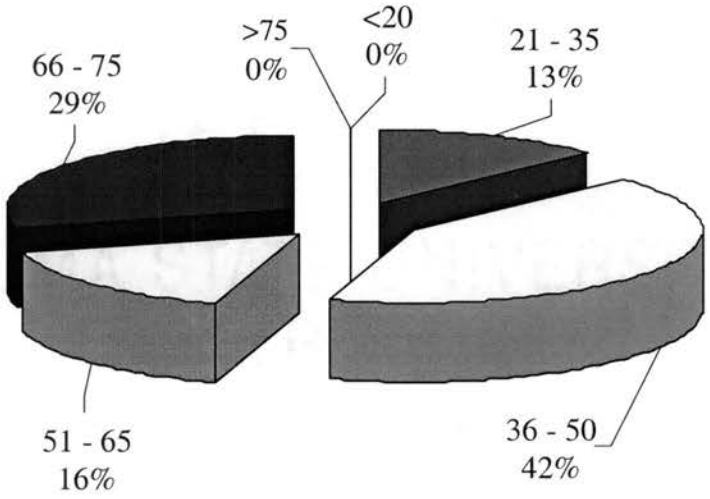



Figure 1.2. Distribution of Percentage of Stillwater Farmers' Market Consumers' Age
Source: Oklahoma Farmers' Markets Consumers Survey, 2002

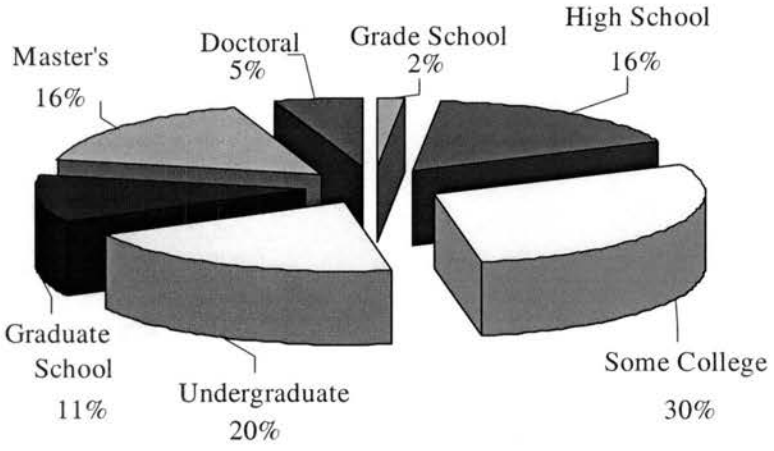



Figure 1.3. Distribution of Percentage of Oklahoma Farmers' Market Consumers Education
Source: Oklahoma Farmers' Market Consumers Survey, 2002

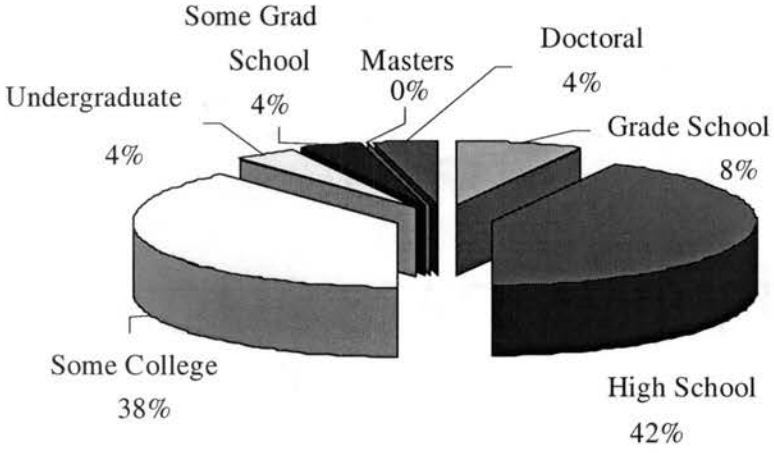



Figure 1.4. Distribution of Percentage of Shawnee Farmers' Market Consumers Education
Source: Oklahoma Farmers' Market Consumers Survey, 2002

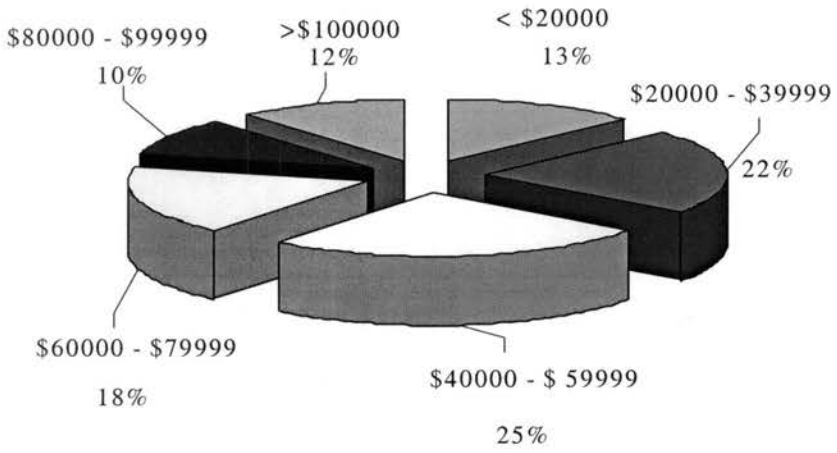



Figure 1.5. Distribution of Percentage of Oklahoma's Farmers' Markets Consumers Household Annual Income
Source: Oklahoma Farmers' Market Consumers Survey, 2002

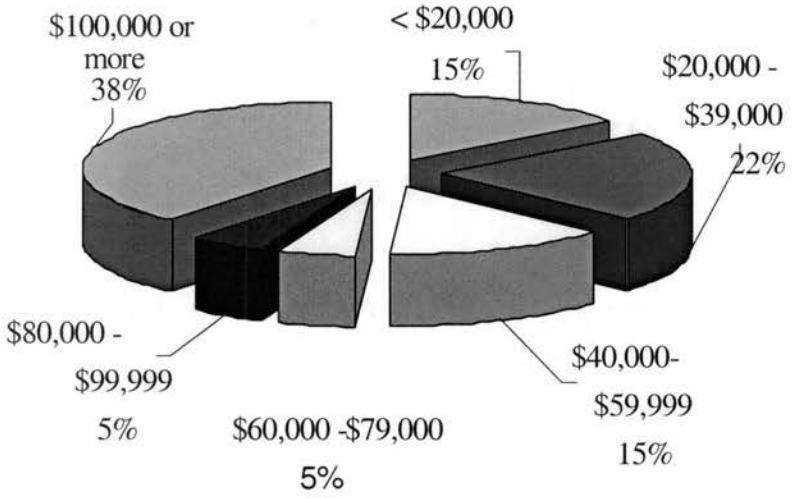



Figure 1.6. Distribution of Percentage of Shawnee's Farmers' Market Consumers Annual Household Income
Source: Oklahoma Farmers' Market Consumers Survey, 2002

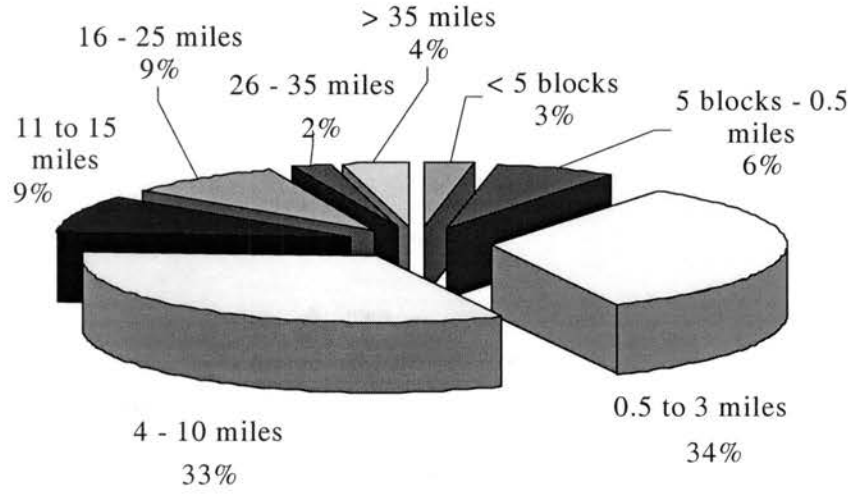



Figure 1.7. Distribution of Percentage of Respondents Based on Distance From Respondents Residence to Farmers' Market in Oklahoma
Source: Oklahoma Farmers' Market Consumers Survey, 2002

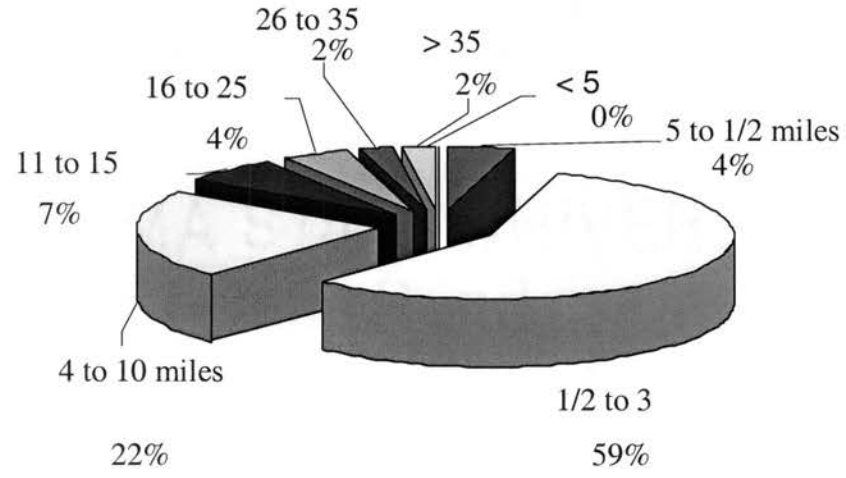



Figure 1.8. Distribution of Percentage of Respondents Based on Distance From Respondents Residence to Farmers' Market in Stillwater
Source: Oklahoma Farmers' Market Consumers Survey, 2002

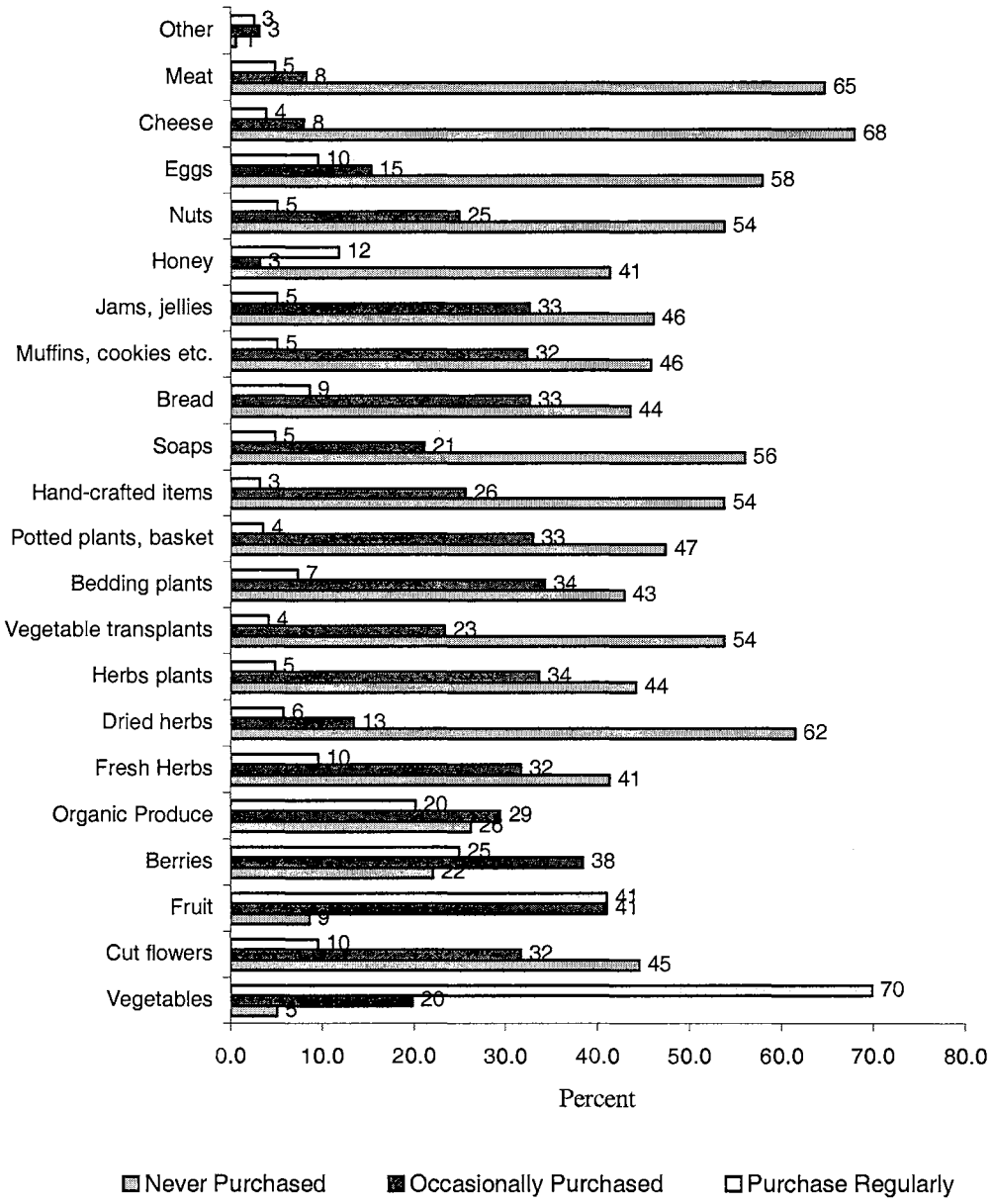



Figure 1.9. Percentage of Respondents that Stated They Purchased These Items at Oklahoma Farmers' market
Source: Oklahoma Farmers' Market Consumers Survey, 2002

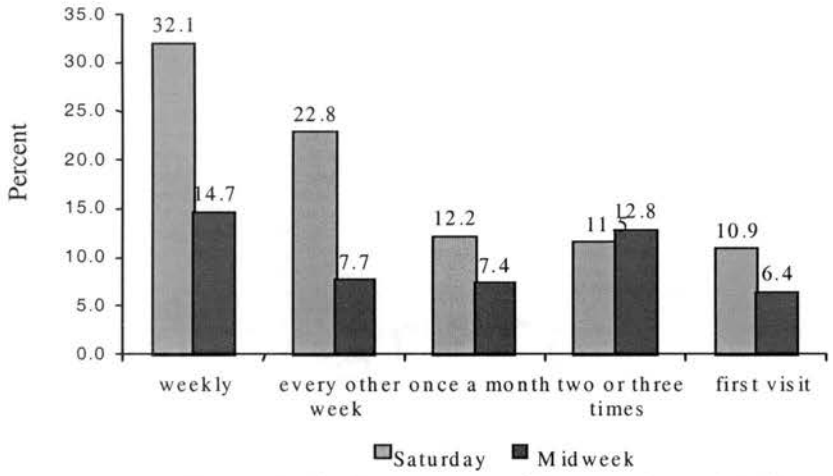



Figure 1.10. Percentage of Respondents that Stated the Frequencies of Visitations to Oklahoma Farmers' Market in Year 2001
Source: Farmers' Market Consumers Survey, 2002

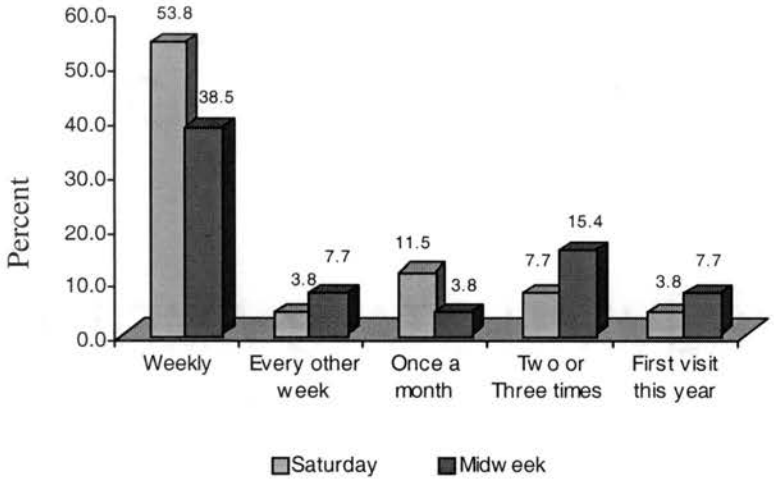



Figure 1.11. Percentage of Respondents that Stated Their Frequencies of Visitations at Shawnee's Farmers' Market
Source: Oklahoma Farmers' Market Consumers Survey, 2002

