

MODELING REVENUE AND VISITATION
PATTERNS OF AGRITOURISM OPERATIONS IN
OKLAHOMA

By

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MODELING REVENUE AND VISITATION
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Abstract:

With agritourism increasingly promoted as a way to generate income in rural areas, information is needed on the potential performance of agritourism operations. Currently, existing research provides little information about the business characteristics that can affect agritourism revenue. This manuscript presents research on the business characteristics associated with differences in agritourism revenue of Oklahoma businesses. This research also identifies whether offering wedding services financially benefit agritourism businesses. Ordinary least squares (OLS) and interval regression techniques are used to estimate the revenue model. In the latter case, tests are performed to gauge the effects of different interval sizes on model estimates.

There is also a lack of information relating the use of different marketing methods and agritourism visitation. This manuscript presents research examining the effect that different marketing methods have on the number of visitors a business receives. A visitation model is developed that measures the significance of seven distinct marketing methods. Three different specifications of the visitation model are considered: a linear model, a log-linear model and an exponential model estimated using a quasi-maximum likelihood (QML) estimator. The exponential method is based off research performed by Santos Silva and Tenreyro (2006) that shows log models can produce inconsistent parameter estimates when heteroscedasticity exists.

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CHAPTER I

INTRODUCTION

Agritourism is the set of activities at agricultural operations designed for the purposeful benefit of visitors. Agritourism lies at the intersection of agriculture and tourism, and includes farm stays, farm tours, corn mazes, u-picks, trail rides and wineries, to name a few activities and experiences. An agritourism operation can be a large, traditional working-farm or ranch, or a stand-alone business.

Agritourism is a growing industry in the United States (U.S. Department of Agriculture, 2014). Research suggests that farmers and ranchers are adding agritourism enterprises to their operations with the hope of supplementing income, while rural residents are starting agritourism businesses to take advantage of a growing market. However, there is currently a lack of research studying the performance of agritourism operations. This gap motivated the present study, which examines the factors affecting revenue generated by agritourism businesses—for example, I test whether wedding hosting is a stand-out contributor to agritourism revenue—and the effects that different marketing techniques can have on visitation. This study also makes several methodological contributions by examining alternative ways of modeling the relationship between business characteristics and revenue, and between marketing methods and visitation.

This study took advantage of data from a recent survey of agritourism operations in Oklahoma. With the help of the Oklahoma Department of Agriculture, Food and Forestry (ODAFF), addresses for almost 300 businesses were identified. The businesses received a questionnaire that contained five sections: 1) business characteristics, 2) customers, 3) business challenges and future plans, 4) a new agritourism law and 5) owner demographics. For the purposes of this study, several questions were included that asked about revenue, profitability, operating season, owner education, the decision to host weddings, visitation and marketing techniques. The survey response rate was 63%. Complete details of the survey are contained in Appendix C.

The first chapter of this study identifies characteristics that affect the revenue of agritourism businesses in Oklahoma. This chapter also discusses whether there is a significant difference in revenue between businesses that offer wedding services and those that do not offer wedding services. Two regression techniques were applied to the revenue model: ordinary least squares (OLS) and interval regression. Business revenue had to be interpreted from interval-coded data. Also, the effect that different interval ranges could have on the regression results was examined. Three interval regressions—one with the original eight intervals from the survey and two with four differently aggregated intervals—were run to determine whether fewer and larger intervals would have been sufficient to accurately relate income to business characteristics. Tables that provide descriptions and summary statistics of the variables in the model, a breakdown of the interval sizes, and a comparison of the four sets of regression estimates are included in Appendix A.

The second chapter looks into the effects that different marketing methods have on the number of visitors a business receives. The marketing methods included in the research are grouped into seven categories: social media, website/blog, other online methods, radio/television advertisements, print, road signs/billboards, and an other category. Three versions of the visitation model were estimated: a linear model, a log model and an exponential model. The exponential model design is based on the research of Santos Silva and Tenreyro (2006). Tables that provide descriptions and summary statistics of the variables in the visitation model and a comparison of the three regression results are included in Appendix B.

CHAPTER II

THE RELATIONSHIP BETWEEN BUSINESS CHARACTERISTICS AND REVENUE AT AGRITOURISM OPERATIONS IN OKLAHOMA

Rural residents are increasingly taking advantage of agritourism as a market sector with low barriers to entry and significant profit potential. This includes farmers looking to supplement existing farm revenue, and non-farmers who use agritourism as the primary source of household income. According to the 2012 USDA Census of Agriculture (U.S. Department of Agriculture, 2014), between 2007 and 2012 the number of farms offering agritourism services increased 42% in the United States and 36% in Oklahoma. This significant increase is evidence that businesses offering on-farm visitor attractions and events are successful income-generators.

Not surprisingly, research finds that income generation is a critical factor in the decision to open and operate an agritourism business. Several published studies show that income and revenue concerns dominate other motivations, including the owner's personal interest in the marketed attraction and enhancing the owner's quality of life (Nickerson, Black, & McCool, 2001; McGehee & Kim, 2004; Barbieri, 2010). However, despite the importance of income and revenue to agritourism entrepreneurs, relatively little research has examined agritourism business performance.

Establishing a profitable business can be challenging, and the lack of research on agritourism operation revenues means agritourism entrepreneurs and consultants have little guidance about the most lucrative characteristics of businesses designed to serve agritourists. This is an important concern to entrepreneurs who must decide, for instance, what type of service or attraction to add to an existing farm or ranch operation, or where to locate a new business. This decision can also have implications for existing hospitality businesses and rural communities at large (Che, Veeck, & Veeck, 2005; McGehee, 2007). Of course, there will be limits to revenue potential; not all farms and ranches will profit from offering visitor attractions and not all areas are suitable for agritourism start-ups.

This paper presents research investigating the relationship between agritourism business performance and operator characteristics. Using data on agritourism businesses in Oklahoma, regression analysis is used to test whether individual agritourism business revenue is related to location, on-site activities and owner characteristics. Naturally, these factors vary substantially from business to business, and this research exploits such variation to identify the characteristics influencing agritourism business performance.

Of particular interest to this study is the relationship between revenues and the decision to offer wedding services. This is because the attractiveness of outdoor and country weddings is growing and agritourism operations are an important supplier of wedding sites (Bronson, 2015; Hatmaker, 2014). In addition, there is significant anecdotal evidence in the media that offering wedding services is profitable for agritourism businesses (for example, see Goad (2015)), although objectively it is currently unclear what businesses can expect in return for investing in the wedding industry.

This paper makes several contributions to the existing literature on agritourism. First, it investigates the effects of business and owner characteristics, such as location and owner age, on agritourism business revenue. This research relates closely to prior work by Barbieri and Mshenga (2008), who found that the size of farm and owner age, among other characteristics, were significantly related to the performance of farms and ranches offering agritourism services. In contrast, this study focuses exclusively on revenue from agritourism sales. Second, the analysis considers the relationship between business performance and several variables not previously examined in prior work, including wedding hosting. Finally, the consequences of measuring business income as a categorical variable are examined. Nonresponse is common in collecting income data from surveys, but asking respondents to report their income within categories can increase response rates (Barbieri & Mshenga, 2008). Broad income categories may maximize response rates, although income information will then be very imprecise. This study examines whether the sizes of these categories matter in econometric analyses of business income.

Before discussing this research the term agritourism should be defined as it is used here. A basic definition of agritourism includes all activities and services for visitors at agricultural operations. Some note that activities at non-functional agricultural facilities, and those facilities only used for scenery, do not fall under this definition (Arroyo, Barbieri, & Rich, 2013), while others include direct sales as part of agritourism (Schilling, Attavanich, & Jin, 2014). This investigation uses data collected from businesses that self-identify as agritourism producers, so the term is applied quite broadly and includes some activities and services that would otherwise fall under the definition of

rural tourism (Phillip, Hunter, & Blackstock, 2010). The rural tourism definition includes traditional visitor activities at working farms and ranches as well as visitor services and activities at non-working agricultural facilities, including country lodges and rural heritage museums. Note further that this paper uses operator, producer, farmer and provider interchangeably when referring to an agritourism business owner.

EXISTING RESEARCH ON AGRITOURISM BUSINESS CHARACTERISTICS

Research documents the large variety of activities and services offered by agritourism operations. In Missouri, Tew and Barbieri (2012) found that 50% of agritourism businesses gave educational tours, 49% offered leisure tours, 38% operated a u-pick and 35% hosted guests on dude ranches. Rilla, Hardesty, Getz, and George (2011) found a similar diversity of agritourism businesses in California, where 51% of businesses accommodated school field trips, 41% offered tours of a traditional farm or ranch operation, 38% operated a farm stand with fresh produce and 23% operated a u-pick. Rilla et al. (2011) also found that one-third of businesses hosted weddings, family reunions, and retreats. In Montana, Nickerson et al. (2001) found that 25% of businesses operated as guiders/outfitters, 21% hosted guests on dude ranches and 10% hosted guests as part of a bed and breakfast, among other services.

Other research has examined the desirability of expanding the range of activities and services offered by existing agritourism operations. In their survey of California businesses, Rilla et al. (2011) found 64% intended to grow or diversify their operations within five years. Tew and Barbieri (2012) found a surprisingly similar proportion of

operators—66%—in Missouri intended to add activities in the future, and that the same percentage would recommend other farm owners add an agritourism enterprise.