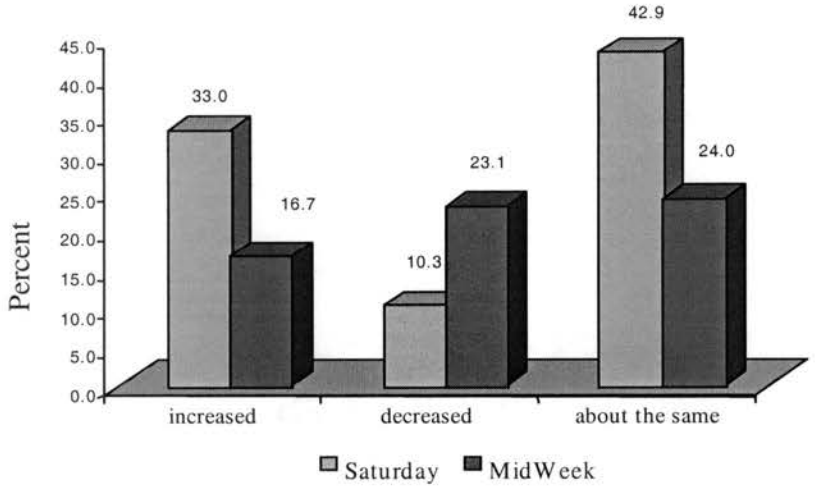



Figure 1.12. Percentage of Respondents that Stated the Numbers Visitations to Oklahoma Farmers' Market in Year 2002 Compared to Year 2001
Source: Oklahoma Farmers' Market Consumers Survey, 2002

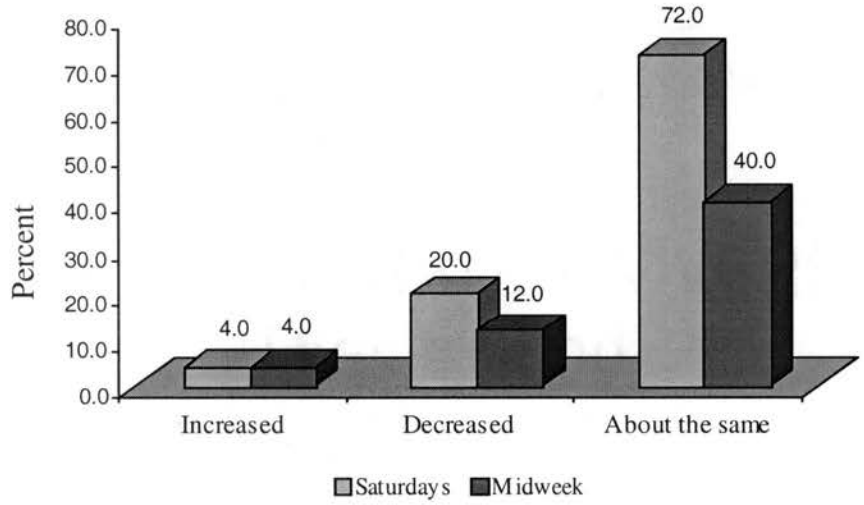



Figure 1.13. Percentage of Respondents that Stated the Numbers Visitations to Norman Farmers' Market in Year 2002 Compared to Year 2001
Source: Oklahoma Farmers' Market Consumers Survey, 2002

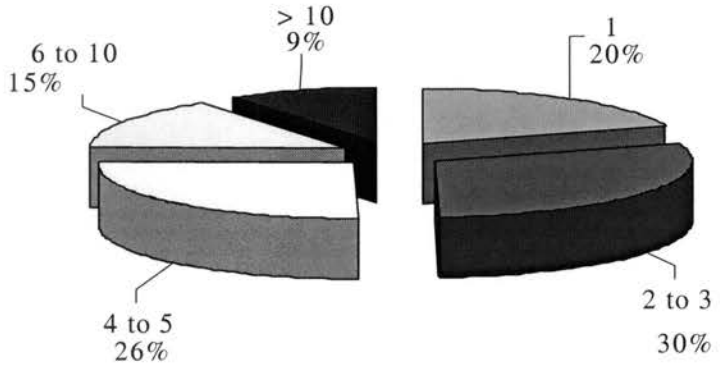



Figure 1.14. Distribution of Percentage of Respondents by Numbers of Years They Have Been Visiting Oklahoma's Farmers' Market
Source: Oklahoma Farmers' Market Consumers Survey, 2002

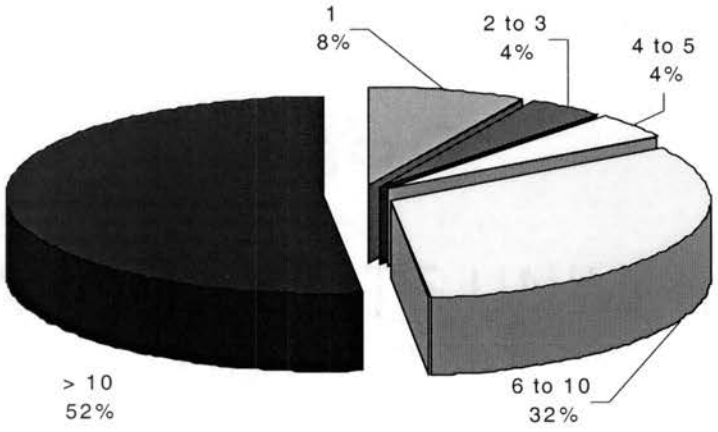



Figure 1.15. Distribution of Percentage of Respondents by Numbers of Years They Have been Visiting Norman's Farmers' Market
Source: Oklahoma Farmers' Market Consumers Survey, 2002

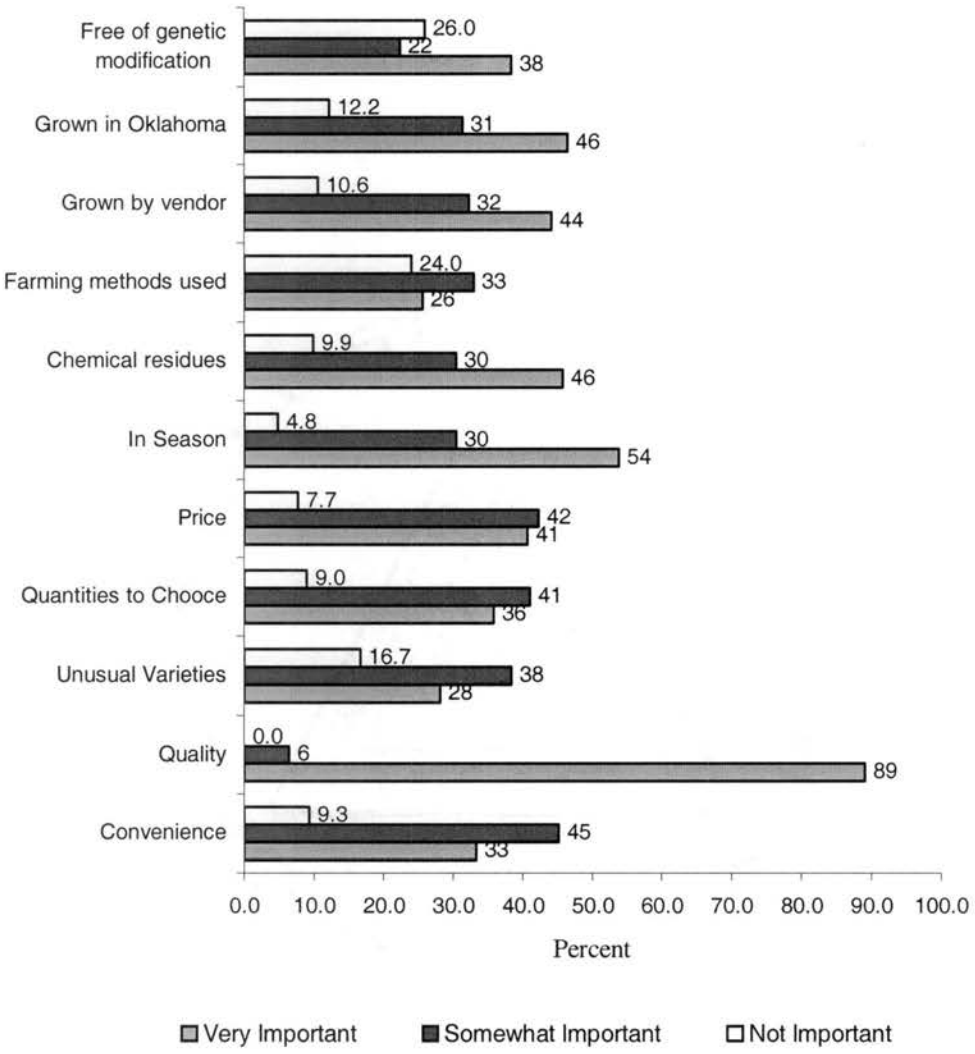
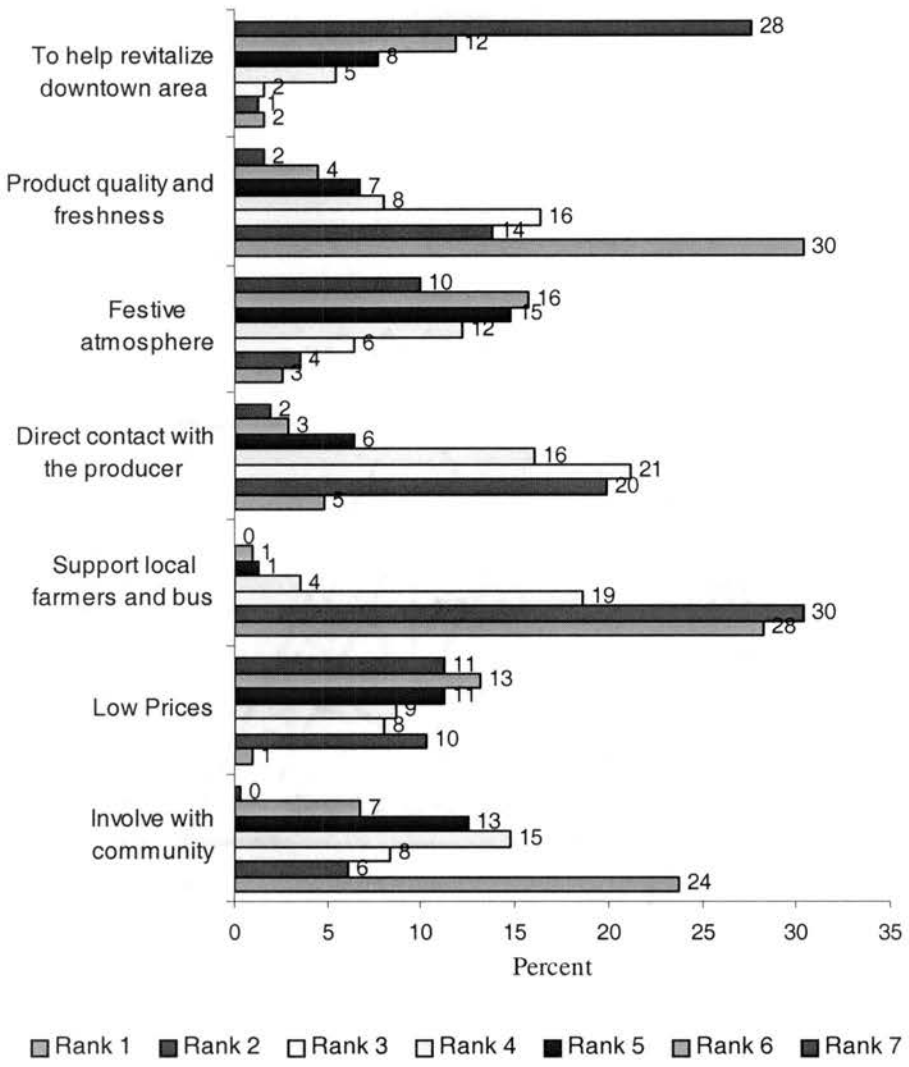



Figure 1.16. Percentage of Respondents that Stated the Importance of These Quality Characteristics on Fresh Produce
Source: Oklahoma Farmers' Market Consumers Survey, 2002




Rank 1 = the Most Important, Rank 7 = Least Important

Figure 1.17. Percentage of Respondents that Stated the Reasons for Shopping at Oklahoma Farmers' Market
Source: Oklahoma Farmers' Market Consumers Survey, 2002

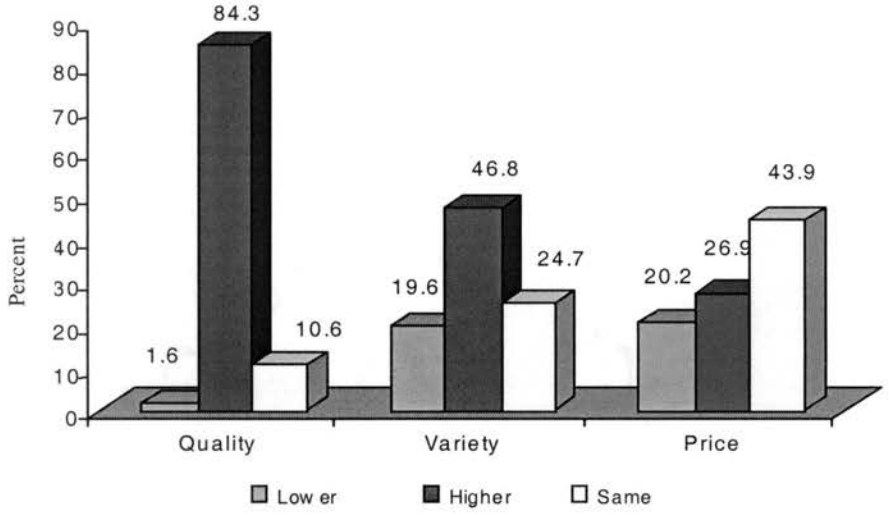



Figure 1.18. Consumers Expectation Toward Produce Purchased at Oklahoma Farmer's Market Compared to Produce Purchased at other Outlets
Source: Oklahoma Farmers' Market Consumers Survey, 2002

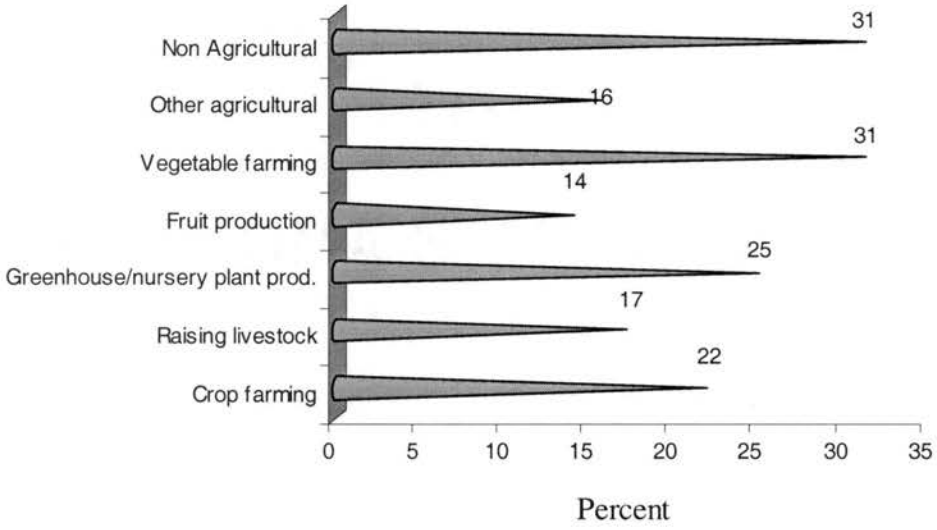



Figure 1.19. Percentage of Oklahoma Farmers' Market Producers Primary Occupation
Source: Oklahoma Farmers' Market Producers Survey, 2002