Many studies have examined the reasons farmers and ranchers diversify into the agritourism industry. One of the most common reasons—if not the most common reason—is financial-based, which includes motivations stated as: providing an additional revenue source, offset fluctuations in agricultural income, increasing income from current farm and ranch resources, the need to offset dwindling agricultural profits and the need to diversify (Barbieri, 2010; Barbieri, Mahoney, & Butler, 2008; Brown & Reeder, 2007; Nickerson et al., 2001; Rilla et al., 2011; Schilling, Sullivan, & Komar, 2012).

Non-financial reasons reported in the literature include the desire to educate consumers, build relationships with customers, help the local community, escape urban lifestyle, and an interest in agriculture (Blank, 2002; Rilla et al., 2011). Barbieri and Mshenga (2008) note that agritourism can be a useful way to explain the issues farmers face to the unknowledgeable public. Nickerson et al. (2001) and Barbieri (2010), among others, find the desire to educate the public can be an important motivator in operating an agritourism business. In fact, Tew and Barbieri (2012) concluded in their Missouri study farmers in that state were more interested in using agritourism to educate people about agriculture than avoiding financial hardships. Nevertheless, most studies have found the primary reason owners went into agritourism was to gain additional income and secure farm and ranch profitability (Nickerson et al., 2001; Barbieri, 2010; Rilla et al., 2011). Several studies have grouped the goals and motivations of adding an agritourism enterprise into four or five factors (Barbieri, 2009; Barbieri & Mahoney, 2009; Getz & Carlsen, 2000; McGehee & Kim, 2004). The six factors identified by Barbieri and Mahoney (2009) in

their study of Texas operators summarize the general findings of this research, in order of importance: reduce uncertainty and risk, grow and service markets, enhance financial condition, personal aspirations and pursuits, revenue enhancement and family connection. Note that the first, second, third and fifth factors all relate to income security and revenue generation.

Several studies have examined the relationship between farm characteristics and the propensity of operators to engage in agritourism. One study found that farm size in North America was not a significant factor in the number of income-generating activities on a farm (Barbieri et al., 2008). Similarly, another study concluded that in the United Kingdom farm size was unrelated to the type of diversification strategy implemented (Ilbery, 1991), although there is evidence farm retailing is negatively related with farm size and that other diversification strategies are more likely to be found on large farms in England and Wales (McNally, 2001).

There is a relative dearth of research examining agritourism revenues explicitly, despite the prominence of income as a motivator for agritourism operators. Brown and Reeder (2007) identified a positive and statistically significant relationship between a farm's net worth and the owner's decision to add an agritourism activity to their business. Barbieri and Mshenga (2008) found that farms with more acres had higher incomes; however, their study did not separate general farm income from agritourism income. Joo, Khanal, and Mishra (2013) found that in terms of total household income and net farm income, small scale farms benefited from participating in agritourism while large scale operations did not benefit at all. Similarly, Schilling et al. (2014) found that intermediate-scale and lifestyle farms enhanced their profits by adding an agritourism attraction, but that

commercial-scale farms did not increase profits by engaging in agritourism. Most recently, Hung, Ding and Lin (2015) examined the revenue of farms offering agritourism activities and found that revenue was positively related to the education level of the owner but little evidence that revenue was related to the type and size of farm. Like the Barbieri and Mshenga (2008) and Hung et al. (2015) studies, this paper examines the relationship between agritourism business characteristics and business revenue, although this research is unique in that it uses data on revenue specific to agritourism sales rather than overall farm receipts.

DATA AND METHODS

Survey

Data on agritourism operators were gathered by the Oklahoma Agritourism Producers Survey (OAPS). The Oklahoma Department of Agriculture, Food and Forestry (ODAFF) provided a list of state-registered agritourism operations. This list included 355 businesses, but for the purposes of this study 64 farmers markets in the list were removed. The remaining 291 businesses were invited to participate in the OAPS in January 2015, which was conducted as a mailed questionnaire following the protocols outlined by Dillman (1978). The OAPS questionnaire contained five sections asking about business characteristics, customers, business challenges and future plans, a new agritourism law and owner demographics. For the purposes of this study, several questions were included in the survey that asked about revenue and profitability, operating season, owner education and the decision to host weddings. Other questions were developed in collaboration with ODAFF employees in the Oklahoma Agritourism

Program, including questions about the Program's agritourism website and the recent passing of the Oklahoma Agritourism Liability Limitations Act.

The initial mailing included the questionnaire and an individualized, hand-signed letter describing the purpose of the survey. The letter also contained a hand-written thank you note. The week following the mailing of the questionnaire, a postcard was sent out to the entire sample expressing our gratitude to those who had responded to the survey and to remind non-respondents to complete and return their questionnaire. Two weeks later, a second questionnaire was mailed to the businesses that still had not responded. The only significant difference between this mailing and the first mailing is that the letters did not include the written thank you note. Businesses that had undeliverable surveys due to a wrong address in the first mailing were researched online for a new address, to which the second survey was sent. A final reminder postcard was mailed out to these non-respondents one week later. This postcard expressed gratitude for their participation and noted that this was the last time they would be contacted. These methods resulted in an overall response rate of 63%.

Operator Data

Revenue is measured in the amount of dollars the company earned from their agritourism services in 2014. The OAPS asked operators to report their 2014 revenues in mutually exclusive categories. This was done to reduce item nonresponse, following the work of Barbieri and Mshenga (2008). These categories included: \$0 to \$9,999; \$10,000 to \$24,999; \$25,000 to \$49,999; \$50,000 to \$99,999; \$100,000 to \$249,999; \$250,000 to \$499,999; \$500,000 to \$999,999 and >\$1,000,000. As a result, revenue is not formed as a

continuous variable. It can be interpreted as a continuous variable by assuming that actual revenue lies at some point within these intervals. Such a measure was constructed assuming that actual income lies at the midpoint in each of the first seven categories: \$4,999.50; \$17,499.50; \$37,999.50; \$74,999.50; \$174,999.50; \$374,999.50; \$749,999.50. The last category had no upper bound, so the lower-bound \$1,000,000 was used.

Based on data collected by ODAFF prior the survey, agritourism businesses could be placed into four classifications of the services and activities that they offer: lodges, commodities, experiences and wineries. In the Oklahoma sample, about 24% of businesses are lodges, 36% market commodities, 29% market experiences, and the remaining 11% are wineries. Lodges include guest ranches, country stays and overnight fee-hunting. Commodity operations include pumpkin patches, u-picks and specialty crops (for example, Christmas tree farms). These businesses were grouped because they all offer a tangible product a visitor could purchase and take home. Experiences include traditional farm and ranch attractions, trail riding, mazes and fee-hunting without the overnight stay capability. These businesses were grouped because they offered a visitor service on a working farm or ranch. The final group includes wineries and vineyard attractions, which frequently offer visitors the opportunity to tour and learn about working viticulture facilities and are marketed separately from other working farms and ranches.

The data collected from the OAPS provided most of the variables used in the revenue analysis: days open, owner education level, owner age and the hosting of wedding services (Table A1). The days open variable is the number of days the business was open in 2014. The OAPS gathered the information for days open and age of operator variables

through questions with open-ended responses. Businesses were also asked whether they offered wedding services with a yes/no response. This information was used to generate a dummy variable equaling one if the business offered wedding services and zero otherwise. To determine each owner's education level, a question with a categorical response was set up that asked the participant to indicate their highest level of education. These categories included: less than high school degree, high school degree or GED, some college, technical/trade school, associate's degree, bachelor's degree and graduate degree.

Several variables were created for factors anticipated to play an important role in business performance but not collected through the survey. These include distance to major population centers and local consumer population. Distance (in miles) was calculated from the zip code address of each business to the city centers of Oklahoma City and Tulsa, the major metropolitan areas of Oklahoma. The distance from the closer city was then logged and used as the relevant distance measurement. The populations for each county were gathered from 2010 Census data reported by the Oklahoma Department of Commerce. The county population for each business served as a measure of the local consumer population.

REVENUE ANALYSIS

Revenue Model Specification

Producer theory implies that for a particular good or service individual supply is

$$(1) \quad q_i = q(p, c, x_i)$$

where q_i is the amount produced by business i , given output price p , input costs c and business characteristics x_i . Equation (1) is a basic supply curve. The corresponding business revenue equation is

$$(2) \quad r_i = pq(p, c, x_i).$$

This equation provides the theoretical support for relating revenue to business characteristics. Given fixed prices, observed variation in revenue is driven by differences in business characteristics x_i . In fact, given the diversity of business types and activities offered in the market for agritourism, p and c are unlikely to be fixed across business types. However, differences in prices and costs can be controlled for by allowing revenue to shift between business types.

After controlling for business types b_i , this study relates agritourism revenue to firm-specific operating aspects a_i , the decision to host weddings w_i , and owner demographics d_i . With these variable classifications, the agritourism revenue model can be expressed as

$$(3) \quad r_i = f(b_i, a_i, w_i, d_i)$$

where r_i is business i 's annual revenue from agritourism operations.