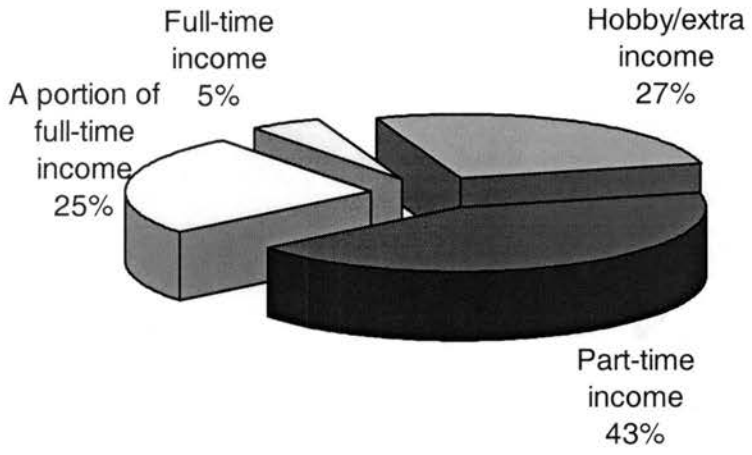
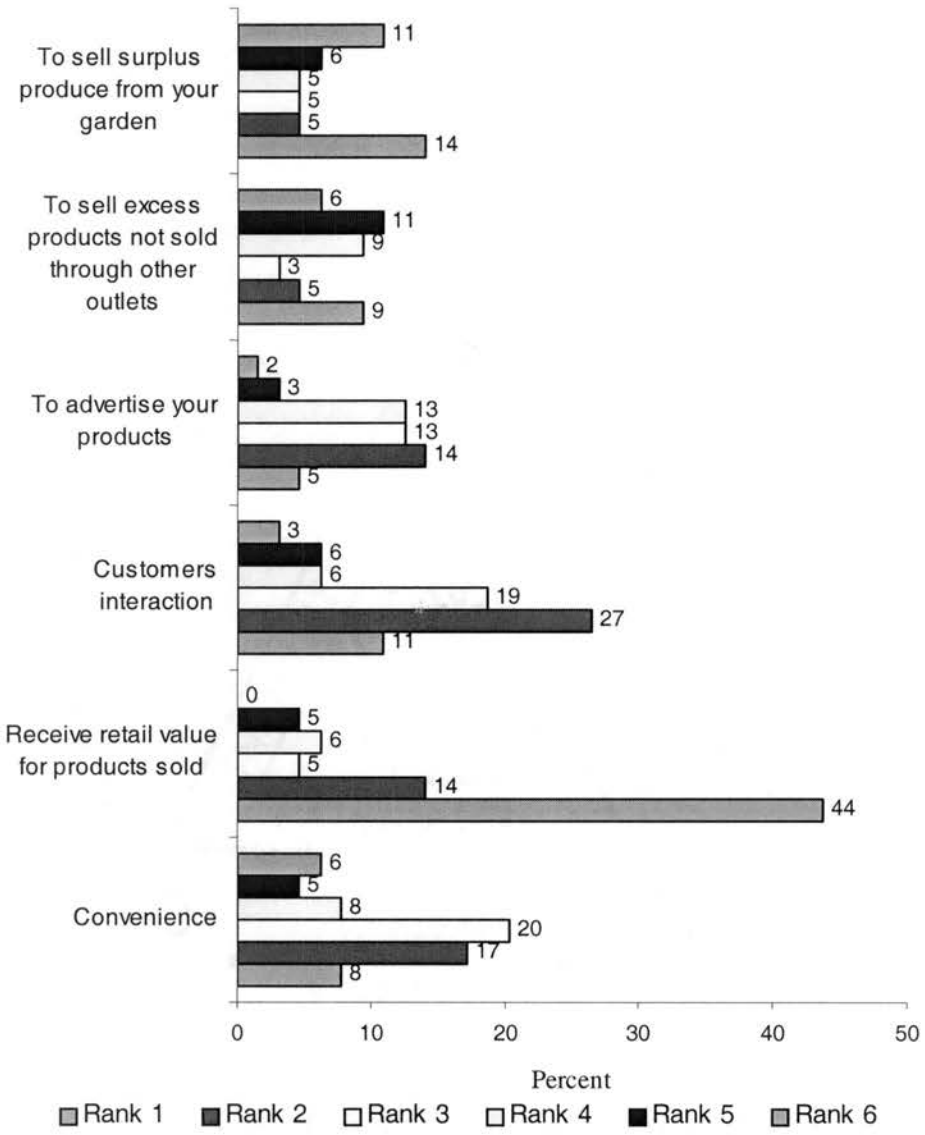



Figure 1.20. Distribution of Percentage of Producers with Income from Farmers' Market Sales Contributing to Their Total Income
Source: Oklahoma Farmers' Market Producers Survey, 2002




Rank 1 = Very Important, ……, Rank 7 = Not Important

Figure 1.21. Percentage of Producers with the Ranking Each Indicated Reason for Selling Products at Farmers' Market
Source: Oklahoma Farmers' Market Producers Survey, 2002

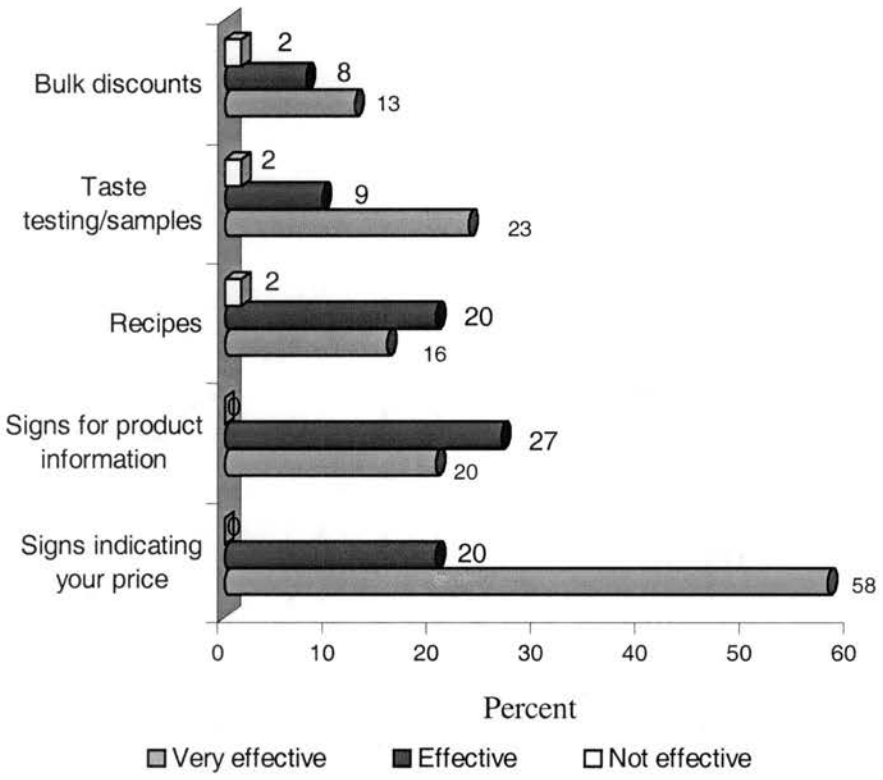



Figure 1.22. Percentage of Producers that Stated the Ranks of Methods Used to Promote Sales at Farmers' market
Source: Oklahoma Farmers' Market Producers Survey, 2002

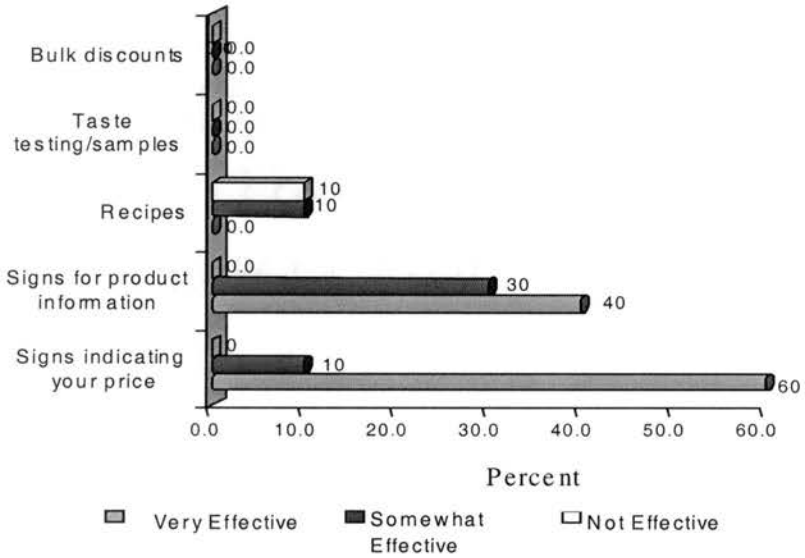
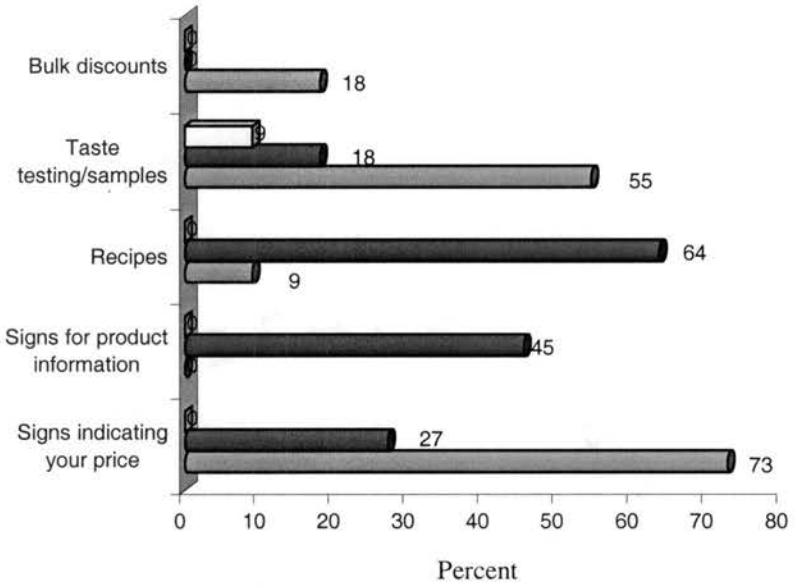



Figure 1.23. Percentage of Producers that Stated the Ranks of Methods Used to Promote Products Sales in Norman
Source: Oklahoma Farmers' Market Producers Survey, 2002




Very Effective Somewhat Effective Not Effective

Figure 1.24. Percentage of Respondents that Stated the Effectiveness of Methods Used to Promote Product Sales, Stillwater

Source: Oklahoma Farmers' Market Producers Survey, 2002

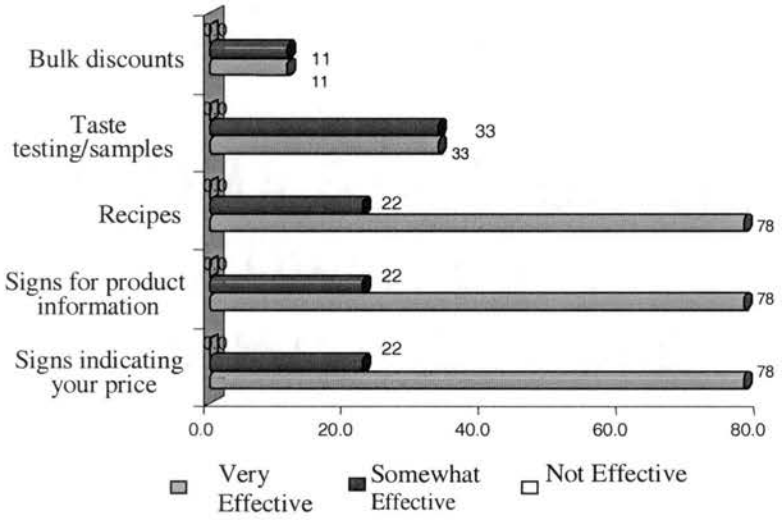



Figure 1.25. Percentage of Respondents that Stated the Effectiveness of Methods Used to Promote Products Sale in Muskogee Farmers' Market

Source: Oklahoma Farmers' Market Producers Survey, 2002

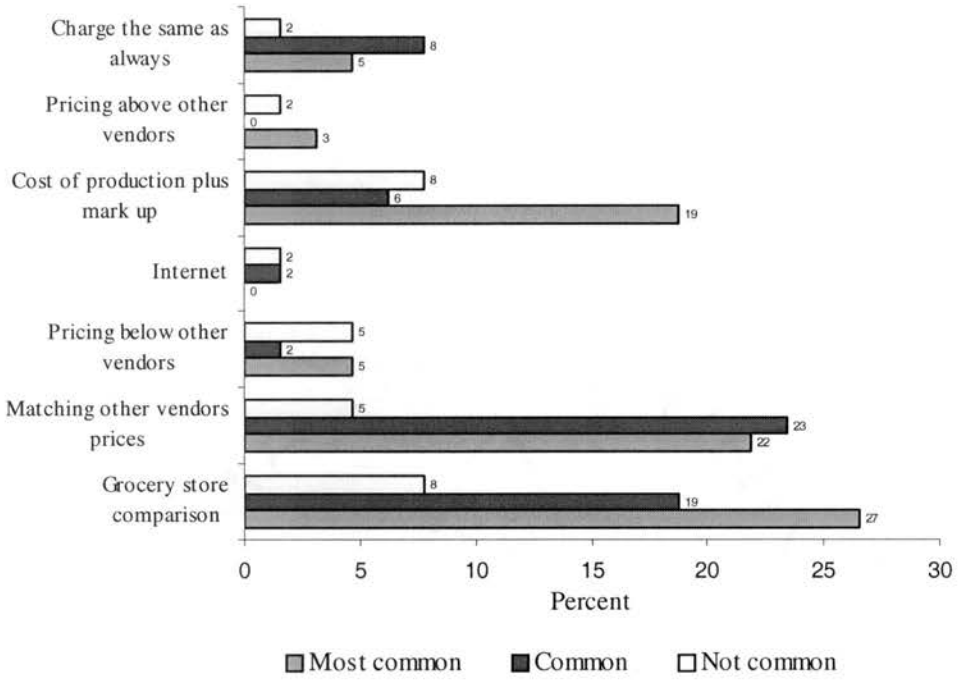



Figure 1. 26. Percentage of Respondents that Stated the Ranks on How Producers Determine Prices
Source: Oklahoma Farmers' Market Producers Survey, 2002

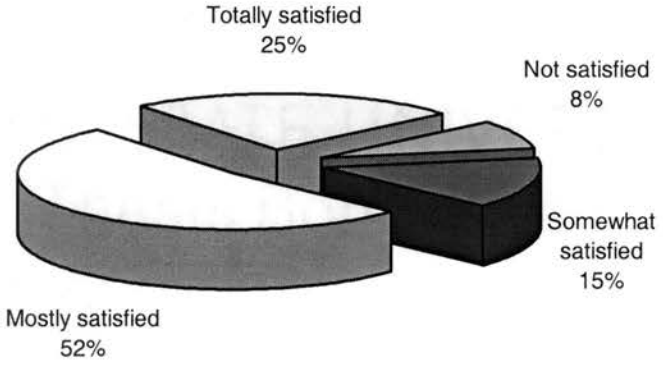



Figure 1.27. Percentage of Respondents with Given Satisfaction Levels on Profit From Selling at Farmers' Market
Source: Oklahoma Farmers' Market Producers Survey, 2002

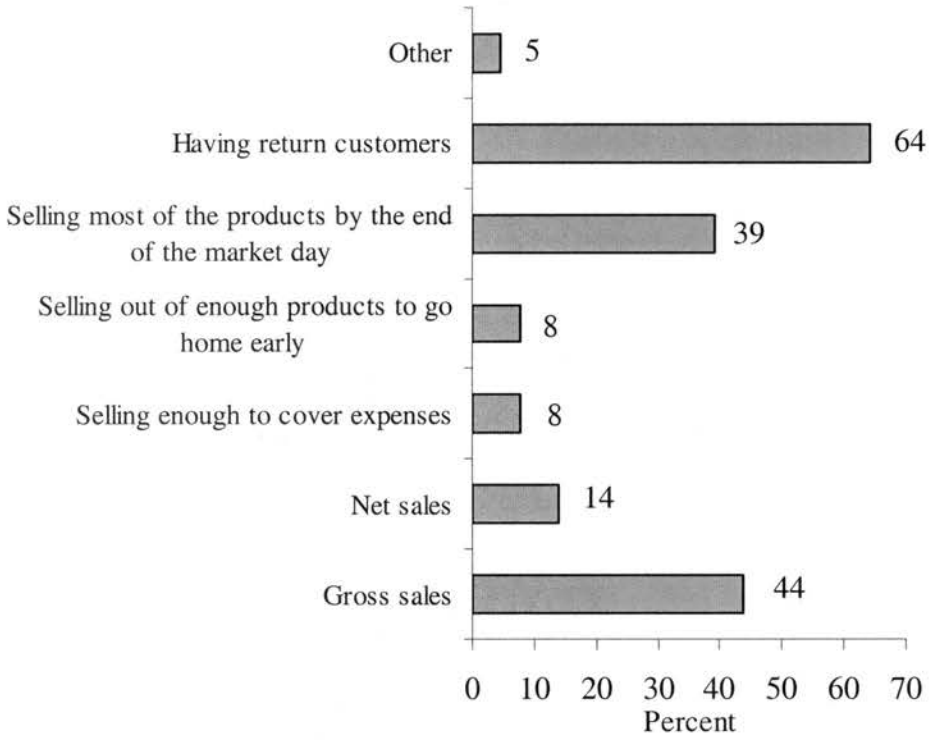



Figure 1.28. Percentage of Respondents that Stated the Measurement of Producers' Success at Farmers' Market
Source: Oklahoma Farmers' Market Producer Survey, 2002

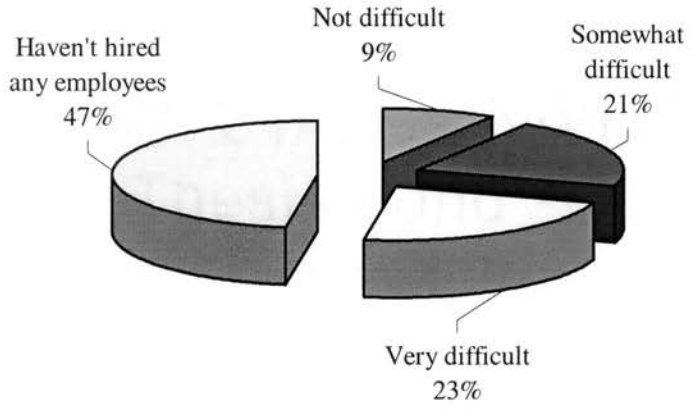



Figure 1.29. Percentage of Respondents that Stated the Levels of Difficulty in Finding Reliable Employees
Source: Oklahoma Farmers' Markets Producers Survey, 2002

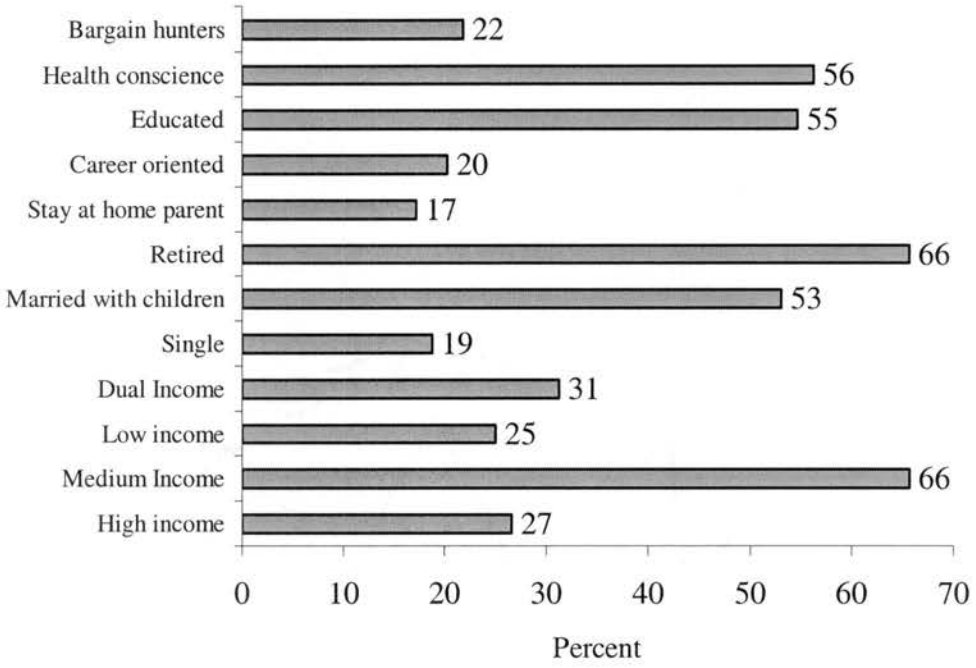



Figure 1.30. Percentage of Respondents that Stated a Typical Customer at Farmers' Market
Source: Oklahoma Farmers' Market Producers Survey, 2002

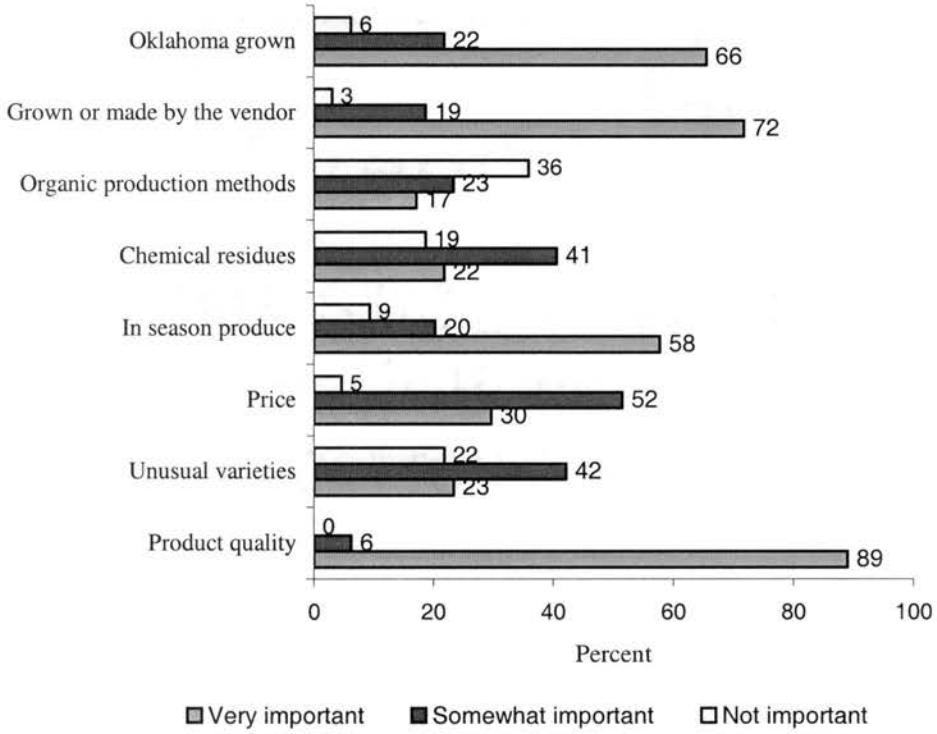



Figure 1.31. Percentage of Respondents that Stated the Importance of Quality Characteristics to Customers
Source: Oklahoma Farmers' Market Producers Survey, 2002

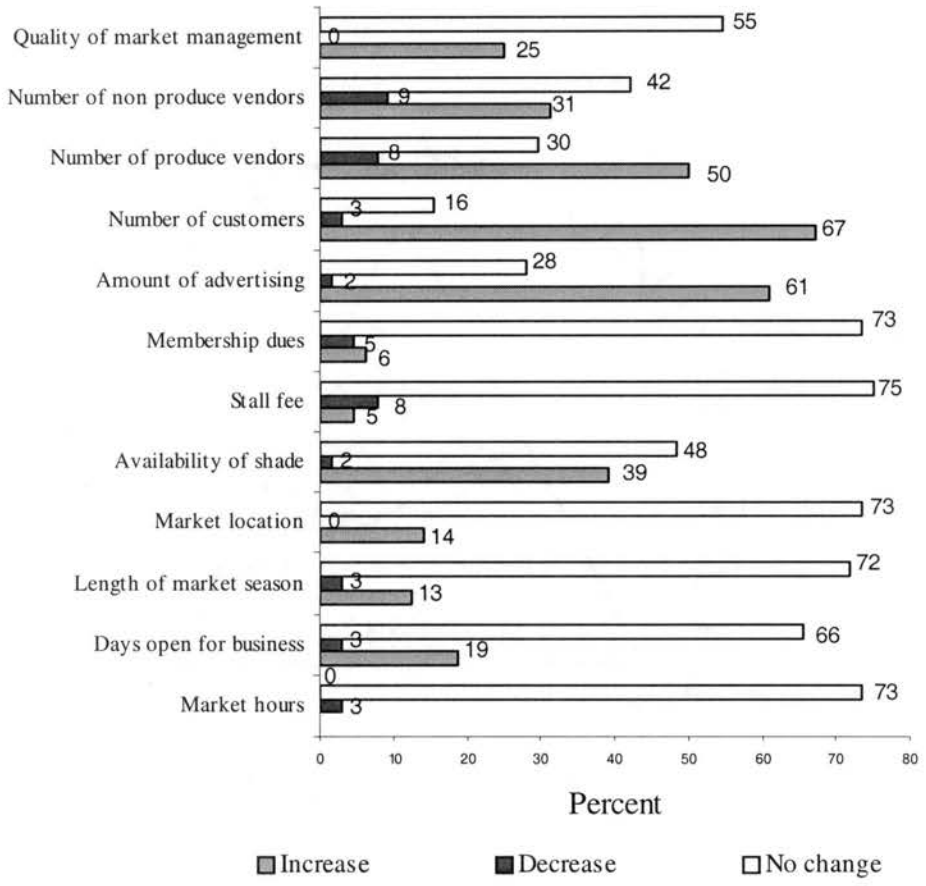



Figure 1.32. Percentage of Respondents that Stated the Expectation of Changes in the Future
Source: Farmers' Market Producers Survey, 2002

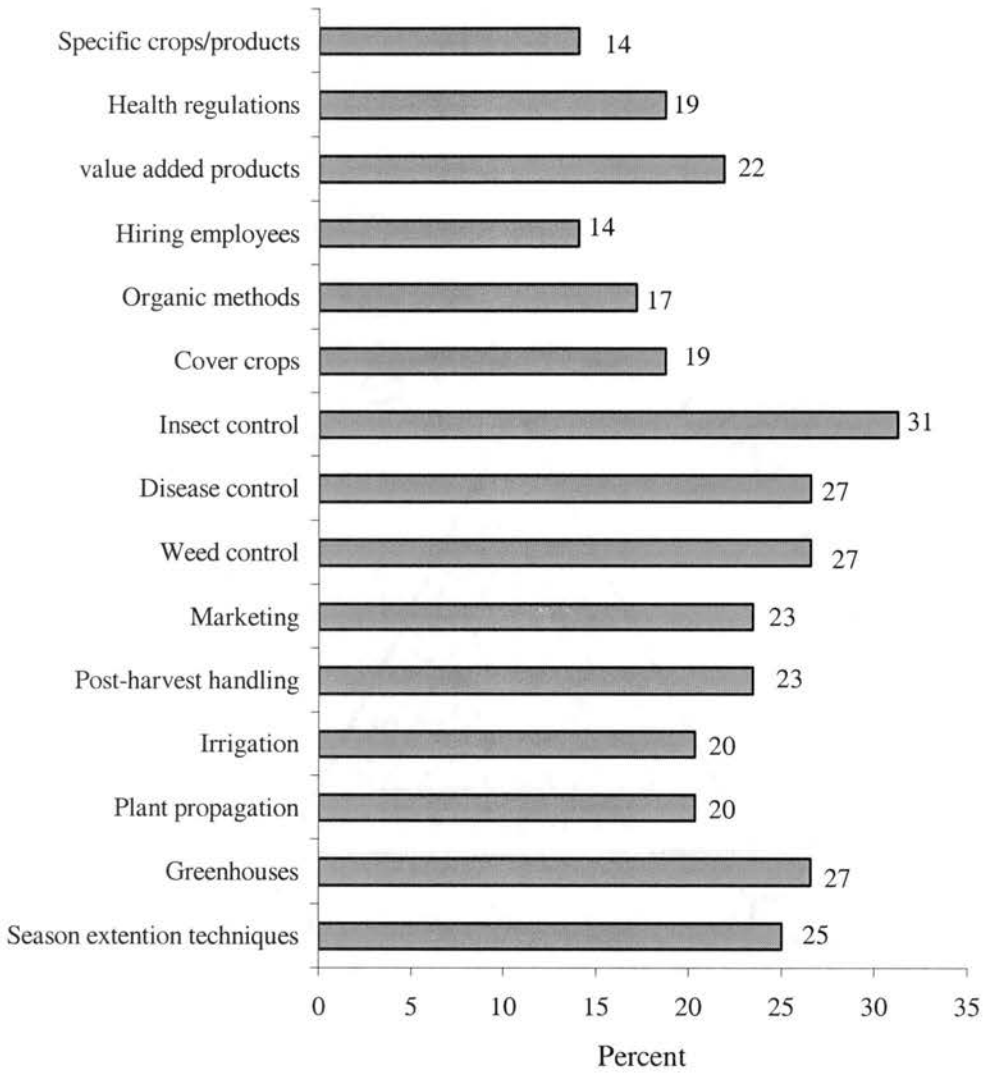



Figure 1.33. Percentage of Respondents that Stated the Kinds of Information Needed
Source: Oklahoma Farmers' Market Producers Survey, 2002

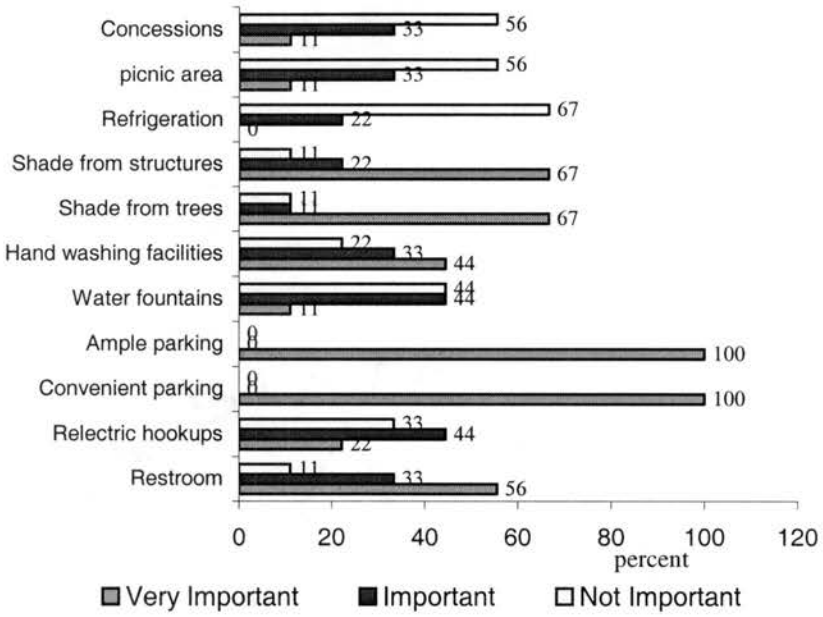



Figure 1.34. Percentage of the Farmers' Market Managers with the Importance of Infrastructures at Farmers' Markets Location
Source: Oklahoma Farmers' Market Manager Survey, 2002

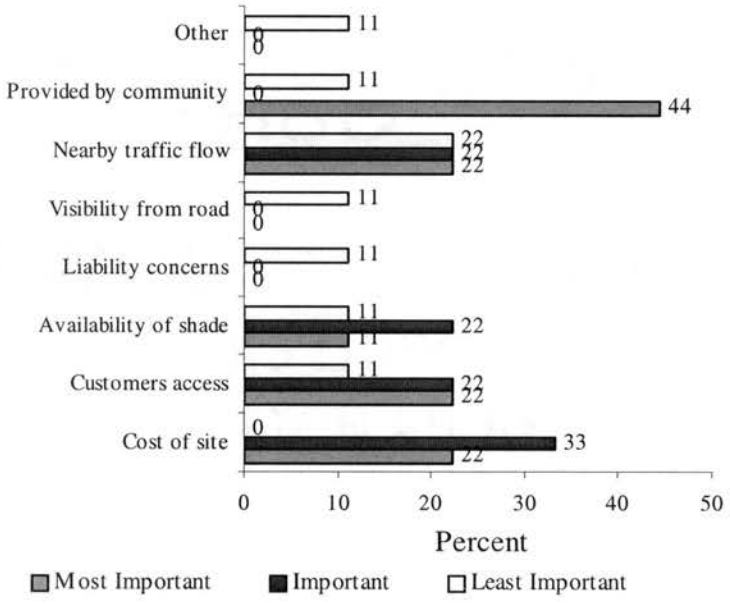



Figure 1.35. Percentage of Respondents that Stated the Most Important Factors When Choosing Farmers' Markets Site
Source: Oklahoma Farmers' Market Managers Survey, 2002

# CHAPTER II

# FEASIBILITY OF A UNIT-TRAIN LOAD-OUT FACILITY FOR DIRECT SHIPMENTS TO MEXICO

## INTRODUCTION

In recent decades wheat markets have undergone rapid changes. The U.S. share of world agricultural trade has decreased over the past three decades, which has stimulated an array of market development activities to assist U.S. agricultural exports. Trade agreements have opened up new markets for U.S. agricultural products. One of the most important trade agreements benefiting U.S. agricultural producers has been the North American Free Trade Agreement (NAFTA). NAFTA has expanded agricultural trade with Mexico and Oklahoma has been one of the states that has benefited from NAFTA. Most of the increase in demand for wheat from Mexico has been from higher quality wheat. Moreover, Mexican millers have been willing to pay a premium for wheat that meets their specifications. Shipping via direct shipments that would not involve other stops at other elevators, is expected to preserve the quality of wheat by not commingling the wheat from the specific source that meets the buyer specifications with wheat from other sources that may not meet those specifications.