Given a functional form for equation (3), the effects of business characteristics on revenue can be estimated empirically using regression analysis. There is little existing work on modeling farm or agritourism revenues, so there is no existing justification on the analytical form of equation (3). However, a natural starting point is to assume a linear function of revenues or logged revenues. Barbieri and Mshenga (2008) and Hung et al.

(2015) both construct linear models that are level in farm income, the dependent variable. The general revenue model adopted here is a logged revenue model,

$$(4) \quad \ln(r_i) = \beta_0 + \beta_1 b_i + \beta_2 a_i + \beta_3 w_i + \beta_4 d_i + \varepsilon_i$$

where the β s are parameters and ε_i is a random error. The effects of different characteristics on revenue r_i is tested by regression analysis of equation (4) and examining the significance of the parameters.

Business type b_i includes dummy variables for the four classifications: lodging, commodities, experiences and wineries. To avoid perfect multicollinearity, the dummy variable for commodity attractions was left out of the regression model. With the commodity category serving as the base, it is hypothesized that the remaining three attraction types have a positive relationship with revenue, i.e. that businesses defined by these three attraction types have higher revenues than those that market agritourism commodities.

Business operating aspects include days open in a year, distance to nearest major city and county population. All three are continuous variables with distance being measured in one-way miles. It is hypothesized that days open has a positive, significant effect on revenue. This is expected due to the more days that a business is open, the more opportunity it has to earn revenue from potential customers. Distance is expected to have a negative relationship with revenue due to the costs distance imposes on potential visitors, which reduces the demand for visits to the business and therefore business

revenue. For a similar reason, county population is expected to have a positive relationship with business revenue.

A dummy variable was developed to characterize the decision to offer wedding services. Hosting weddings is a service that supplements a business's current attractions, so it is anticipated that businesses that host weddings will have higher revenue compared to those that do not.

Owner demographics include variables for the owner's age and education. Age is measured in years and is expected to have a positive effect on revenue, as age should be a proxy for experience and knowledge. Dummy variables were developed to represent the education levels of agritourism business owners. These dummy variables include: high school diploma or GED, technical or trade school degree and a college degree variable combining associate's, bachelor's and graduate degree recipients (no one chose the less than high school diploma category, so no dummy variable was developed for this category). The high school diploma/GED dummy variable was excluded in order to avoid perfect multicollinearity. Two dummy variables remain for analysis: technical/trade school and college. It is expected that there is a positive and significant effect on revenue when an owner has a higher education level than a high school diploma/GED. It is also expected that the effect of college will be larger than the effect of having completed a technical/trade school degree.

Regression Analysis

Two different regression techniques were applied to the revenue model: ordinary least squares (OLS) and interval regression. OLS was chosen because it is commonly used to

estimate linear models and interval regression was chosen because the data for the dependent variable is categorical and is therefore interval-coded.

The first regression estimates equation (4) using ordinary least squares (OLS). In order to use the OLS estimator, the revenue categories were transformed to their midpoints, as discussed in the previous section. OLS has several well-known advantages in estimating linear models, but setting the dependent variable equal to the midpoint of the interval the true value falls into causes OLS to be an inconsistent estimator of the coefficients (Wooldridge, 2002). Nevertheless, I expect OLS will provide useful insights into the impact of business characteristics on agritourism revenue.

Equation (4) is next estimated with interval regression. Since revenue was set up categorically in the OAPS, interval regression allows the modeler to use the information contained by the known bounds of the categories, unlike OLS where the modeler is forced to assume a value for revenue. Following Wooldridge (2002) and Barbieri and Mshenga (2008), under the assumption that $\varepsilon_i \sim N(0, \sigma^2)$, r_i is treated as a latent variable, with

$$w = 1 \text{ if } 0 \leq r_i \leq 9,999$$

$$w = 2 \text{ if } 10,000 \leq r_i \leq 24,999$$

$$w = 3 \text{ if } 25,000 \leq r_i \leq 49,999$$

$$w = 4 \text{ if } 50,000 \leq r_i \leq 99,999$$

$$w = 5 \text{ if } 100,000 \leq r_i \leq 249,999$$

$$w = 6 \text{ if } 250,000 \leq r_i \leq 499,999$$

$$w = 7 \text{ if } 500,000 \leq r_i \leq 999,999$$

$$w = 8 \text{ if } 1,000,000 \leq r_i$$

with conditional probabilities $\Phi[(\beta_0 + \beta_1 b_i + \beta_2 a_i + \beta_3 w_i + \beta_4 d_i - a_j)/\sigma]$ where a_j are the known interval limits for $j = 1, 2, \dots, 8$ and Φ is the standard cumulative normal. The conditional probability function is used to construct a likelihood function with the parameters estimated by maximum likelihood. As with OLS estimation, the dependent variable is the natural log of revenues (in this case the upper and lower bounds of the revenue categories). The interval regression coefficients are interpretable as if r_i was observed and equation (4) was estimated by OLS (Wooldridge, 2002).

Barbieri and Mshenga (2008) also estimate a model of business revenue using interval regression. Their income data was collected and distributed across four mutually exclusive categories, whereas this study uses income data spread across eight categories. While respondents may be less likely to report their income when there are many income categories, each with a relatively small interval, using larger intervals as in Barbieri and Mshenga (2008) could lead to a loss of information. To test what effect different interval ranges have on the regression results, two additional interval regressions are tested, referred to as Hypothetical Intervals 1 (HI1) and Hypothetical Intervals 2 (HI2). This is a simple experiment to judge the impact of different intervals on revenue; it does not control for the fact that using different interval types could influence responses, e.g. response rates. A more complex experiment could use a split sample in the survey, where half of the sample gets one type of intervals and the other half gets another type.

The first hypothetical interval regression contains the following four intervals:

$$w = 1 \text{ if } 0 \leq r_i \leq 24,999$$

$$w = 2 \text{ if } 25,000 \leq r_i \leq 99,999$$

$$w = 3 \text{ if } 100,000 \leq r_i \leq 499,999$$

$$w = 4 \text{ if } 500,000 \leq r_i$$

These intervals are developed by evenly pairing the existing eight categories in the benchmark interval regression, for example 1+2, 3+4 and so on. The second hypothetical interval regression being tested contains the intervals:

$$w = 1 \text{ if } 0 \leq r_i \leq 9,999$$

$$w = 2 \text{ if } 10,000 \leq r_i \leq 49,999$$

$$w = 3 \text{ if } 50,000 \leq r_i \leq 249,999$$

$$w = 4 \text{ if } 250,000 \leq r_i$$

These intervals, which are identical to those used by Barbieri and Mshenga (2008), are created by combining the benchmark categories 2+3, 4+5, and 6+7+8 with the first category remaining by itself. When looking at the distribution of the sample based on the performance categories (Table A2), it is evident that the survey responses are more evenly distributed across the categories of hypothetical intervals 2 than hypothetical intervals 1.

In summary, four regressions are run to test the characteristics that may relate to business revenue and to test the importance of interval sizes on regression results. The four regressions are:

- Linear regression using OLS,
- Interval regression with 8 revenue categories (benchmark),
- Interval regression with 4 revenue categories that equally pairs the categories used in the benchmark (HI1), and
- Interval regression with 4 revenue categories with more equally distributed survey responses (HI2).

Post-estimation Testing

The usual OLS standard errors rely on homoskedasticity. A Breusch-Pagan test was computed to test this assumption. The null hypothesis was not rejected ($p = 0.3280$) at the 10% level, which suggests that by logging revenues the homoscedasticity assumption is valid. Of course, robust standard errors can be calculated for the OLS coefficients using the White estimator, but this issue is moot if the OLS coefficients are inconsistent due to revenue being in a categorical format.

Assumptions regarding homoscedasticity and normality are more critical to the interval regressions. This is why, to avoid problems with heteroscedasticity, the log of the revenue bounds was used for the interval regressions. To test for normality, Shapiro-Wilk and Shapiro-Francia tests were performed on the revenue data. The null hypothesis of

normality was rejected by the Shapiro-Wilk test ($p < 0.0001$) but was not rejected by the Shapiro-Francia test ($p = 0.7359$) providing mixed evidence that the data satisfies the normality assumption. Thus, the interval regressions could yield inconsistent estimates because one of the requirements for standard censored regression estimators is that the data follow a homoscedastic, normal distribution (Wooldridge, 2002).

A Ramsey RESET test was performed to test functional form. This test failed to reject the null hypothesis of no omitted variables ($p = 0.7011$). As heteroscedasticity can be associated with an omitted variables problem, the result of the RESET test is consistent with the earlier finding that the logged revenue model satisfies the homoscedasticity assumption. Based on these tests, all models appear to be correctly specified, except for the linear model that assumes the business's revenue is the midpoint of the reported interval values.

FINDINGS

Results

Overall, the OLS and benchmark interval regression results are similar in terms of coefficient signs and significance levels (Table A3). In terms of operating aspects, the effect of county population is positive and statistically significant at the 1% level in both models, while the effect of days open in a year is positive and statistically significant at the 5% level in both models. Surprisingly, the OLS results suggest the distance to the closest metropolitan area does not affect revenue; this effect is negative but insignificantly different from zero at the 10% level. On the other hand, the effect of

distance to the closest metropolitan area is negative and statistically significant at the 10% level for the benchmark interval model.