Direct shipments from the elevator to the buyer can be made via single-car (normally involving 1-24 cars), multi-car (normally involving 25-49 cars), or unit-car

(normally involving 50-99 cars or more) trains. There is a rate savings in shipping via larger car trains. Uniform Railroad Costing System (URCS) reduces car-day cost at origin and destination by 50 percent when a multi-car or unit-train movement is specified, reflecting reduced loading/unloading, switching, and waiting time per car. Locomotive switching costs at origin and destination are reduced by 50 percent for multi-car shipment and 75 percent for a unit-train (Tolliver and Bitzan). However, a unit-train would involve a larger investment (several million U.S. dollars) on the side of the elevator in the load-out facility, as unit-trains are normally on a strict schedule and the elevator is given only so many hours to load the train. Therefore, the elevator needs to have a rather efficient facility that would enable it to load grain fast. Direct shipments have usually involved using unit-train facilities that go directly from the elevator to the importer in Mexico and therefore would involve investment on the part of the elevator on rail access. Kenkel and Anderson identified significant rate advantages in using unit-trains at approximately 50-55-car and 100-110-car levels, Compared to rates applied to single and multi-cars. A recent study by the Vachal et. al concluded that there are economic advantages in shipping large quantities of grains for exports. This result brought about greater interest in the construction of 100+ car trains. Oklahoma currently has four unit-train load-out facilities: 100-110-car facilities operate out of Enid, Watonga and Kingfisher while a 50-car facility is operating in Alva. To accommodate such an opportunity of selling wheat directly to Mexico, existing elevator load-out facilities that do not support unit-train shipments need to be upgraded.

The objective of this study is to calculate the financial returns-to-investment on unit-train facilities in Oklahoma for direct shipments of wheat. The results of this study

are expected to assist elevator managers and decision makers in the wheat industry as they plan strategies to improve the return of selling wheat directly to Mexico and to other destinations. This study is expected to have significant implications for grain marketers who are interested in preserving the identity and making available information about grain production process.

## Oklahoma Wheat Production

Historically, hard red winter wheat has been the dominant cereal grain of the Great Plains and the largest class of wheat exported out of the U.S. Oklahoma is among the major wheat production states in the U.S. In 1999, Oklahoma produced 150.5 million bushels of wheat; Oklahoma wheat production decreased to 142.8 million bushels in 2000, but still accounted for 6.4 percent of total U.S. production in that year (USDA, 2003). In 2001, Oklahoma wheat production declined to 122.1 million bushels. In spite of the declining trend in Oklahoma wheat production over the past three years, the historical trend line reveals that Oklahoma wheat production increased about 1 percent per year between 1965 and 2001 (Figure 2.1).

## Marketing Wheat

Traditionally, Oklahoma wheat is sold through the local elevators to the exporting grain companies such as Cargill, ADM, Continental Grain, and Farmland. Once in regional elevators, Oklahoma wheat originating from different areas and farms in Oklahoma are mixed with hard red winter wheat from other areas in the U.S. A more recent alternative marketing channel for Oklahoma producers has been direct shipments of wheat from Oklahoma elevators to millers in Mexico. Direct shipments are expected

to raise wheat prices received by producers as they may entail a price premium on wheat that meets Mexican miller's quality specifications.

Marketing strategy involving direct shipments are a form of identity preservation, which are the shipments are come from the same origin or region. Direct shipments are not as stringent as full identity preservation, in which the field of identity is preserved.

The concept of identity preservation is not new to agriculture, and many agribusiness experts see it as one of the most effective ways to increase value in a product, by allowing a more direct connection with the consumer. Vachal and Reichert pointed out that identity-preserved marketing arrangement attributed to producers seeking means of diversifying or specializing; technological advancements in communication, production, processing, and marketing; sophistication of customer demand; low commodity grain prices; and refined consumers expectations. Identity-preserved programs for U.S. wheat have been implemented in several regions as a marketing technique for adding value. Idaho has licensed a hard-white-noodle-wheat (Idaho 377S) to be marketed in Asian markets through an IP program. In 1996, this IP wheat proved competitive to the popular Australian Standard White in Asia. While yields were comparable to the soft white wheat previously grown by these producers, Idaho 377S provided returns of 70 cents a bushel more (USDA, 2000). Identity-preserved marketing has also been used to add value to hard red winter wheat, such as that produced in Oklahoma (21$^{st}$ Century Alliance Press Release). The 1997 formation of a Kansas based cooperative of 360 farmer investors was a reaction to declining wheat prices. With domestic delivery rights for 1.5 million bushels of identity-preserved wheat, this program has successfully added value to this commodity. Programs of this type support the

potential of identity-preserved marketing programs in adding value, and indicate that it is possible to create a distinguishable and competitive product in domestic and international grain markets (21st Century Alliance Grain Processing Cooperative,).

Larue investigated two kinds of product differentiation for wheat using a hedonic pricing approach. Results show that wheat is differentiated by end-use and by country-of-origin. This simply recognizes the fact that buyers who purchase wheat for different purposes put different weights on quality criteria and that country-specific factors, such as weather, grading, and inspection systems matter. The results of the study suggested that between 1980 and 1988, wheat protein content had a significant influence on price. This influence varies over time and across wheat categories.

Transportation Issues Related To Direct Shipments of Wheat

The U.S. success of production of agriculture is very much related to a healthy and competitive rail system. Rail service is a key component in the long-run competitiveness of the U.S. grain in delivering product to domestic and international markets. The structures of rail rates for major agricultural commodities currently cover a broad range of rail shipping options. Four primarily rail shipment sizes typically applied are: single-car, multi-car, unit-train and shuttle-train (Vachal and Bitzan). The minimum and maximum number of cars included in each shipment type may vary slightly by rail carrier and commodity. Single-car and multi-car shipments are generally bound for domestic destination, while unit-trains and shuttle-trains are generally bound for larger domestics processors and export facilities and have to meet certain defined origin destination.

Producers and shippers have used larger trains to gain economic advantages in shipping grain for exports. Vachal et al. investigated the possibility of developing a 100+ car train for upper-Midwest shippers who rely on unit-trains for shipping most of their product. In looking at the potential for a 100+ car marketing, they identified four key factors to be considered: production density, dependence on rail marketing, railroad spreads, and desire of customers to use unit-train shipments. The result suggested that a 100+ car unit-train may likely benefit market participants. Unit-train freight rate advantages to the Gulf markets currently (2003) range from 5 to 15 cents/bushel ($1.80 to $5.5/ton) relative to single-car rates. There is an example of a discount rate saving applied to larger train shipments. A study by Vachal et al. revealed that Burlington Northern and Soo line gave a discount of $0.02 per bushel in addition to rate savings from using unit-train, if the shippers used unit-train to ship from Minot, North Dakota to Portland. In Oklahoma, railroad tariff schedule may provide additional incentive of $.03 for using unit-train from Kingfisher to Enid. This rate gave elevators an opportunity to invest in their facilities and expand their trade areas.

Also, a study on the initial investment for unit-train load-out facilities by Schnake and Stevens revealed that total costs (fixed and operating costs) per bushel decrease as annual rate of load-out increases from 25 trains to 50 trains load-out. In their study, investments on the facilities were calculated for pre-existing elevators. Changing structure of rail network transportation to become more efficient is influenced by factors such as market developments, government policies, technological innovation, and investment decisions on rail industry. Wheat shippers have to adapt to the changes and to include them into their marketing decision factors.

## METHODS OF ANALYSIS

This study assumes that Oklahoma exporting elevator obtains wheat from farmers or farmers' cooperatives and sells it directly or to the Mexican millers. The total benefit for the elevator from shipping wheat directly versus marketing it through traditional channels is expressed as:

$$B = Q\,(P_{IP} - P_{TR}) + Q\,(TS) \qquad (2.1)$$

where $B$ is the difference between total revenue from selling wheat through direct shipments in unit-train (IP wheat) and selling through direct shipment other than unit-train. Q is the quantity of wheat available for shipment. Here, it is assumed that this quantity, in its entire amount, is either shipped directly to Mexico (IP wheat) or sold through traditional marketing channels at the terminal market price. $P_{IP}$ is the price received at from Mexican miller, $P_{TR}$ is the Gulf terminal export market price ($P_{IP}$-$P_{TR}$ is referred to as "price premium" throughout this study), and $TS$ is the transportation savings per bushel from using a unit-train relative to a non unit-train. In other words; B measures the net price premium per bushel of wheat shipped directly from the Oklahoma elevator to the Mexican miller, compared to selling wheat via other channels (traditional). B also includes any transportation savings by shipping via unit-train shipments compared to standard rail transport. Net-rate-benefit (NRB) is calculated as

$$NRB = (P_{IP} - P_{TR}) + TS \quad (2.2)$$

and total benefit (B) is total quantity of wheat shipped in bushels (the quantity assumed here is 10 million bushels) multiplied by the net rate benefit.

In this study, three measures are used for evaluating return to elevator's investment on unit-train load-out facility: net-present-value (NPV), benefit-cost ratio (B/C), and return-to-investment (RTI). Return-to-investment is sometimes referred to as internal-rate-of-return (IRR). It is the maximum interest that a project could pay for the resources used if the investment in the facilities is to recover its investment and operating costs and still break even. It is assumed that the higher values for the three indicators reflect higher profits. That is, investments with higher internal rates of return are more profitable than those with lower rates. The calculation of net-present-value (NPV) on investment is as given by Gittinger:

$$NPV = \sum_{t=1}^{N} \frac{B_t - C_t}{(1+i)^t} \quad (2.3)$$

where $B_t$ is the same as was defined earlier, $C_t$ is the infrastructure cost (it is assumed here that the entire amount of $C_t$ occurs in year zero) plus operating costs of the load-out facility (for the years after), $i$ is the discount rate, $N$ is the number of years that the investment is expected to last. Positive NPV's indicate investment profitability, while negative values present unprofitability.

The benefit-cost ratio is another indicator that is used in this study to measure the profitability of the elevator's investment on unit-train load-out facility. The benefit-cost ratio is calculated as:

$$B/C = \frac{\sum_{t=1}^{N} \frac{B_t}{(1+i)^t}}{\sum_{t=1}^{N} \frac{C_t}{(1+i)^t}} \qquad (2.4)$$

A more than one B/C indicates investment profitability. B/C ratio can be used to compare investment project in different sizes, because B/C ratio does not increase as project size increase.

The third measure of profitability of investment used here is return-to-investment (RTI). RTI is equal to the discount rate that sets the NPV equal to zero. The RTI is then compared with the actual market discount rate (the cost of capital). If the RTI is greater than the actual discount rate, then it is concluded that the investment is profitable. Unprofitability is concluded if the opposite is true. IRR or RTI is used for comparing alternative projects.

## SOURCES OF DATA

In this study, the investment is assumed to be for upgrading storage facilities, improving access to unit-train (rail track) and for improving cleaning facilities. Moreover, the estimation on costs on investment needed is obtained from an exporting elevator in Oklahoma. Annual operating costs consist of fixed cost and variable cost. Fixed costs include depreciation, interest on investment, insurance, taxes, and administrative expenses. Variable costs include wages and salaries, electricity, fuel, maintenance and repairs, insurance on inventory, inspection and sampling fees, interest on working capital, and other costs. Transportation cost varies as distance from elevators to shipment destinations differ from one point to another. In this case, transportation cost

is treated as a variable cost. The initial investment is assumed to be 9 million dollar and total annual operating costs is 1 million dollar, and the lifetime of the project is assumed to be 9 years. This structure of costs is referred to 'base cost' for the next section.

Cost data used for this research were hypothetical, as actual data were difficult to obtain. The cost of infrastructure investment for existing elevators was based on information from one of the Oklahoma elevators, but adjusted to reflect general types of existing elevators. Annual operating costs were adapted from Vachal et al..

The current average hard red winter load-out capacity in Oklahoma is assumed to be eight million bushels and current average rail load-out capacity is assumed to be 50 cars. Investment is required for the improvement of facilities in order to handle unit-train shipments. Improvements on unit-train facilities allow additional wheat storage capacity of about two million bushels. Transportation cost saving is assumed to be $0.10 per bushel.

## RESULTS

### Benefits to Unit-train Shipments

In this study, the profitability of the unit-train infrastructure investment was calculated, using the two indicators defined earlier: NPV and B/C. For each indicator, various scenarios were constructed by assuming three sets of price premiums relative to Gulf Terminal ($0.05, $0.08. and $0.11 per bushel), six discount rates (5%, 10%, 15%, 18% and 20%) and two cost structures (base cost which is the original annual operating costs and cost of investment; and a 10 percent increase in variable cost). The RTI is

calculated the maximum discount rate. The results for each indicator under these scenarios are explained below.

Net-Present-Value (NPV)

In this study, net-present-value of the investment is calculated. Various discount factors are applied in order to calculate the present value of the investment in load-out facility. The process of finding the present worth of the future value is called "discounting" (Gittinger).

The first scenario of calculating net-present-value in this study shows that at a price premium of 5 cents per bushel and transportation saving at 10 cents per bushel, investment on unit-train facilities would give a positive net-present-value at a discount rate (cost of capital) of less 3 percent. At discount rates above 3 percent, the net-present-value would be negative and therefore, investment in unit-train load-out structure would make for an unprofitable investment. At price premiums above 5 cents per bushel (8 and 11 cents per bushel), the results show that the net-present-value gives a positive result up to until a 18 percent discount rate applied. The result is shown in Figure 2.2.

The second scenario involves increasing the variable costs by 10 percent. Using the same initial investment, a discount rate of 3 percent, and a price premium of 5 cents per bushel, the net-present-value will change to a negative value. At the price premiums of 8 and 11 cents per bushel, the net-present-value will result in a positive value as illustrated in Figure 2.3.

Benefit-Cost Ratio

The result indicated that the benefit-cost ratio calculation produce consistent results with those from net-present-value. If benefit-cost ratio is less than one, then it can be concluded that the investment is not profitable. As it is shown in Figure 2.4, any discount rate of above 3 percent would turn the ratio to less than one. The benefit-cost ratio at the discount rate of 3 percent is 1.01.

The benefit-cost ratio is also calculated for a 10 percent increase in variable costs and assuming 3 percent discount rate. The results show that under this scenario, the benefit-cost ratio is less than one. The complete result is depicted on Figure 2.5.

Return-To-Investment

Assuming a price premium of 5 cents per bushel, the calculated RTI is 3.8 percent. The RTI changes to 19.9 percent if the price premium changed to 8 cents per bushel, and to 30.2 percent with a price premium of 11 cents per bushel. Therefore, it can be concluded from the results that increasing the price premium have big impact on the rate of return during the lifetime of the facilities.

The rate of return-to-investment is re-calculated assuming a variable cost increase of 10 percent. The results indicate that at a price premium of 5 cents per bushel, the RTI is 1.78 percent; at a price premium of 8 cents per bushel, the RTI is 17.6 percent; and at the price premium of 11 cents per bushel, the RTI is 28.8 (Figure 2.6).

# SUMMARY AND CONCLUSIONS

Under the traditional methods of wheat marketing, the identity of wheat is not preserved in regard to its origin. Once in the regional and export elevators, wheat from different farms and production areas are mixed. In recent years, some producers have been able to receive a price premium for wheat that has its identity-preserved. When it comes to exports, there are a variety of end uses for wheat in the importing countries, and each use requires differing wheat characteristics. These particular characteristics range from factors such as milling quality extraction, grain hardness and protein content of wheat. Moreover, tolerances for foreign material and for types and levels of pesticides residues and biotech wheat vary from country to country. Oklahoma is among the major wheat producing states and Mexico has become one of the growing markets for Oklahoma's hard red winter wheat. Direct shipments of wheat with desired milling characteristics to Mexico is one of the marketing options currently available to some Oklahoma farmer-owned cooperatives/elevators.

Direct shipments of identity-preserved wheat with desired milling characteristics have usually involved unit-trains (50-99 cars or more). Unit-train, one of the alternative transportation modes, involves transportation cost savings. However, the elevator needs to be equipped with the load-out facilities that connect to the unit-train. In this study, the return to investment for the improvement of elevator facilities is examined using three methods: net-present-value, benefit-cost ratio, and return-to-investment. The results show

that assuming a price premium of 5 cents per bushel, a discount rate of 3 percent, and transportation cost savings of 10 cents per bushel, the net-present-value is a small positive number and benefit-cost ratio is 1.01. Moreover, at discount rates above 3 percent, calculations show that present value of costs exceed the present value of benefits implying that the benefits would not have covered the costs of the investment on the unit-train facilities. The third indicator, the financial return-to-investment (RTI) assuming base level costs, is around 3.8 percent; which is above the current U.S. market discount (long-term interest) rate.

Results were also calculated for a 10 percent increase in variable costs. Under this scenario, the net-present-value becomes negative at 3 percent discount rate; the benefit-cost ratio remains around 1.00, while the RTI decreases to 1.7 percent. Results were also calculated assuming price premiums of 8 cents per bushel and 11 cents per bushel and as expected infrastructure investment profitability was indicated assuming these premiums. The results of this study have significant implications for marketing of non-biotech agricultural products via larger-car trains where the identity of crops needs to be preserved.

REFERENCES

21st Century Alliance Press Release, *Alliance Announces 21st Century Grain Processing Cooperative*,1997.

21st Century Alliance Grain Processing Cooperative, *What is the GPC?* www.hpi.com/wsdocs/kawg/alliance/GPC.htm, 1998.

Gittinger, J. Price. Economic Analysis of Agricultural Projects. EDI series in Economic Development. 2nd Edition, Completely Revised and Expanded. Baltimore: Published for the economic Development Institute of the World Bank (by) Johns Hopkins University Press, 1982.

Kenkel, Phil and Kim Anderson. Trends in Oklahoma Grain Production and Grain Transportation on the McClellan-Kerr Waterway System. Department of Agricultural Economics, Oklahoma State University, June 27, 2002.

Larue, B. " Is Wheat a Homogeneous Product?". *Canadian Journal of Agricultural Economics*. V39,n1 (March 1991):103-17.

Schnake, L. D. and C. A. Stevens, Jr. Inland Grain Elevator operating Costs and Capital Requirements, 1982. Agricultural Experiment Station, Kansas State University, Manhattan 66506, Bulletin 644, October 1983.

Tolliver, Denver and John Bitzan. Analysis of Revenues and Costs for Wheat Shipments Originated in North Dakota on the BNSF Railroad. Upper Great Plains Transportation Institute. North Dakota State University: March 2002.

USDA, "Competitive Agricultural Systems in a Global Economy", *Agricultural Science and Education Impact*, Washington DC: USDA, 2000.

Vachal, Kim, John Bitzan, Denver Tolliver and Bridget Baldwin. 100+ car marketing: An Alternative for Shipping Hard Red Spring Wheat. Ag Transportation News. Upper Great Plains Transportation Institute. North Dakota State University: May, 1999.

Vachal, Kimberly, and Heidi Reichert. Identity Preserved Grain: Logistical Overview. Upper Great Plains Transportation Institute, North Dakota State University: January 2000.

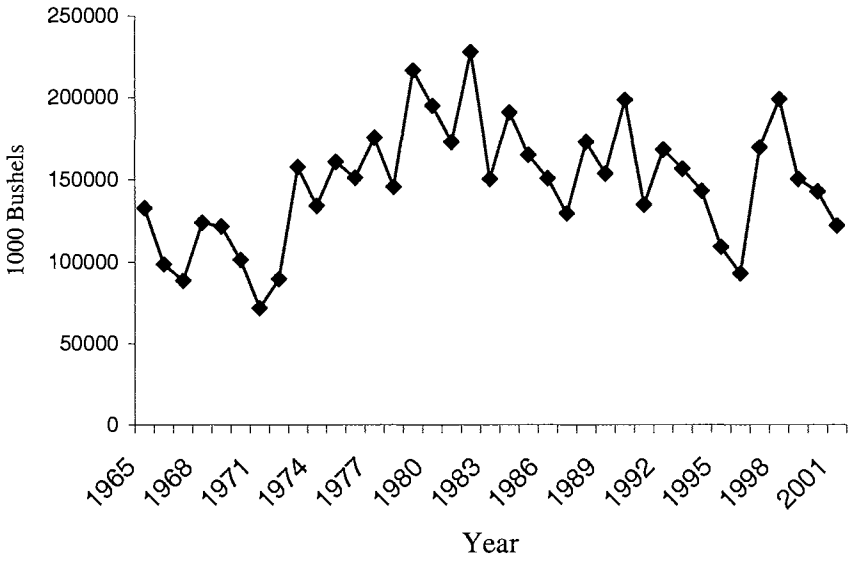



Figure 2.1. Oklahoma Winter Wheat Production, 1960-2001

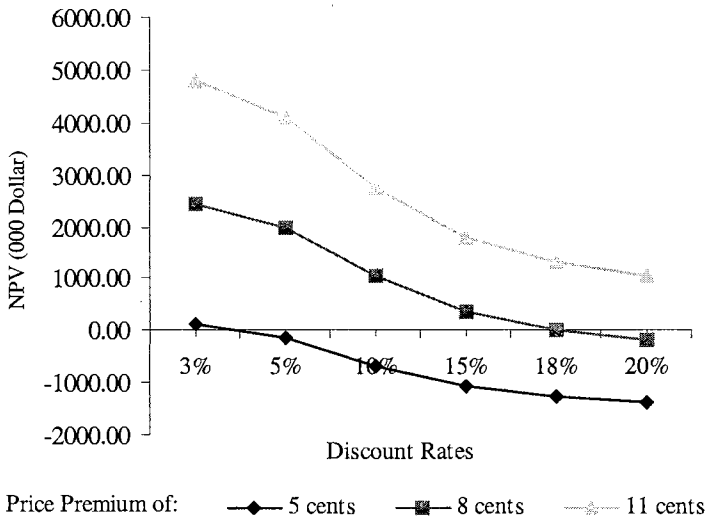



Figure 2.2. Net-Present-Value Assuming Varying Discount Rates and Price Premiums

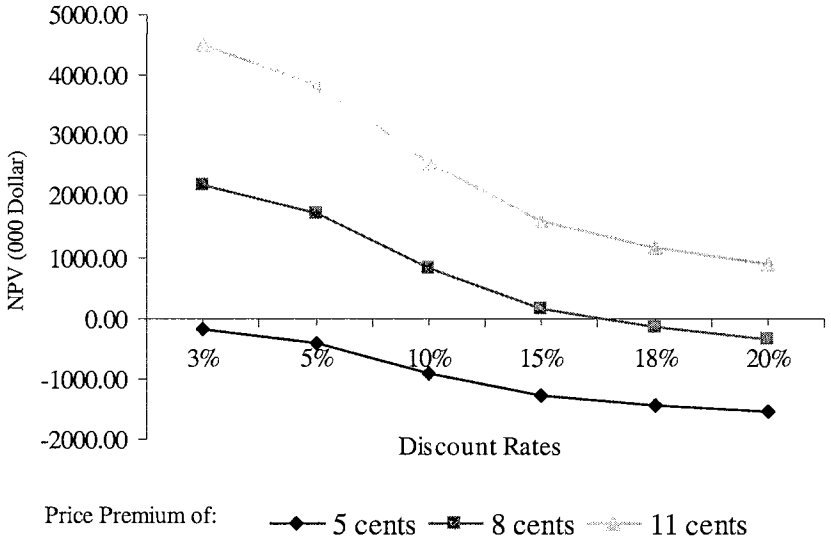



Figure 2.3. Net-Present-Value Assuming Varying Discount Rates, Price Premiums and Increasing Variable Costs by 10 Percent From Base Costs

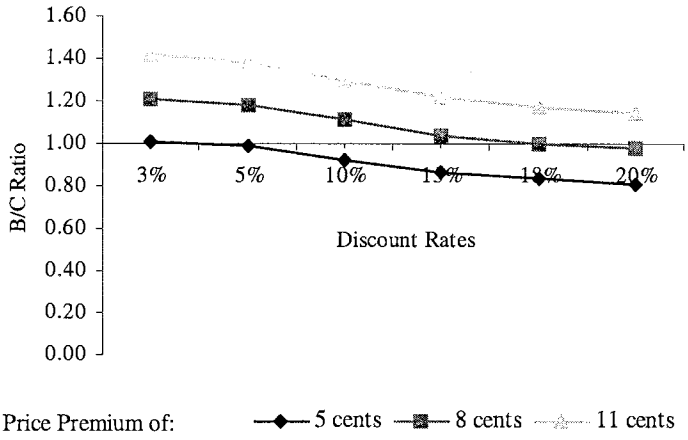



Figure 2.4. Benefit-Cost Ratio Assuming Varying Discount Rates and Price Premium, Calculated at Based Costs

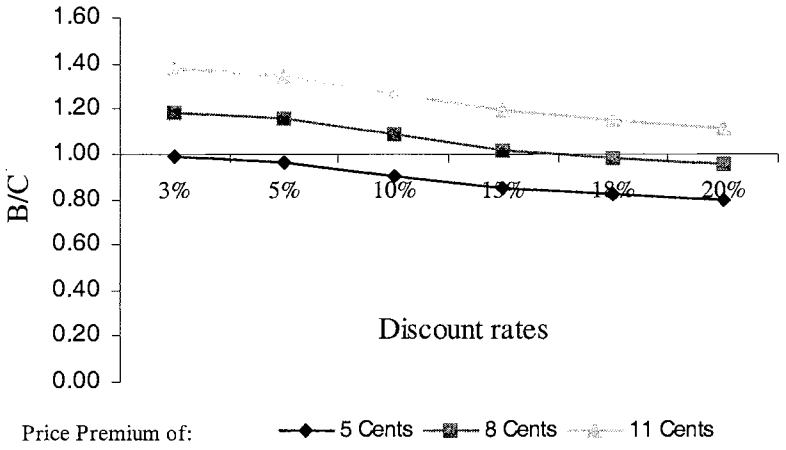



Figure 2.5. Benefit-Cost Ratio by Assuming Varying Discount rates, Price Premiums and Increasing Variable Costs by 10 Percent From the Base Costs

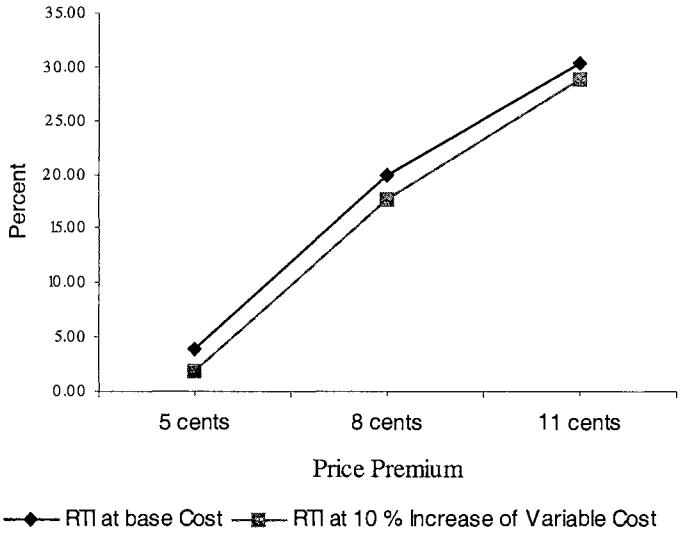



Figure 2.6. Comparison of Return to Investments by Price Premiums

APPENDIX A

Farmers' Market Consumers' Questionnaire

1.) How did you first learn about this farmers' market?

- ☐ roadside sign
- ☐ driving by and saw the market
- ☐ newspaper article
- ☐ newspaper ad
- ☐ event / activity calendar
- ☐ television
- ☐ radio
- ☐ internet
- ☐ friend/word of mouth
- ☐ flyer/post card
- ☐ don't remember
- ☐ other

2.) How often have you visited this farmers' market this year?

| Saturdays | Mid-week |
|---|---|
| ☐ weekly | ☐ most every week |
| ☐ every other week | ☐ every other week |
| ☐ once a month | ☐ once a month |
| ☐ two or three times | ☐ two or three times |
| ☐ first visit this year | ☐ first visit this year |

3.) How does the number of visits that you have made this year compare to last year?

| Saturdays | Mid-week |
|---|---|
| ☐ Increased | ☐ Increased |
| ☐ Decreased | ☐ Decreased |
| ☐ About the same | ☐ About the same |

4.) How many years have you been coming to this farmers' market?

☐ 1 ☐ 2-3 ☐ 4-5 ☐ 6-10 ☐ over 10

5.) How many different farmers' markets have you visited this year?

☐ 1 ☐ 2 ☐ 3 ☐ 4 or more

6.) How far do you live from this farmers' market?

| | |
|---|---|
| ☐ less than 5 blocks | ☐ 11 to 15 miles |
| ☐ 5 blocks to 1/2 mile | ☐ 16 to 25 miles |
| ☐ 1/2 to 3 miles | ☐ 26 to 35 miles |
| ☐ 4 to 10 miles | ☐ over 35 miles |

7.) Are you the primary shopper of food in your household?

☐ Yes ☐ No

8.) Please identify the following places from which you normally obtain your fruits and vegetables during the farmers' market season. Check one box next to each location to indicate what portion of your total fruit and vegetable consumption comes from that source.

| | All | Most | Some | None |
|---|---|---|---|---|
| Own Garden | ☐ | ☐ | ☐ | ☐ |
| Friend's Garden | ☐ | ☐ | ☐ | ☐ |
| Farmers' Market | ☐ | ☐ | ☐ | ☐ |
| Roadside Stand | ☐ | ☐ | ☐ | ☐ |
| Grocery Store | ☐ | ☐ | ☐ | ☐ |
| Discount Super Store | ☐ | ☐ | ☐ | ☐ |
| Other | ☐ | ☐ | ☐ | ☐ |

9.) When shopping for fresh produce, how important to you are the following items?

| | Very Important | Somewhat Important | Not Important |
|---|---|---|---|
| convenience | ☐ | ☐ | ☐ |
| quality | ☐ | ☐ | ☐ |
| unusual varieties | ☐ | ☐ | ☐ |
| quantities from which to choose | ☐ | ☐ | ☐ |
| price | ☐ | ☐ | ☐ |
| in season | ☐ | ☐ | ☐ |
| chemical residues | ☐ | ☐ | ☐ |
| farming methods used | ☐ | ☐ | ☐ |
| grown by the vendor | ☐ | ☐ | ☐ |
| grown in Oklahoma | ☐ | ☐ | ☐ |
| free of genetic modification | ☐ | ☐ | ☐ |

10.) Do you grow herbs at your home?

☐ Yes ☐ No

If yes, please indicate how you normally use your own herbs. Check all that apply.

☐ Fresh cut – culinary
☐ Dried – culinary
☐ Dried – ornamental
☐ Medicinal
☐ Ornamental plantings
☐ other

11.) How often do you prepare meals at home?