The different regression estimates are largely in agreement about the effects of the owner demographics. Both models identify a college education as an important determinant of agritourism revenues. The possession of a college education is associated with higher revenues, an effect that is significant at the 10% level for the OLS regression and at the 5% level for the interval regression. Both regressions failed to identify the attraction type, operator age and technical/trade education variables as significant factors in business performance.

Both regression models are in agreement pertaining to the wedding variable. The effect of hosting weddings is insignificant at the 10% level across the regressions.

For the OLS and interval regressions, the interpretation of the coefficients is that they are the marginal effects, holding everything else constant. The OLS coefficient for the days open variable suggests that for every 1% increase in the number of days a business is open in a year (about 1-2 days), revenue increases by 0.28% $((1.01^{0.2810103} - 1) * 100\%)$.

For distance to the nearest metropolitan area, the OLS coefficient indicates that for every 1% increase in mileage to either Tulsa or Oklahoma City, revenue is expected to decrease by 0.29% $((1.01^{-0.2920018} - 1) * 100\%)$. County population is denominated in thousands and is kept in level form, so the coefficient says that an additional 1000 people in the county is expected to increase revenues by 0.25% $((e^{0.0000025} - 1) * 100\%)$. If the operator has a college degree, revenue is expected to be 69.26% $((e^{0.5262507} - 1) * 100\%)$ higher than it would be if the operator had a high school degree, which is the base category for the

education vector. When interpreting the technical/trade education variable, even though it was not significant, a person with a technical/trade school education is expected to have revenue that is 93.25% $((e^{0.6588199}-1)*100\%)$ higher than an operator with a high school education. When interpreting the operator age variable, although insignificant, a one-year increase in the age of the operator is expected to decrease revenue by 1.41% $((e^{-0.0141620}-1)*100\%)$. The effects are nearly the same when interpreting the benchmark interval regression coefficients.

The hypothetical intervals produce regression results that differ somewhat from the benchmark intervals. All coefficients are similar in sign and magnitude, and all three interval regressions show the effect of distance significant at the 10% level. All three interval regressions show business type, wedding hosting, owner age and possession of a technical/trade degree as insignificant predictors. Also, all three models found the number of days open and population significant, but at different levels. The days open variable is significant at the 10% level when using hypothetical intervals 1, but significant at the 5% level when using either the benchmark intervals or hypothetical intervals 2. The population variable is significant for hypothetical intervals 1 and hypothetical intervals 2 at the 5% level, but significant at the 1% level with the benchmark intervals. College education was found insignificant when using hypothetical intervals 1, but was significant at the 5% level when using the benchmark intervals and hypothetical intervals 2.

Discussion

The results provide strong evidence that the number of days a business is open and local population affect agritourism revenue. This study found that revenue increases with the number of days a business is open. This seems logical as the more days that a business is open, the more opportunities it has to gain customers, and therefore, increase revenue. This study also found revenue decreases with the distance a business is from a major metropolitan area, although this variable received mixed significance results between models, and increases with county population. These effects match with intuition, as a business should receive more customers and revenue the closer it is to highly populated areas.

Although insignificant, the negative relationship between age and revenue is unexpected. Earnings are known to be positively correlated with work experience in non-farm occupations, which itself is highly correlated with age. This confounding result may be due to the limitations in working with cross section data. However, this result comports with Barbieri and Mshenga (2008), who found that farmer age was inversely related to agritourism business performance.

Another surprising result is the lack of any significant difference between the incomes of different types of agritourism businesses. The experience variable does have the highest coefficient, which means that experiential attractions have the highest revenue on average, other things being equal, but that the difference is not enough compared with the baseline and the variance in the data to conclude that there is a significant difference among businesses. Also, the lodging variable is negative suggesting that lodging

attractions have less revenue when compared to commodity attractions, other things being equal, but again the difference is not significant. The dummy variable for weddings was also unexpectedly insignificant. This null result could be explained by self-selection into the wedding industry; perhaps many of the businesses that elect to host weddings do so because the revenues from their other agritourism activities are poor, which would dampen the positive effect of wedding hosting that could be detected in the model.

There is also modest evidence that education affects revenue. The estimates suggest that an operator with a college education receives annual revenues that are 69% higher than an operator with a high school education, *ceteris paribus*. The sign of this effect is not surprising, although the magnitude is quite large. This speaks to the importance of a college education. The effect of a trade school degree is actually larger but is insignificantly different from zero. The precision with which this effect is estimated may be due to data limitations as less than a dozen individuals in the sample possess such a degree. Overall, the significance of education is in agreement with prior work by Joo et al. (2013) and Hung et al. (2015), although Barbieri and Mshenga (2008) did not find that education was a significant factor in agritourism farm performance.

The testing of interval sizes' effect on the regression results leads to an interesting outcome. Clearly, using intervals like those in hypothetical intervals 1 is undesirable in terms of model fit and the knowledge that the benchmark model is closest to the truth. The R-squared of the interval regression estimated on hypothetical intervals 1 ($R^2 = 0.271$) is less than the R-squared of the regression applied to hypothetical intervals 2 ($R^2 = 0.286$) and even further away from the benchmark regression ($R^2 = 0.306$). Using hypothetical intervals 1 would also lead the researcher to falsely conclude that owners

having a college education does not factor significantly into business revenue. When looking at the standard errors of the regressions, hypothetical intervals 1 has the highest standard errors when compared to both the benchmark and hypothetical intervals 2. This means that applying interval regression to the data from hypothetical intervals 1 generates the least precise estimates. The benchmark regression has the smallest standard errors, implying that using more intervals produces more precise estimates. However, hypothetical intervals 2 produces results very similar to the benchmark results; it appears that the use of only a few intervals is sufficient as long the responses are fairly evenly distributed within the intervals.

CONCLUSION

The results suggest that there are a few key business characteristics that impact revenue: days open and local population. One objectively measurable owner attribute also relates to revenue: education level. On the other hand, this study found there was no significant difference in expected revenue for agritourism businesses marketing different types of attractions; experiential attractions generate more revenue than other agritourism attractions, but the average difference was not a large enough in the data to be definite. Wedding hosting was also not found to significantly impact revenue.

Two regression techniques were used in this study: OLS and interval regression. Interval regression is preferred over OLS because it accounts for the manner in which the revenue data was collected. However, the OLS estimates were very similar to their counterparts from interval regression. In order for interval regression estimates to be valid, homoskedasticity and normality must be satisfied. A Breusch-Pagan test failed to reject

the null hypothesis of homoskedasticity, while the Shapiro-Wilk and Shapiro-Francia tests offered conflicting evidence about normality. Nevertheless, the similarity of the OLS and interval regression estimates suggest the implied effects are robust to these modeling concerns.

Three different interval regressions were used to test the importance of interval sizes. The benchmark interval regression strategy was applied to the eight individual income categories, while two additional interval regressions were applied to different formulations of the income variable, each containing four categories. The results were sensitive to the construction of the intervals. The regression that used four intervals paired evenly from among the eight categories in the survey measured fewer and less statistically significant effects compared to the other interval regressions. In contrast, the regression that used the four intervals with a more even distribution of responses in each category led to results that were almost identical to the benchmark interval regression. This suggests that using only a few income categories is acceptable for the purpose of modeling business performance, as long as the researcher constructs the categories so that they receive a somewhat equitable distribution of responses, as done by Barbieri and Mshenga (2008).

While past research has identified the main reasons that farmers expand into agritourism, this research identifies what business and owner characteristics are associated with higher agritourism revenue based on a sample of Oklahoma agritourism businesses. Future research should examine whether different performance measures are influenced by the characteristics mentioned in this study as well as others such as marketing techniques,

climate variability, etc. Also, future research should study the costs associated with agritourism attractions based on activity type.

This research will be useful to existing and future agritourism entrepreneurs in Oklahoma. Current agribusinesses will be able to use this information to anticipate the potential success of adding an agritourism component, depending on their existing location and the type of attraction they might like to add. Incoming agritourism entrepreneurs and consulting organizations such as the Oklahoma Agritourism Program could also use this information in deciding on the importance of education, days open and activities to the performance of an agritourism business.

CHAPTER III

RELATING VISTATION TO THE USE OF DIFFERENT MARKETING METHODS BY AGRITOURISM OPERATIONS IN OKLAHOMA

The success of a business depends on attracting customers. For agritourism businesses, this means offering activities, products and services that will attract paying visitors.

Agritourism lies at the intersection of agriculture and tourism, and includes attractions such as wineries, farm stays, farm tours, corn mazes, u-picks and trail rides. By tapping into the market for tourism and catering to visitors, agritourism businesses can provide a significant source of income for residents in rural areas. Fortunately for agritourism entrepreneurs, the demand for agritourism opportunities is growing (U.S. Department of Agriculture, 2014). However, increasing the number of customers a business receives can be quite challenging. Several aspects can affect the number of customers an agritourism business receives besides the products it offers, including location and marketing.

Prior research shows substantial variation in the number of customers received by agritourism businesses, although most operations attract less than a few thousand visitors annually. For example, Rilla, Hardesty, Getz & George (2011) found 51% of California businesses received less than 500 visitors annually, while 12% hosted more than 20,000. A similar pattern was noted by Bruch & Holland (2004), who found individual agritourism operations in Tennessee attracted anywhere from 0 to 425,000 visitors in a

year, with a median of 3,500. This research highlights a strong rightward skew in visitation rates, in that many businesses have little trouble averaging a few visitors per day, but attracting many visitors appears challenging. While not all businesses rely on a large number of customers, for most agritourism businesses attracting new visitors is an important goal (Jensen, Bruch, Menard, English & Hall, 2014).