☐ 1-2 times a week
☐ 3-4 times a week
☐ 5-6 times a week
☐ 7 or more times a week

12.) How many of the meals that you prepare at home include the following items?

| | All | Most | Some | None |
|---|---|---|---|---|
| fresh vegetables | ☐ | ☐ | ☐ | ☐ |
| fresh fruit | ☐ | ☐ | ☐ | ☐ |
| fresh herb | ☐ | ☐ | ☐ | ☐ |
| dried herbs | ☐ | ☐ | ☐ | ☐ |

13.) Please indicate how often you have purchased the following items from this farmers' market during this season. Check one box to the right of each item.

| | Never Purchased | Occasionally Purchased | Purchase Regularly |
|---|---|---|---|
| ☐vegetables | ☐ | ☐ | ☐ |
| ☐cut flowers | ☐ | ☐ | ☐ |
| ☐fruit | ☐ | ☐ | ☐ |
| ☐berries | ☐ | ☐ | ☐ |
| ☐organic produce | ☐ | ☐ | ☐ |
| ☐fresh herbs | ☐ | ☐ | ☐ |
| ☐dried herbs | ☐ | ☐ | ☐ |
| ☐herb plants | ☐ | ☐ | ☐ |
| ☐vegetable transplants | ☐ | ☐ | ☐ |
| ☐bedding plants | ☐ | ☐ | ☐ |
| ☐potted plants, baskets | ☐ | ☐ | ☐ |
| ☐hand-crafted items | ☐ | ☐ | ☐ |
| ☐soaps | ☐ | ☐ | ☐ |
| ☐bread | ☐ | ☐ | ☐ |
| ☐muffins, cookies etc. | ☐ | ☐ | ☐ |
| ☐jams, jellies | ☐ | ☐ | ☐ |
| ☐honey | ☐ | ☐ | ☐ |
| ☐nuts | ☐ | ☐ | ☐ |
| ☐eggs | ☐ | ☐ | ☐ |
| ☐cheese | ☐ | ☐ | ☐ |
| ☐meat | ☐ | ☐ | ☐ |
| ☐other | ☐ | ☐ | ☐ |
| ☐other | ☐ | ☐ | ☐ |

14.) Please check the box to the left of any item in the previous question that you would likely purchase, if it were normally available at this market.

15.) Please list any specific items, such as types or varieties of vegetables, that you wish were more frequently available at this farmers' market.

1. 4.

2. 5.

3. 6.

16.) How familiar are you with the concept of organically grown produce?

☐ Not familiar ☐ Somewhat familiar ☐ Very familiar

17.) How important is it that there be organically grown produce available at this farmers' market?

☐ Not important ☐ Somewhat important ☐ Very important

18.) How important is it that the organically grown produce at the farmers' market be certified organic?

☐ Not important ☐ Somewhat important ☐ Very important

19.) How do you expect the produce at the farmers' market to compare to the produce you buy elsewhere, in terms of the following characteristics?

| | Lower | Higher | Same |
|---|---|---|---|
| Quality | ☐ | ☐ | ☐ |
| Variety | ☐ | ☐ | ☐ |
| Price | ☐ | ☐ | ☐ |

20.) On average, how much do you spend each time you visit the farmers' market?

☐ less than $5 ☐ $5 to $10 ☐ $10 to $15 ☐ $15 to $25 ☐ over $25

21.) How would you rate the following characteristics of this farmers' market?

| | Poor | Good | Excellent |
|---|---|---|---|
| Hours of operation | ☐ | ☐ | ☐ |
| Location | ☐ | ☐ | ☐ |
| Availability of shade | ☐ | ☐ | ☐ |
| Parking facilities | ☐ | ☐ | ☐ |

| | | | |
|---|---|---|---|
| Cleanliness | ☐ | ☐ | ☐ |
| Level of courtesy | ☐ | ☐ | ☐ |
| Variety of products | ☐ | ☐ | ☐ |
| Quality of products | ☐ | ☐ | ☐ |
| Prices | ☐ | ☐ | ☐ |
| Packaging | ☐ | ☐ | ☐ |
| Other | ☐ | ☐ | ☐ |

In your opinion, what can be done to improve this farmers' market?

22.) Please rank the following reasons why you shop at this farmers' market. (using a "1" to indicate the most important reason)

Involvement with community
Low prices
Supporting local farmers and businesses
Direct contact with the producer of your food
Festive atmosphere
Product quality and freshness
To help revitalize downtown area

YOUR ANSWERS TO THE FOLLOWING QUESTIONS WILL HELP US INTERPRET THE RESULTS OF THIS SURVEY AND WILL BE KEPT STRICTLY CONFIDENTIAL

23.) Please check the box that includes your age

☐ less than 20
☐ 21 – 35
☐ 36 – 50
☐ 51 – 65
☐ 66 – 75
☐ over 75

24.) Please indicate your gender.

☐ Male
☐ Female

25.) Regarding your household,

a. Number of adults
b. Number of children under 18

26.) Please name the county in which you currently live.

27.) Are you a vegetarian or semi-vegetarian?

☐ Yes ☐ No

28.) Which of the following best describes your neighborhood?

☐ Urban ☐ Suburban ☐ Rural

29.) Please indicate the highest level of education you have completed.

☐ grade school
☐ high school
☐ some college
☐ undergraduate
☐ some graduate school
☐ masters
☐ doctoral

30.) Please check the category that best describes your ethnicity.

☐ African American
☐ American Indian
☐ Asian / Pacific Islander
☐ Middle Eastern
☐ Caucasian
☐ Hispanic
☐ Other

31.) In what range does your annual household income fall?

☐ less than $20,000
☐ $20,000 - $39,999
☐ $40,000 - $59,999
☐ $60,000 - $79,000
☐ $80,000 - $99,999
☐ $100,000 or more

APPENDIX B

## Farmers' Market Producers' Questionnaire

Please answer all of the following questions based on the 2001 market year.

1. What is your primary occupation?

   - ❑ Crop farming: ☐ wheat ☐ soybeans ☐ cotton ☐ other
   - ❑ Raising livestock: ☐ cattle ☐ dairy ☐ hogs ☐ sheep ☐ poultry ☐ other
   - ❑ Greenhouse/nursery plant production
   - ❑ Fruit production
   - ❑ Vegetable farming
   - ❑ other agricultural (please list)
   - ❑ non-agricultural (e.g. teacher, construction, etc. please list)

2. If your primary occupation is in agricultural production, how large is your total operation (in acres/sq.ft./head)?

3. How many years have you worked at your primary occupation?

4. How many years have you been selling products through farmers' markets?

5. How many farmers' markets do you attend per day?

Monday
Tuesday
Wednesday
Thursday
Friday
Saturday

6. What is the shortest distance you travel to a farmers' market? (in miles)

7. What is the longest distance you travel to a farmers' market? (in miles)

8. If you attend only one farmers' market, how interested are you in attending a second market?

- ❑ not interested
- ❑ somewhat interested
- ❑ very interested

9. Please indicate the number of paid employees that fit into each group below. (include yourself)

A. Regarding the total number of employees (production and retailing)

| | Family members | Non-family members |
|---|---|---|
| Full-time* | | |
| Part-time** | | |

B. Regarding only the employees that go to the farmers' market

| | Family members | Non-family members |
|---|---|---|
| Full-time* | | |
| Part-time** | | |

* 30 hours/week or more
** less than 30 hours/week

10. Please indicate the level of difficulty that you've experienced in finding reliable employees.

- ❑ not difficult
- ❑ somewhat difficult
- ❑ very difficult
- ❑ haven't hired any employees

11. During the market season, which of the following terms best describe how you consider your income from farmers' market sales?

- ❑ hobby / extra income
- ❑ part-time income
- ❑ a portion of full-time income that is combined with sales from other outlets
- ❑ full-time income

12. On what basis, do you work off-farm or away from your farmers' market enterprise during the market season?

- ❑ none
- ❑ part-time (less than 30 hrs./ week)
- ❑ full-time (more than 30 hrs./week)

Questions #13 thru #16 pertain to the chart below.

13. In the first column below, please list in order of importance (as measured in sales dollars) the top ten (10) principle products* you sell at the farmers' market. (Please be specific such as – strawberries, tomatoes, cut flowers, cider, apples, honey, jam, bedding plants, etc.)

| Product | Quantity Sold (specify units, e.g. lbs, bu.) | Acreage (or sq. ft.) | Price per unit |
|---|---|---|---|
| ex: strawberries | 420 qt (1080 qt) | 1/2 acre(2 ac.) | $2.50/qt($1.80/qt) |
| a. | | | |
| b. | | | |
| c. | | | |
| d. | | | |
| e. | | | |

f.

g.

h.

i.

j.

* For the remainder of the survey, let these products and all other products that could be sold through a farmers' market be referred to as farmers' market – type products.

14. In the column next to each item above, please estimate the approximate quantity that you sold through farmers' market(s) in 2001. In parenthesis, please also list the approximate total quantity that you sold through all other sources besides the farmers' market (wholesale and retail). Specify the unit of measurement (quarts, lbs., etc.) that is used for the majority of your farmers' market sales.

15. In the next column of question #13, estimate the approximate acreage (or square footage) allocated to grow each item for farmers' market sales. In parenthesis, please list the approximate total area allocated to grow the item for all sales locations.

16. In the last column of question #13, please list the average price per unit that you charged for the item at the farmers' market(s). Use a parenthesis to show the average price charged for all other sales. Please use the same units as in question #14.

17. Please check any of the following marketing outlets through which you normally retail your farmers' market - type products. In the column next to each outlet that you check, estimate the percentage of your total retail sales coming from that location.

| | percent of total retail sales | profit margin |
|---|---|---|
| farmers' market | | |
| temporary roadside stand (table, tailgate etc.) | | |
| permanent roadside stand / market | | |
| greenhouse /nursery | | |
| pick-your-own | | |
| farmhouse or out-building | | |

community supported agriculture (subscription)
other

18. In the second column of question 17., please use the following symbols to show how the profit margin from each location that you checked compares to the profit margin from farmers' market sales. [ + (greater than), - (less than), = (same as)]

19. Do you wholesale your farmers' market - type products? Yes
No

If yes, please check any of the following to whom you normally wholesale your products. In the right-hand column, next to each method that you check, estimate the percentage of your total wholesale sales coming from that method.

| | percent of total wholesale sales | profit margin |
|---|---|---|
| packer | % | |
| grocery store | | |
| produce stand | | |
| restaurant | | |
| greenhouse | | |
| nursery | | |
| specialty store | | |
| farmers' market vendors | | |
| other | | |

20. In the second column of question 19., please use the following symbols to show how the profit margin from any wholesale outlets that you checked compares to the profit margin from farmers' market sales. [ + (greater than), - (less than), = (same as)]

21. Please estimate the percentage of your business' gross sales that comes from the following sources

wholesale sales %
retail sales (direct markets) %

22. How interested are you in expanding your production for distribution through the following areas, if these outlets were available or developed?

| | Not Interested | Somewhat Interested | Very Interested |
|---|---|---|---|
| current farmers' market(s) | ☐ | ☐ | ☐ |
| other retail outlets | ☐ | ☐ | ☐ |
| wholesale outlets | ☐ | ☐ | ☐ |

23. How many acres (or parts of an acre) do you have under production for farmers' market – type products, regardless of where they were sold?

How does the size of this area compare with three (3) years ago?

- ❑ an increase of acre(s)
- ❑ a decrease of acre(s)
- ❑ the same

24. Do you have a business plan of any kind for your farmers' market enterprise?

☐ Yes ☐ No

25. In what county is your primary acreage for farmers' market production located?

26. Which of the following best describes your neighborhood?

☐ Urban ☐ Suburban ☐ Rural

27. What percentage of all the products that you sell at the farmers' market is grown or prepared by you and your employees (not resold)? %

28. Do you sell value added products such as baked goods, preserves, dried flowers, etc.

Yes No

If yes, please check which of the following best describes your situation?

☐ I primarily purchase most of the items (raw materials) to which I add value
☐ I primarily add value to items which I have produced myself

Please list the value added products you sell

29. Please rank the following reasons why you choose to sell your products at a farmers' market. Place a "1" in front of the most important reason, a "2" for the second most important and so on.

___ convenience
___ receive retail value for products sold
___ customer interaction
___ to advertise your products
___ to sell excess products not sold through other outlets
___ to sell surplus produce from your garden
___ other

30. Did you sell organically grown* or made products at the farmers' market during the 2001 season?
* (grown without the use of synthetic fertilizers, synthetic pesticides and synthetic food additives)

Yes No

If Yes, what percent of your farmers' market sales were from these products? %

If No, do you have plans to sell organic products anytime in the future?

Yes No

31. Did you sell organically grown or made products three years ago during the 1998 season?

Yes No

32. Check the box next to each method that you have used to promote the sale of your products at the farmers' market? For each method you check, circle the appropriate number to indicate how effective it was for you.

| | Very Effective | Somewhat Effective | Not Effective |
|---|---|---|---|
| ☐ signs indicating your price | 1 | 2 | 3 |
| ☐ signs for product information | 1 | 2 | 3 |

| | | | | |
|---|---|---|---|---|
| □ | recipes | 1 | 2 | 3 |
| □ | taste testing/samples | 1 | 2 | 3 |
| □ | bulk discounts | 1 | 2 | 3 |
| □ | other | 1 | 2 | 3 |

33. Please rank the top three (3),or fewer, methods that best describe how you normally determine your prices at the farmers' market? ( use a "1" for the most common method and so on)

___ grocery store comparison
___ matching other vendors prices
___ pricing below other vendors
___ internet
___ other
___ cost of production plus mark-up
___ pricing above other vendors
___ charge the same as always
___ other

34. Do you tend to hold your prices the same throughout a market day?

Yes No

If No, which of the following best describe how your own prices change during a day at market?

hold steady until the end of day, then cut prices
gradually lower prices throughout the day
raise or lower throughout the day depending on sales
other

35. Is price undercutting (where one or two vendors are charging significantly less than the rest of the vendors) a problem at your market?

Yes No

36. Concerning your business expenses related to your farmers' market products, please rank the following expense items from largest to smallest, using a (1) for your largest expense and so on. (leave non-expenses blank)

seeds/plants
fertilizer
weed control
insect control
labor
utilities
transportation
land payment

disease control
irrigation
machinery
other

buildings
marketing
other
other

37. How do you measure your success at the farmers' market(s) you attend? (please check any two.)

- ☐ gross sales
- ☐ net sales
- ☐ selling enough to cover expenses
- ☐ selling out of enough products to go home early
- ☐ selling most of your products by the end of the market day
- ☐ having return customers
- ☐ other
- ☐ other

38. How satisfied are you with the profitability of the farmers' market portion of your sales?

not satisfied
somewhat satisfied
mostly satisfied
totally satisfied

39. How do you see the farmer's market(s) that you attend changing over the next three (3) years?

Expanding
Staying the same
Decreasing

Comments

40. Check the appropriate categories below that help to describe a typical customer who buys your products at the farmers' market(s) you attend.

| | | |
|---|---|---|
| ☐ high income | ☐ single | ☐ career oriented |
| ☐ medium income | ☐ married with children | ☐ educated |
| ☐ low income | ☐ retired | ☐ health conscience |
| ☐ dual income | ☐ stay-at-home parent | ☐ bargain hunters |

41. Do any of your customers request organically grown or made products at the farmers' market?

Yes No

42. Please check a box to indicate how important you think each item is to your customers at the market.

| | Very Important | Somewhat Important | Not Important |
|---|---|---|---|
| product quality | ☐ | ☐ | ☐ |
| unusual varieties | ☐ | ☐ | ☐ |
| price | ☐ | ☐ | ☐ |
| in season produce | ☐ | ☐ | ☐ |
| chemical residues | ☐ | ☐ | ☐ |
| organic production methods | ☐ | ☐ | ☐ |
| grown or made by the vendor | ☐ | ☐ | ☐ |
| Oklahoma grown | ☐ | ☐ | ☐ |

43. Please choose the category that includes your approximate gross sales from all farmers' market – type products. Include your sales of these products from all sources (wholesale and retail) in 2000.

| | |
|---|---|
| under $1,000 | $25,000-39,999 |
| $1,000-2,499 | $40,000-54,999 |
| $2,500-4,999 | $55,000-74,999 |
| $5,000-9,999 | $75,000-99,999 |
| $10,000-14,999 | $100,000-149,999 |
| $15,000-24,999 | $150,000 or more |

44. Please check a box next to each item to indicate what direction of change you wish to occur at the primary farmers' market you attend. If you are satisfied with the state of the current item, check "No Change."

| | Increase | Decrease | No Change |
|---|---|---|---|
| market hours | ☐ | ☐ | ☐ |
| days open for business | ☐ | ☐ | ☐ |
| length of market season | ☐ | ☐ | ☐ |
| market location | ☐ | ☐ | ☐ |
| availability of shade | ☐ | ☐ | ☐ |

| | | | |
|---|---|---|---|
| stall fee | ☐ | ☐ | ☐ |
| membership dues | ☐ | ☐ | ☐ |
| amount of advertising | ☐ | ☐ | ☐ |
| number of customers | ☐ | ☐ | ☐ |
| number of produce vendors | ☐ | ☐ | ☐ |
| number of non-produce vendors | ☐ | ☐ | ☐ |
| quality of market management | ☐ | ☐ | ☐ |

Comments:

44. Please check any of the following topics that you would like to have more information about.

☐ season extension techniques
☐ greenhouses
☐ plant propagation
☐ irrigation
☐ post-harvest handling
☐ marketing
☐ weed control
☐ disease control
☐ insect control
☐ cover crops
☐ organic methods
☐ hiring employees
☐ value added products
☐ health regulations
☐ specific crops/products

☐ other

YOUR ANSWERS TO THE FOLLOWING QUESTIONS WILL HELP US INTERPRET THE RESULTS OF THIS SURVEY AND WILL BE KEPT STRICTLY CONFIDENTIAL

45. Please check the proper category to indicate your age

- ☐ 16 – 25 yrs.
- ☐ 26 – 35 yrs.
- ☐ 36 – 45 yrs.
- ☐ 46 – 55 yrs.
- ☐ 56 – 65 yrs.
- ☐ 66 – 75 yrs.
- ☐ 76 – 85 yrs.
- ☐ over 85 yrs.