One important method of attracting customers is to promote the business through marketing. On average, an agritourism business invests in between four and five forms of marketing (Tew & Barbieri, 2012; Galinato, Galinato, Chouinard, Taylor & Wandschneider, 2011). Between 50% and 95% of operators use a website to promote and provide information about their business (Barbieri, Mahoney, & Butler, 2008; Duffy, 2014; Galinato et al., 2011; Hupp, 2009; Jensen et al., 2014; Rilla et al., 2011). Online advertising can be particularly useful in attracting distant and international customers. For example, agritourism operations in countries like Romania are increasingly turning to the use of websites (Pop, Stanca, & Matei, 2008). Other popular methods include magazine and newspaper ads, brochures and pamphlets, local farm associations, Facebook business pages and road signs (Duffy, 2014; Galinato et al., 2011; Hupp, 2009; Jensen et al., 2014; Rilla et al., 2011). In California, word of mouth, feature stories and a business website were deemed the most effective (Rilla et al., 2011), while Ohio operators identified billboards and road signs as the most effective (Hupp, 2009). Consumers in Oklahoma as well as Iowa found word of mouth to be the most effective advertising method (Murphy & Melstrom, 2015; Nasers & Retallick, 2012). However, most of these conclusions are anecdotal, as there is little quantitative research on the relationship between marketing methods and agritourism visitation.

This study presents data on the relationship between agritourism marketing methods and visitation. Specifically, this paper presents the results of a visitation model relating different marketing methods and business characteristics to the annual number of visitors an agritourism business receives. This research focuses especially on the following marketing methods: social media, print, billboards and road signs, radio and television advertising, business websites and blogs, and other online promotion methods. Business characteristics such as attraction type, distance from densely populated areas, local population size and annual days open are also included in the model as these are expected to have an effect on visitation. Results are obtained using data on agritourism visitation in Oklahoma.

This paper makes an additional contribution to the literature on tourism. Several variants of the visitation model are estimated, including a linear model, a logged model and an exponential model. The motivation for the logged model comes from the skew in the Oklahoma visitation data. While this is a common treatment to “normalize” data or provide a better model fit, the parameters of logged models are biased under conditions of heteroskedasticity (Santos Silva and Tenreiro, 2006). Heteroskedasticity is likely to be encountered in practice, which includes the agritourism visitation data used in this study. As a solution, an exponential-version of the model is estimated using a quasi-maximum likelihood (QML) estimation technique. Regression estimates are compared across the logged and exponential model specifications to determine the scale of bias from ignoring heteroscedasticity in visitation.

DATA

Data on agritourism visitation comes from businesses in Oklahoma. A survey of operators was conducted in January 2015 based on a list of state-registered agritourism operations provided the Oklahoma Department of Agriculture, Food and Forestry (ODAFF). This list initially included 355 businesses, but the survey excluded the 64 farmers markets on the list. The remaining 291 businesses were invited to participate in the survey as a mailed questionnaire following the protocols outlined by Dillman (1978). The questionnaire contained five sections asking about business characteristics, customers, business challenges and future plans, a new agritourism law and owner demographics. For the purposes of this study, questions were included to ask about annual visitation and marketing methods.

The initial mailing included the questionnaire and an individualized, hand-signed letter describing the purpose of the survey. The letter also contained a hand-written thank you note. The week following the mailing of the questionnaire, a postcard was sent out to the entire sample expressing our gratitude to those who had responded to the survey and to remind non-respondents to complete and return their questionnaire. Two weeks later, a second questionnaire was mailed to the businesses that still had not responded. The only significant difference between this mailing and the first mailing is that the letters did not include the written thank you note. Businesses with undeliverable surveys due to a wrong address in the first mailing were researched online for a new address, to which the second survey was sent. A final reminder postcard was mailed out to non-respondents one week later. This postcard expressed gratitude for their participation and noted that this was the

last time they would be contacted. These methods resulted in an overall response rate of 63%.

The survey asked operators in an open-ended format to report the number of visitors in 2014, including repeat customers. On average, a business reported 6,724 visitors. The median number of visitors was 500. Table B1 presents descriptive statistics of the data used in this study.

The survey also asked agritourism operators to identify the type of marketing and promotion methods they used in 2014. The survey listed 14 methods including (verbatim): operation's own website/blog; social media; online advertisements; online discount deals (Groupon, living social, etc.); email or newsletter list; newspaper advertising; television advertising; direct mail; billboards/road signs; partnership with other businesses; regional, county or local association/Chamber of Commerce; business brochures; radio advertising; and an other category with a fill-in-the-blank space. For the purposes of this study, this list was simplified to seven broad categories, including: *social media*, *print*, *billboards/road signs*, *radio/television*, *website/blog*, *other online methods* and an *other* category (Figure B1). Thus, the *social media*, *billboards/road signs*, and *website/blog* categories were not pooled with any of the other categories. Radio advertising was combined with television advertising to create the *radio/television* category, and online advertisement was combined with online discount deals to develop the *other online methods* group. The *print* category consists of newspaper advertising, direct mail and business brochures. The *other* category combines email or newsletter list, partnerships with other businesses, regional, county or local association/Chamber of Commerce and those replies that could not be assigned to any other category.

The visitation analysis included several additional variables collected by the survey, including days open. The days open variable is the number of days the business was open in 2014. This data was gathered using open-ended responses.

Information about the type of visitor attraction was provided by ODAFF prior to the survey. For this study, business were placed into one of four classifications: lodging, commodities, experiences and wineries. The categories made up 24%, 36%, 29% and 11% of the businesses respectively. Lodges include guest ranches, country stays and overnight fee-hunting. Commodity operations include pumpkin patches, u-picks and specialty crops (for example, Christmas tree farms). These businesses were grouped because they all offer a tangible product that a visitor could purchase and take home. Experiences include traditional farm and ranch attractions, trail riding, mazes and fee-hunting without the overnight stay capability. These businesses were grouped because they offered a visitor service on a working farm or ranch. The final group includes wineries and vineyard attractions, which generally offer visitors the opportunity to tour and learn about working viticulture facilities and are marketed separately from other working farms and ranches.

Two variables are expected to play a significant role in visitation but were not collected through the survey. These factors are local consumer population and distance to major population centers. Local consumer population was measured using the 2010 Census-recorded population of the county in which the business is located. The distance from major population centers was measured as the mileage driving distance from the business to Oklahoma City and Tulsa, the two major metropolitan areas of Oklahoma. The mileage to the closer city was then logged and used as the relevant measure of distance.

VISITATION MODEL

A visitation model is developed to formally test the hypothesis of a significant relationship between visitation and the use of different marketing methods. The visitation model is written generally as,

$$(1) \quad V_i = f(M_i, X_i, B_i)$$

where V_i is the number of annual visitors for business i , M_i is a vector of marketing variables, B_i are attraction type dummies, and X_i is a vector of other business characteristics.

The vector M_i contains dummy variables for the seven marketing methods: *social media*, *website/blog*, *other online methods*, *radio/television*, *print*, *road signs/billboards*, and *other*. The dummies do not represent mutually exclusive categories so there is no need to exclude one of the marketing dummies to avoid perfect multicollinearity. Producers could and typically did indicate the use of several methods. All forms of marketing are expected to have a positive relationship with the number of visitors. *Social media*, *website/blog*, *road signs/billboards* and *print* were the most popular methods in the sample (Table B1). *Radio/television* was the least popular method, which is not surprising because this is one of the most expensive forms of advertising (Hupp, 2009). The *other* category combined answers like the use of associations, partnerships and email or newsletter lists, which were popular methods in Oklahoma.

Business type B_i is comprised of mutually exclusive dummy variables identifying different classifications: lodges, wineries, commodities and experiences. The dummy for

lodges is removed from the regression model to avoid perfect multicollinearity with the other attraction types. This leaves visitation to lodges as the base to compare visitation levels at different businesses. The three remaining business types are expected to have a greater number of visitors when compared to lodges.

Other business characteristics X_i include days open in a year, local population size and driving distance to the nearest metropolitan area. The relationship between visitation and the first two variables is expected to be positive. The relationship between visitation and distance is expected to be negative because the expense and time to travel to an agritourism attraction is an important factor of the cost of a visit. However, initial trials of the model indicated substantial heterogeneity in the effect of distance between lodges and the other business types. In brief, the demand for overnight stays was quite inelastic with respect to distance. To address this issue, the effect of distance in the model is specified only for winery, commodity and experience-type businesses. For similar reasons, county population is specified only for winery, commodity and experience-type attractions.

Assuming a linear and additive functional form for the right-hand side of equation (1), the visitation model is,

$$(2) \quad V_i = \beta_0 + \beta_1 M_i + \beta_2 X_i + \beta_3 B_i + \varepsilon_i$$

where the β s are parameters and ε_i is the error. The effects of business characteristics, attraction type and marketing methods on visitation V_i is tested by estimating equation (2) by ordinary least squares (OLS) and assessing the significance of the parameters.

An alternative visitation model assumes an exponential relationship between visitation and the independent variables:

$$(3) \quad V_i = \exp(\gamma_0 + \gamma_1 M_i + \gamma_2 X_i + \gamma_3 B_i) + \omega_i.$$

The advantage of this model is that it acknowledges that visitation can only take on nonnegative values—a fact which is ignored by the linear visitation model. Logging the left-hand side of equation (1) yields

$$(4) \quad \ln(V_i) = \gamma_0 + \gamma_1 M_i + \gamma_2 X_i + \gamma_3 B_i + \xi_i,$$

which hereafter is referred to as the log visitation model. Like the linear visitation model in equation (2), the log visitation model can be estimated with OLS. However, unlike equation (2), OLS estimates will be biased under most conditions of heteroscedasticity (Santos Silva and Tenreyro, 2006). To see this, note equation (3) can be written as

$$V_i = \exp(\gamma_0 + \gamma_1 M_i + \gamma_2 X_i + \gamma_3 B_i) \eta_i,$$

where $\eta_i = 1 + \omega_i / \exp(\gamma_0 + \gamma_1 M_i + \gamma_2 X_i + \gamma_3 B_i)$. OLS is a consistent estimator only if $\xi_i = \ln(\eta_i)$ is not a function of the independent variables, which requires $\omega_i = \exp(\gamma_0 + \gamma_1 M_i + \gamma_2 X_i + \gamma_3 B_i) v_i$ where v_i is itself uncorrelated with the independent variables. Given V_i is nonnegative, ω_i is necessarily heteroscedastic in a manner that depends on the independent variables (e.g. the error must shrink as the expected value of V_i goes to zero). Santos Silva and Tenreyro (2006) argue that, in practice, ω_i is unlikely to have the (very) specific form that ensures OLS is a consistent estimator of equation (4), which effectively requires ξ_i is homoscedastic. Put simply, what is needed is an estimator that is consistent without requiring $\omega_i = \exp(\gamma_0 + \gamma_1 M_i + \gamma_2 X_i + \gamma_3 B_i) v_i$.

An alternative approach is to directly estimate the exponential model of visitation in equation (3). The challenge is this requires using nonlinear least squares (NLS). The NLS estimator is defined by:

$$(5) \quad \hat{\gamma} = \arg \min_{\gamma} \sum_{i=1}^n [V_i - \exp(\gamma_0 + \gamma_1 M_i + \gamma_2 X_i + \gamma_3 B_i)]^2$$

The first-order conditions implied by equation (5) places more weight on observations where $\exp(\gamma_0 + \gamma_1 M_i + \gamma_2 X_i + \gamma_3 B_i)$ is large and therefore have larger variance, implying an inefficient estimator. Santos Silva and Tenreyro (2006) suggest a NLS estimator that gives all observations the same weight. This NLS estimator happens to have the same form as the Poisson maximum-likelihood estimator, which is often used for count data. Poisson estimation applied to a model in which the dependent variable is not Poisson-distributed is known as a Poisson pseudo-maximum-likelihood estimator (PPML). This estimator provides consistent parameter estimates as long as the conditional mean is specified correctly—i.e. the right-hand side of equation (1) can be written as an exponential function, regardless of heteroscedasticity. Poisson regression typically estimates standard errors under the assumption that the expected variance equals the expected mean, which is unlikely to be true, so in practice the precision of the parameters should be measured using robust standard errors (e.g. White standard errors).

RESULTS

Two estimation methods are used in this study: OLS and PPML. The OLS technique is applied to the linear and log visitation models. The PPML method is adopted from Santos Silva and Tenreyro (2006) and applied to the exponential visitation model. A few

regressors (days open and distance) were logged transformed to improve model fit across all three specifications.

Tests confirmed the presence of heteroscedasticity in the visitation data. A Breusch-Pagan /Cook-Weisberg test was performed on the linear model. The null hypothesis of homoscedasticity failed at the 1% level. Under conditions of heteroscedasticity, OLS parameters remain unbiased but standard errors are inconsistent. White standard errors were used to provide heteroscedasticity-robust inference on the significance and precision of the parameter estimates in the linear visitation model and exponential visitation model. OLS standard errors were used in the log visitation model as the validity of this model is predicated on the homoscedasticity assumption. A Breusch-Pagan /Cook-Weisberg test was performed on the logged model which resulted in the null hypothesis of homoscedasticity failing to reject at the 10% level. This suggests that the log visitation model does not violate the assumption of homoscedasticity and the parameters are unbiased.

The results of the log and exponential models can be directly compared because they are estimating the same parameters. Interestingly, there are significant differences between the model parameters (Table B2). It is also interesting to note that while the parameters of the linear model have a different interpretation, the signs of the coefficients occasionally differ from their counterparts in the other models.

When looking at the marketing techniques, the three models agree that there is a statistically significant relationship between visitation and *road signs/billboards*, and no evidence of a relationship between visitation and the use of a *website or blog*. The models

also agree that there is not a significant relationship between visitation and *other online methods*. The linear visitation model finds *social media* insignificant at the 10% level, while the log and exponential visitation models find *social media* significant at the 1% level. The relationship with *road signs/billboards* is significant at the 1% level in the exponential visitation model and 5% in the linear and log visitation models. The log and exponential models agree that *print* is significant, at the 1% and 5% levels respectively. The *other* category was significant in the linear and exponential visitation models, at the 10% and 5% levels respectively. The log visitation model was the only model to find *radio/television* significant (1% level).

Relatively more commonality between models was found when measuring the influence of business types. All three models agreed experience-type attractions generated significantly more visitation when compared to lodges. The linear model found experiential attractions significant at the 10% level, while the log model found it significant at the 5% level and the exponential model at the 1% level. Also, two of the models agreed commodity-type attractions generated significantly more visitation; this relationship was significant at the 5% level in the log visitation model, and at the 1% level in the exponential visitation model. Only the log visitation model found winery attractions significant (5% level).

The remaining business characteristics yielded some interesting results in terms of significance. Surprisingly, local population was not found significant in any of the models. The days open variable was only significant in the exponential model (10% level). Distance was significant at the 1% level in the exponential visitation model and significant at the 5% level in the linear and log visitation models.

As expected, all marketing methods have a positive relationship with the number of visitors except the *website/blog* method, which was negative and insignificant in the log and exponential visitation models. The results suggest the use of a website/blog to draw in visitors is one of the least effective marketing methods. The linear, log and exponential models predict that visitation will increase by 5023, 9669¹ and 12883, respectively, when *social media* methods are used. Social media was found to be the most effective of the marketing methods according to the log and exponential models and the second most effective method, but insignificant, in the linear model. The linear, log and exponential models estimate that visitation will increase by 11548, 5580 and 8441, respectively, when *road signs/billboards* are used as marketing methods. This is the most effective marketing method identified by the linear model, while it is the second most effective in the exponential model and fourth most effective in the log model. Visitation is estimated to increase by 3022, 7988 and 4543 when *print* methods are used according to the linear, log and exponential models, respectively. This is the third most effective method found in the log model, fourth in the exponential model and insignificant and fifth effective in the linear model. The *other marketing methods* category, containing associations, partnerships and email or newsletter lists, among others, is expected to increase visitation by 4232, 1934 and 5626 according to the linear, log and exponential models, respectively. This category is the third most effective method in the linear and exponential models, but only the fifth in the log model which found it insignificant.

¹ The formula used to determine the marginal effects for the log and exponential models is the coefficient multiplied by the average number of visitors. This formula, while technically incorrect, gives a good approximation of the effect of a qualitative variable without having to take a stand on the base group. In general, the correctly predicted value is quite different if the variable changes in value from 0 to 1 than from 1 to 0. The number reported here lies between these two extremes. This issue is discussed in Wooldridge (Wooldridge, 2012).

Radio/television advertisements are estimated to increase visitation by 491, 8126 and 3073 when used according to the linear, log and exponential models, respectively. This method is identified as the second most effective method in the log model which was the only model to find it significant, but is the sixth most effective method in the exponential model and seventh in the linear model. The *other online methods* technique is suggested to increase the number of visitors by 3303, 1696 and 3586 by the linear, log and exponential models, respectively. No model found it significant, but it is the fifth most effective method in the exponential model, fourth in the linear model and sixth in the log model.

Several interesting results were found in regards to business activity types. The attraction type with the most visitors compared to lodges is experiential attractions according to the linear model; this attraction is second in the log and exponential models. These models suggest that experiential attractions have 21476, 23032 and 22270 more visitors on average than lodges, respectively. This range is dwarfed by the standard errors suggesting that the differences are not statistically significant. The same situation applies to the commodity attractions as well. Commodity attractions were identified as the business type with the highest number of visitors when compared to lodging attractions according to the exponential model, second highest in the linear model and the third highest in the log model. These models suggest that commodity attractions have 22691, 19196 and 21837 more visitors when compared to lodging attractions in a year. These differences are not statistically significant when taking the standard errors into consideration. The coefficient and marginal effect of the linear and exponential models, although insignificant, are interpreted to mean that winery attractions are expected to have 11606

and 13827 more visitors than lodging attractions respectively. Again, the difference between the models is insignificant when considering the standard errors.