46. Please indicate your gender.

- ☐ Male
- ☐ Female

47. Which of the following best represents your level of education?

- ☐ grade school
- ☐ high school
- ☐ some college
- ☐ undergraduate
- ☐ some graduate school
- ☐ masters
- ☐ doctoral

48. Please check the category that best describes your ethnicity.

- ☐ African American
- ☐ American Indian
- ☐ Asian / Pacific Islander
- ☐ Middle Eastern
- ☐ Caucasian
- ☐ Hispanic
- ☐ Other

49. Regarding your household,

a. Number of adults
b. Number of children under 18

50.) In what range does your annual household income fall?

- ☐ less than $20,000
- ☐ $20,000 - $39,999
- ☐ $40,000 - $59,999
- ☐ $60,000 - $79,000
- ☐ $80,000 - $99,999
- ☐ $100,000 or more

APPENDIX C

# Farmers' Market Managers' Questionnaire

Please answer all of the following questions based on the 2001 market year.

1. Is your market associated with a downtown or main street development program?

   Yes No

2. On what type of property is the farmers' market located?

   city
   county
   state
   tribal
   private
   other

3. How long has your market existed at its current location?

   - ❑ less than 2 years
   - ❑ 2 to 5 years
   - ❑ 6 to 10 years
   - ❑ over 10 years

4. How long has your market been in existence within your community?

   - ❑ less than 2 years
   - ❑ 2 to 5 years
   - ❑ 6 to 10 years
   - ❑ 11 to 15 years
   - ❑ over 15 years

5. Without regard to the number of years your market has been in business, which of the following terms best characterizes your stage of business development?

| | |
|---|---|
| initial | mature |
| growth | decline |

6. Please circle the day(s) of the week that your market is open. Also please write the corresponding dates (month/day) during which your market is open.

FROM (mo./dy) - TO (mo./dy)

S M T W T F S

S M T W T F S

7. What are your market's hours of operation? Please indicate if these hours vary by day of week and/or vary during the season.

8. Please indicate your busiest market hours. (please check only one under each column)

| | Weekday | | Weekend |
|---|---|---|---|
| ☐ | first hour of market | | first hour of market |
| ☐ | second hour of market | | second hour of market |
| ☐ | middle of market day | | middle of market day |
| ☐ | last hour of market | | last hour of market |
| ☐ | other | other | |

9. Please identify the three (3) most important factors considered when choosing the site for your farmers' market. (label as 1, 2 and 3, with 1 as most important)

| | |
|---|---|
| cost of site | visibility from road |
| customer access | nearby traffic flow |
| availability of shade | provided by community |
| liability concerns | other |

10. Check the box next to each item that is available at your market location. For all items, regardless of their availability at your market, please circle the appropriate number to indicate the importance of each item.

| | very important | | not important |
|---|---|---|---|
| restrooms | 1 | 2 | 3 |
| electric hookups | 1 | 2 | 3 |
| convenient parking | 1 | 2 | 3 |
| ample parking | 1 | 2 | 3 |
| water fountains | 1 | 2 | 3 |
| hand washing facilities | 1 | 2 | 3 |
| shade from trees | 1 | 2 | 3 |
| shade from structures | 1 | 2 | 3 |
| refrigeration | 1 | 2 | 3 |
| picnic area | 1 | 2 | 3 |
| concessions (food and/or drink items) | 1 | 2 | 3 |

11. Overall, how satisfied are you with your current market location? Please explain your response below.

not satisfied
somewhat satisfied
mostly satisfied
totally satisfied

Comments

12. Does your market operate as a membership organization?

Yes No

If yes, approximately how many members (vendors) belong to your farmers' market organization?

Do your members pay annual dues? Yes No

If yes, what are your membership dues?

13. Does your market have some type of governing board, such as a board of directors?

Yes No

If yes, are you a voting member of that board?

Yes No

14. Does your market operate under a set of by-laws or regulations?

Yes No

15. Please circle a number to indicate how important you think each item is to the success of any farmers' market.

| | very important | | not important |
|---|---|---|---|
| being a membership organization | 1 | 2 | 3 |
| having membership dues | 1 | 2 | 3 |
| having a governing board | 1 | 2 | 3 |
| having by-laws | 1 | 2 | 3 |

16. How would you describe your position as a market manager/coordinator?

- ❑ employed by farmers' market organization
- ❑ employed by the city
- ❑ employed by the county
- ❑ volunteer
- ❑ other

17. If you are employed as a market manager, which of the following best describes the amount of time allocated for managing/coordinating your farmers' market?

- ❑ Full-time
- ❑ Half-time
- ❑ Quarter-time

- ❑ Other

18. How many years have you been working as a farmer's market manager?

- ❑ less than 2 years
- ❑ 2 to 5 years
- ❑ 6 to 10 years
- ❑ over 10 years

19. Have you received any specialized training as a market manager?

Yes No

20. Do you feel you would benefit from specialized market manager training?

Yes No

21. Do you have any farming experience yourself?

Yes No

22. Do you personally sell your own products through the farmer's market that you manage?

Yes No

23. Please list the stall fee that is charged to each vendor for the periods below. Write a zero (0) if no fee is charged; leave blank if your market isn't open during the specified period.

Weekday Weekend

24. What fee level would be most appropriate for your market?

| Weekday | Weekend |
|---|---|
| ☐ less than current fee | less than current fee |
| ☐ same as current fee | same as current fee |
| ☐ more than current fee | more than current fee |

25. Does your market collect any commission on the vendors' sales?
Yes No

If yes, please state the amount of commission and how this is collected.

26. Do you request sales figures from your vendors? ☐ Yes ☐ No

If yes, how do you collect this information.

27. Please rank the following expenses that your market incurs each year. Use a "1" to denote the largest annual expense and so on. Leave blank any item that is not an expense for your market.

| | |
|---|---|
| rent | insurance |
| utilities | special events |
| salary | other |
| advertising | other |

28. Check the box next to each method of advertising that your market has used in the past. For each item that you check, circle the appropriate number to indicate the effectiveness of that method.

| | Very Effective | | Not Effective |
|---|---|---|---|
| newspaper | 1 | 2 | 3 |
| radio | 1 | 2 | 3 |
| television | 1 | 2 | 3 |
| brochures/flyers | 1 | 2 | 3 |
| direct mail | 1 | 2 | 3 |
| permanent signs | 1 | 2 | 3 |

| | | | |
|---|---|---|---|
| signs/banners on market day | 1 | 2 | 3 |
| word of mouth | 1 | 2 | 3 |
| other | 1 | 2 | 3 |
| other | 1 | 2 | 3 |

29. Check the organizations from which your market receives any kind of support. Next to each and every organization, circle the number that best indicates the amount of support that your market would prefer.

| | Increased Support | Same Support |
|---|---|---|
| chamber of commerce | 1 | 2 |
| county extension | 1 | 2 |
| municipality | 1 | 2 |
| local businesses | 1 | 2 |
| churches | 1 | 2 |
| city council | 1 | 2 |
| county commission | 1 | 2 |
| OK Dept. of Agriculture | 1 | 2 |
| other | 1 | 2 |

Please elaborate on specific needs

30. Please check any of the following items which can normally be found at your market during the peak of the season?

| | | |
|---|---|---|
| Vegetables | Cut flowers | Nursery plants |
| Baked goods | eggs | Vegetable plants |
| Berries | Tree fruits | Meat |
| Fresh herbs | Crafts | Jams/jellies/preserves |
| Cheese | Honey | Nuts |
| Dried herbs, teas | Processed foods | Soaps |
| Other | | |

31. Were there any organically produced* items available at your market during 2001.

* grown or processed without the use of any synthetics (fertilizers, pesticides, additives etc.)

Yes No

If yes, approximately how many vendors were selling the following items:

certified organic produce

non-certified organic produce

organically made or processed items

32. How did the number of vendors selling organic products in 2001 compare to three (3) years ago in 1998?

increase from '98
decrease from '98
same as '98

33. Does your market allow craft items to be sold? ☐ Yes ☐ No

If "Yes," please explain any limitations or restrictions that are placed on these items.

34. Does your market require all produce to be Oklahoma grown?

Yes No

35. Does your market specify a certain percentage of produce that must be grown by the vendor?

Yes, % No

36. Do you make farm visits to ensure the origin authenticity of the produce?
Yes No

If Yes, under what circumstances?

If No, what means do you rely on to verify the origins of the produce?

37. Do you feel that verifying the origins of certain vendors' produce is a problem at your market?

Yes No

38. Do you experience problems with the quality of products brought to market by some vendors?

Yes No

39. Do you have the authority to deal with product quality concerns at your market?
Yes No

Please explain how you handle this situation

40. Are wholesalers or resellers allowed to sell at the market you manage?

Yes No

41. Do you feel that there is excessive competitive tension between your farmers' market and any of the following establishments in your area?

| | | |
|---|---|---|
| Retail grocery store(s) | Yes | No |
| Roadside produce stand(s) | Yes | No |
| Other farmers' market(s) | Yes | No |

42. How do the vendors choose their spaces at the market location?

- ❑ Seniority
- ❑ First come first serve
- ❑ Random drawing
- ❑ Assigned
- ❑ Other

43. How are most products displayed for sale at your market? (check only one)

- ❑ tailgate
- ❑ table top without tablecloth
- ❑ table top with tablecloth
- ❑ boxes on ground
- ❑ other

44. What percent of your market's vendors use signage for:

| | |
|---|---|
| pricing | % |
| product name | % |
| product descriptions | % |

45. Please check the point of purchase promotions used at your market and indicate the approximate percent of vendors using each method.

| | | | |
|---|---|---|---|
| free samples | % | quantity discounts | % |
| free recipes | % | other | % |

46. Does your market allow taste testing of products sold?

Yes No

Please explain

47. Is the market set up to avoid having vendors with similar produce items right next to each other in two adjacent spaces?

Yes No

48. Do prices usually remain constant throughout the market day?

Yes No

If No, do prices tend to decrease later in the market day?

Yes No

49. Is price undercutting (where one or two vendors are charging significantly less that the rest of the vendors) a problem at your market?

Yes No

50. Does your market have a procedure for establishing minimum prices?

Yes No

If yes, please describe

51. Do you feel that rivalry among vendors is a problem at your market?

Yes No

Please comment:

52. Approximately how many vendors attended your market during the 2000 season?

| | During Week | Weekend |
|---|---|---|
| Spring (April-May) | | |
| Summer (June-Aug.) | | |
| Fall (Sept.-Nov.) | | |
| Winter (Dec.- Mar.) | | |

53. What are the approximate number of vendors that attended your market during the peak of following seasons

| | |
|---|---|
| 1996 | 1998 |
| 1997 | 1999 |

54. Approximately what percentage of the vendors at your market are primarily selling produce?

| | During Week | Weekend |
|---|---|---|
| Spring (April-May) | % | % |
| Summer (June-Aug.) | % | % |
| Fall (Sept.-Oct.) | % | % |
| Winter (Dec.-Mar.) | % | % |

55. Do you feel that vendor absenteeism is a problem at your market?

Yes No

56. Does your market require regular attendance by the vendors?

Yes No

57. Which of the following do you feel that your market more often needs? (check one)

- ❑ More produce
- ❑ More customers

If you chose more produce, which of the following best describes why this is so:

- ❑ the market needs greater quantities of the same produce currently available
- ❑ the market needs a greater variety of produce than is currently available

Do you feel that your market needs more produce growers?

Yes No

58. Please give any additional comments on the subject of customer demand and produce availability.

59. If possible, please estimate your market's average gross sales per market day for the following periods during the 2000 season.

| | During Week | Weekend |
|---|---|---|

Spring (April-May)

Summer (June-Aug.)

Fall (Sept.-Nov.)

Winter (Dec.-Mar.)

60. Please estimate your market's total gross sales for the following seasons.

| | |
|---|---|
| 1996 | 1999 |
| 1997 | 2000 |
| 1998 | |

61. Please indicate your level of interest in learning more about the following topics:

| | Very Interested | Somewhat Interested | Not Interested |
|---|---|---|---|
| market bylaws | 1 | 2 | 3 |
| market rules/guidelines | 1 | 2 | 3 |
| budget management | 1 | 2 | 3 |
| health regulations | 1 | 2 | 3 |
| liability insurance | 1 | 2 | 3 |
| recruiting vendors | 1 | 2 | 3 |
| handling vendor disputes | 1 | 2 | 3 |
| farm inspections | 1 | 2 | 3 |
| market expansion | 1 | 2 | 3 |
| community involvement | 1 | 2 | 3 |
| WIC farmers' market program | 1 | 2 | 3 |
| market promotions/events | 1 | 2 | 3 |
| advertising | 1 | 2 | 3 |

62. What additional information, resources or assistance do you need for running a successful farmers' market? (Please use the back of page if necessary)

YOUR ANSWERS TO THE FOLLOWING QUESTIONS WILL HELP US INTERPRET THE RESULTS OF THIS SURVEY AND WILL BE KEPT STRICTLY CONFIDENTIAL

63. Please check the proper category to indicate your age

- ☐ 16 – 25 yrs.
- ☐ 26 – 35 yrs.
- ☐ 36 – 45 yrs.
- ☐ 46 – 55 yrs.
- ☐ 56 – 65 yrs.
- ☐ 66 – 75 yrs.
- ☐ 76 – 85 yrs.
- ☐ over 85 yrs.

64. Please indicate your gender.

- ☐ Male
- ☐ Female

65. Which of the following best represents your level of education?

- ☐ grade school
- ☐ high school
- ☐ some college
- ☐ undergraduate
- ☐ some graduate school
- ☐ masters
- ☐ doctoral

66. Please check the category that best describes your ethnicity.

- ☐ African American
- ☐ American Indian
- ☐ Asian / Pacific Islander
- ☐ Middle Eastern
- ☐ Caucasian
- ☐ Hispanic
- ☐ Other

67. Regarding your household,

a. Number of adults
b. Number of children under 18

68.) In what range does your annual household income fall?

- ☐ less than $20,000
- ☐ $20,000 - $39,999
- ☐ $40,000 - $59,999
- ☐ $60,000 - $79,000
- ☐ $80,000 - $99,999
- ☐ $100,000 or more

# VITA

Haerani Natali Agustini

Candidate for the Degree of

Doctor of Philosophy

Thesis: An Analysis of Oklahoma Direct Marketing Outlets: Case Studies of Produce Farmers' Markets and Wheat Direct Shipments to Mexico

Major Field: Agricultural Economics

Minor Field: Statistics

Biographical:

Personal Data: Born in Singaraja, Bali, Indonesia, August 13, 1959, the daughter of Mr. and Mrs. Ismandar.

Education: Graduated from Kupang High School, NTT, in Indonesia, in 1978; received Bachelor of Science in Agronomy from Bogor Agricultural Institute in Indonesia, in 1983. Attended a one year course of National Economic Development and Planning Programs for Indonesia at Indonesian University in Jakarta in 1988; received Master of Science in Experimental Statistics from New Mexico State University in 1993; completed requirements for the Doctor of Philosophy degree at Oklahoma State University in October, 2002.

Experience: Employed by the Central Bureau of Statistics in Jakarta, Indonesia since 1984 until present. Involved in developing General Equilibrium Model for Indonesia. Involved in developing economic Leading Indicator for Indonesia. Involved in various censuses and surveys of economics and agriculture in Indonesia.