The results regarding the business operating aspects were mostly as expected. When interpreting the distance variable results, it is important to keep in mind that the distance from the lodging attractions was removed. The linear, log and exponential results suggest that a 1% increase in the distance to a largely populated area decreases the number of visitors by 52.5, 46.4 and 56.9, respectively. The days open variable, which is only significant in the exponential model, is interpreted to mean that a 1% increase in the number of days open yields an increase in visitors of 15.5 and 25.4 according to the linear and exponential models respectively. The log model suggests that a 1% increase in days open actually decreases the number of visitors by 10.5. Local population was also found to be insignificant by all three models. It is important to remember that this variable only represents the local populations for the winery, commodity and experiential attractions. The linear and log model coefficients suggest that there is a positive relationship between visitation and local population, while the exponential model suggests that local population has a negative relationship with visitation; all three models suggest the relationship is minor.

When comparing results, the differences between the log and the exponential models become apparent. The exponential model has many of the same characteristics as the log model, but does not seem to suffer from the more extreme predictions. For instance, the log model estimates that wineries on average have 24248 more visitors than lodges; yet no winery business reported over 10000 visitors in 2014. Also, the log model found wineries significant at the 5% level when the other models did not find it significant.

Another example pertains to the days open variable. The log model suggests that the more days a business is open, the less number of visitors a business receives which is counter-intuitive. The linear and exponential models both report this variable to have a positive relationship with visitation.

A Ramsey RESET test was performed under the null hypothesis that the model is specified correctly. This hypothesis was rejected at the 1% level for the linear and exponential visitation models and at the 10% level for the log visitation model. The failure of the exponential visitation model is surprising, given that it describes visitation much better when compared with the log visitation model. When looking at the R-squareds, there is roughly a 20 percentage point increase between the linear and log models, while there is a 15 percentage point increase between the log and exponential visitation models (Table B2).

CONCLUSION

The number of visitors to an agritourism business can be related to business characteristics including marketing techniques, on-site attractions and operating characteristics. This study quantitatively examines the relationship between visitation and several marketing, attraction and operating variables. Across several different visitation models, marketing through road signs and billboards was strongly related to higher levels of visitation. Road signs and billboards can increase the number of visitors a business receives by directing customers to the business and also increasing the local awareness of the business, which could lead to customer recommendations and an increase in local participation, making it an effective marketing method. Social media is the most effective

marketing method in the two models that found it significant. Social media is used by a large percentage of consumers and thus allows a business to quickly and directly communicate to a large portion of the population, so it makes sense that this is a highly effective marketing method. Surprisingly, the business website/blog method was not found significant by any regression method. Two reasons for this insignificance may be because, first, customers would need to know the name of the business in order to find its website, and second, people prefer to use social media or tourism websites to find businesses offering the desired attractions. This suggests that businesses should consider whether the money and effort of developing their own website is worth the relatively small boost in customers they think they can achieve through their website.

Not surprisingly, agritourism visitation depends significantly on the type of attraction. Lodges tend to receive the fewest visitors, likely due to the limited accommodation space a business has invested in to host visitors. Commodity, experience and winery attractions do not have this limitation. Experience and commodity attractions were the most popular business types across models, predicted to attract a roughly equal number of visitors, other things being equal. Wineries attracted an intermediate number of visitors compared with the other attraction types.

Business operating aspects do not have as much of an effect on the number of visitors as expected. Even though the distance to a largely populated area is significant as anticipated, local population is insignificant in all three models. It is unclear why the local population variable does not play a significant role. Days open was found to not affect visitation in two of the three models. Days open could be insignificant as businesses may receive the greatest portion of their visitors on the weekends and,

therefore, being open during the week may not significantly impact the number of visitors.

Three different visitation models were used in this study: a linear visitation model, a log visitation model and an exponential visitation model. Relative to the other models, the linear model fit the data very poorly, but the log model produced at least one parameter estimate of questionable validity. The exponential model was estimated using the PPML estimation method suggested by Santos Silva and Tenreyro (2006). The advantage of the PPML model is it accounts for the fact that visitation is necessarily positive and can produce consistent parameter estimates when heteroscedasticity exists. Heteroscedasticity in the log visitation model can result in inconsistent standard errors *and* parameters, so using a heteroscedasticity-robust standard error estimator is not an appropriate correction. Estimating a linear model with OLS will generally produce inconsistent parameter estimates as it ignores the fact that visitation is necessarily positive.

While previous research has identified farmer motivations for expanding into agritourism, this research has examined the effectiveness of marketing techniques in drawing in agritourism customers. Also, this research has tested the effects of three different visitation models to see what differences are developed based on modeling technique; more specifically, a linear model, a log model and an exponential model. Future research should examine whether the cost of different marketing techniques is worth the number of visitors that the techniques draw to the business, e.g. is the expense of television advertisements offset by the number of new visitors a business receives from this method.

This research will be useful to current and future agritourism operators in Oklahoma. Current operations will be able to use this research to identify if they are using the best marketing strategies or if they should change their marketing methods to increase their number of visitors. Future operators will be able to compare this information with their business plans to improve their business models. Organizations such as the Oklahoma Agritourism Program could also use this information when developing marketing strategies in an effort to increase overall demand for agritourism in Oklahoma.

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APPENDICES

APPENDIX A:
CHAPTER 2 TABLES

Table A1. Description and summary statistics of variables in the revenue model

Variable	Description	Variable Type	Average
Business activities			
<i>Lodging</i>	Guest Ranches/Country Stays/Hunts	Categorical	0.24
<i>Commodity</i>	Pumpkin Patches/U-Picks/ Seasonal Crops & Products	Categorical	0.36
<i>Experience</i>	Farm & Ranch Attractions/ Mazes/Trail Riding	Categorical	0.29
<i>Wineries</i>	Wineries/Vineyards	Categorical	0.11
<i>Wedding</i>	Business hosts weddings	Categorical	0.38
Business operating aspects			
<i>Days</i>	Days open in 2014	Continuous	222.52
<i>Distance</i>	Distance from Oklahoma City or Tulsa (whichever is closer)	Continuous	79.27
<i>Population</i>	Population of resident county in thousands	Continuous	102.57
Owner demographics			
<i>Age</i>	Age	Continuous	58.66
<i>High school</i>	Possesses high school diploma	Categorical	1.00
<i>Tech</i>	Possesses technical/trade school education	Categorical	0.08
<i>College</i>	Possesses college degree	Categorical	0.65
Revenue			
<i>Average</i>	Average of revenue category	Ordinal	26314.09
<i>Lower</i>	Lower bound of revenue category	Ordinal	869.42
<i>Upper</i>	Upper bound of revenue category	Ordinal	39619.23

Table A2. Percent of Businesses in Each Bin for the Interval Regressions

Revenue Bounds	Benchmark Intervals		Hypothetical Intervals 1		Hypothetical Intervals 2		
	Interval	Percent in Interval	Interval	Percent in Interval	Interval	Percent in Interval	
\$0 to \$9,999	1	36.5%	}	1	55.1%	1	36.5%
\$10,000 to \$24,999	2	18.6%		2	29.5%		
\$25,000 to \$49,999	3	10.9%		2	24.4%		
\$50,000 to \$99,999	4	13.5%		3	23.7%		
\$100,000 to \$249,999	5	10.3%		3	16.0%		
\$250,000 to \$499,999	6	5.8%		4	10.3%		
\$500,000 to \$999,999	7	3.2%		4	4.5%		
≥\$1,000,000	8	1.3%					
Total		100%		100%		100%	

Table A3. Linear (OLS) and Interval Regression Estimates of the Revenue Model

Variable	Regression Type			
	Linear	Benchmark Intervals	Hypothetical Intervals 1	Hypothetical Intervals 2
Business activities				
<i>Lodging</i>	-0.161 (0.360)	-0.145 (0.438)	-0.232 (0.486)	-0.265 (0.470)
<i>Experience</i>	0.278 (0.323)	0.367 (0.388)	0.457 (0.421)	0.284 (0.419)
<i>Winery</i>	0.134 (0.429)	0.168 (0.502)	0.314 (0.534)	0.033 (0.538)
<i>Wedding</i>	0.182 (0.282)	0.198 (0.334)	0.211 (0.365)	0.238 (0.360)
Business operating aspects				
<i>Days^a</i>	0.281 (0.133)**	0.384 (0.170)**	0.361 (0.193)*	0.397 (0.182)**
<i>Distance^a</i>	-0.292 (0.179)	-0.365 (0.213)*	-0.415 (0.235)*	-0.428 (0.228)*
<i>Population</i>	0.000 (0.000)***	0.000 (0.000)***	0.000 (0.000)**	0.000 (0.000)**
Owner demographics				
<i>Age</i>	-0.014 (0.010)	-0.018 (0.012)	-0.015 (0.013)	-0.018 (0.012)
<i>Tech</i>	0.659 (0.508)	0.798 (0.614)	0.752 (0.674)	0.751 (0.656)
<i>College</i>	0.526 (0.278)*	0.665 (0.337)**	0.551 (0.371)	0.770 (0.361)**
Constant	10.044 (1.126)***	9.647 (1.348)***	9.899 (1.499)***	9.870 (1.438)***
Observations	146	146	146	146
R-squared^b	0.251	0.306	0.271	0.286

Note: Standard errors are in parentheses.

^aIndicates where the natural log (ln) of the variable was used.

^bThe R-squared reported for the interval regression is the squared correlation coefficient between expected revenue and the observed midpoint of the revenue interval values.

*Significant at the 10% level. **Significant at the 5% level. *** Significant at the 1% level.

APPENDIX B:
CHAPTER 3 TABLES AND FIGURES

Table B1. Description and summary statistics of variables in the visitor model

Variable	Description	Variable Type	Average
Visits	Number of visitors in 2014	Continuous	6724.10
Marketing Methods			
<i>Social Media</i>	Social media methods, e.g. Facebook, Twitter, etc.	Categorical	0.75
<i>Print</i>	Newspaper, direct mail and business brochures methods	Categorical	0.65
<i>Road Signs/ Billboards</i>	Road sign and billboard signage	Categorical	0.30
<i>Radio/ Television</i>	Radio and television advertising	Categorical	0.23
<i>Website/Blog</i>	Business's own website or blog	Categorical	0.86
<i>Other Online Methods</i>	Online advertisements and discount deals (Groupon, living social, etc.)	Categorical	0.29
<i>Other Methods</i>	Email/newsletter list, partnerships with other businesses, regional, county or local association/Chamber of Commerce and replies unable to be grouped	Categorical	0.63
Business activities			
<i>Lodging</i>	Guest Ranches/Country Stays/Hunts	Categorical	0.24
<i>Commodity</i>	Pumpkin Patches/U-Picks/ Seasonal Crops & Products	Categorical	0.36
<i>Experience</i>	Farm & Ranch Attractions/ Mazes/Trail Riding	Categorical	0.29
<i>Wineries</i>	Wineries/Vineyards	Categorical	0.11
Business operating aspects			
<i>Days</i>	Days open in 2014	Continuous	223.87
<i>Distance</i>	Distance from Oklahoma City or Tulsa (whichever is closer)-lodges excluded	Continuous	52.47
<i>Population</i>	Population of resident county in thousands	Continuous	99.44

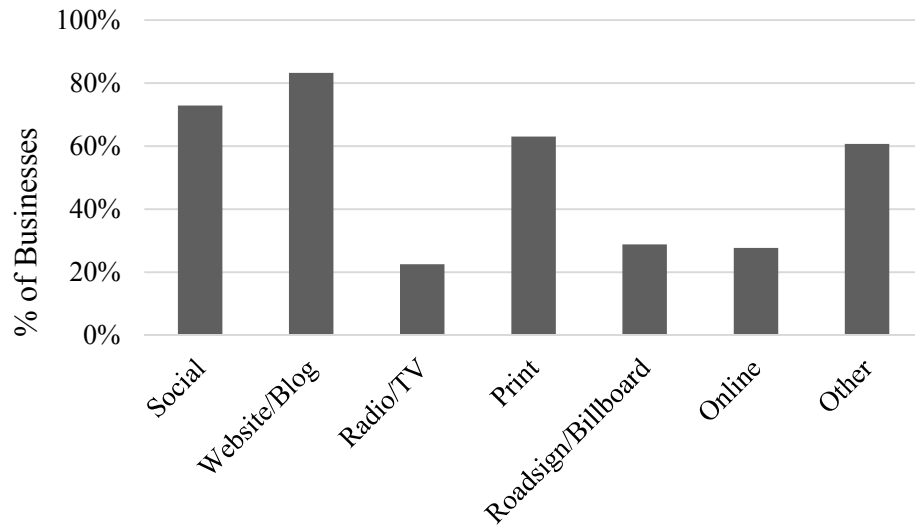
Table B2. Comparison of Linear, Logged Linear and Exponential Regression Results

Variable	Regression Type		
	Linear	Logged Linear	Exponential
Marketing Techniques			
<i>Social Media</i>	5022.638 (3356.459)	1.438 (0.427)***	1.916 (0.579)***
<i>Website/Blog</i>	1962.676 (3235.373)	-0.348 (0.517)	-0.242 (0.596)
<i>Other Online Methods</i>	3302.786 (4083.290)	0.252 (0.344)	0.533 (0.436)
<i>Print</i>	3021.927 (1878.514)	1.188 (0.335)***	0.676 (0.341)**
<i>Road signs/Billboards</i>	11548.28 (5195.935)**	0.830 (0.343)**	1.255 (0.367)***
<i>Radio/Television</i>	491.495 (4751.341)	1.208 (0.409)***	0.457 (0.459)
<i>Other</i>	4231.942 (2254.395)*	0.288 (0.338)	0.837 (0.340)**
Business activities			
<i>Commodity</i>	19196.410 (12162.980)	3.248 (1.506)**	3.375 (1.260)***
<i>Experience</i>	21475.50 (11284.460)*	3.425 (1.489)**	3.312 (1.130)***
<i>Winery</i>	11605.520 (11625.790)	3.606 (1.528)**	2.056 (1.308)
Business operating aspects			
<i>Days^a</i>	1551.441 (1159.890)	-0.156 (0.171)	0.377 (0.202)*
<i>Distance^a</i>	-5247.058 (2061.103)**	-0.689 (0.321)**	-0.847 (0.234)***
<i>Population (1000s)</i>	4.040 (13.688)	0.000 (0.001)	-0.001 (0.001)
Constant	-15587.520 (8149.415)*	4.577 (1.091)***	3.267 (1.360)**
Observations	150	150	150
R-squared	0.2284	0.4097	0.5405
RESET test p-value	0.0010	0.0658	0.0070

Note: Standard errors are in parentheses. These are robust for the linear and exponential regressions.

^aIndicates where the natural log (ln) of the variable was used.

*Significant at the 10% level. **Significant at the 5% level. *** Significant at the 1% level.



Marketing Methods
Figure B1. Percentage of Businesses that use Each Marketing Method

APPENDIX C:
OKLAHOMA AGRITOURISM PRODUCER SURVEY PROCEDURES

SAMPLE DESIGN

The population included all agritourism operations registered with the Oklahoma Department of Agriculture, Food and Forestry (ODAFF). The list of these businesses was obtained from the ODAFF Agritourism Market Development staff in November 2014. This list was received as an excel file that included the names, descriptions, street addresses, website addresses and activities offered at 355 registered agritourism operations. Given this size, the decision was made to survey the entire population of registered agritourism operations after farmers markets were removed from the list.

SURVEY IMPLEMENTATION

This section describes the details of the survey methods used to collect data on agritourism operators. The survey instrument and correspondence are presented in the following sections.

The survey was implemented as a mailed survey following the Total Design Method developed by Dillman (1978). The use of a mail survey was elected because it was felt that operators would view a physical, paper questionnaire as a more serious effort to elicit their information compared with a web survey. A lack of financial resources made it

impossible to implement a telephone survey. The cover page of the mailed questionnaire was designed to coordinate with the writing, images and symbols used by the ODAFF agritourism marketing staff to promote agritourism in the state. The cover page also included a short paragraph describing the purpose of the survey and gave instructions on how to leave additional, unsolicited comments if desired. The remaining pages of the questionnaire were split into 5 sections that included questions about the agritourism operation's characteristics, customers, and challenges, as well as the owner's future plans, perceptions of the Oklahoma Agritourism Liability Limitations Act, and personal demographics. As much as possible, the questionnaire was designed to maintain a sense of vertical flow as respondents proceeded through the survey questions. The questions were formatted using Calibri 11-point font. The back of the survey provided a half page of blank space for respondents to include additional comments.

Before the questionnaire was finalized, it was reviewed by ODAFF staff and two agritourism operators. The operators filled out the questionnaire and were asked follow-up questions about the clarity of the writing and their interpretation of certain questions. Their feedback was noted and taken into consideration in revising the questionnaire. A concern noted by some ODAFF staff was the lack of universal representation of agritourism business types in the images used on the questionnaire cover-page (Figure C1 below). It was decided to not add other emblems for the sake of aesthetic. However, during implementation of the survey, comments were received from some respondents about this lack of representation.

The finalized questionnaire along with two cover letters, two reminder postcards, timeline and an explanation of the survey plan were submitted to the OSU Internal

Review Board (IRB) in November 2014. IRB concluded in December that the project was exempt.

In preparation for the first survey wave, the survey materials were submitted to a local printing company. This printer supplied all the mailed materials except for the outgoing and return envelopes, which were sourced from an office supply company and OSU mail services. The printer printed labels for the postcards and the outgoing envelopes, as well as the questionnaires with a unique identifier. The cover letters were printed on normal 8.5x11 white paper, the postcards were printed on white card stock that was perforated to form sets of four 3.5x5 postcards per printed sheet. The questionnaires were printed on 11x17 paper folded in half, lengthwise, with two staples binding the pages together. The unique identifier was hand stamped in the footer space on the back of the questionnaire.

The survey population was adjusted after reviewing the types of agritourism operations included in the ODAFF database. Farmers markets were removed from the survey, which left 291 businesses.

The first wave of the survey was mailed to the 291 operators on January 7, 2015. The packet consisted of a stamped first-class 9x12 white envelope that included a cover letter, questionnaire and postage-paid return envelope. The cover letter explaining the purpose of the survey was printed with an OSU-stylized letterhead, personalized to the name of the agritourism operation and hand signed in blue ink (Figure C2). The cover letter for the first wave also included a hand written note in blue ink that read “Thank you [name of business].” The return envelope was a #9 envelope with postage-paid business reply postage.

An error on the part of the researchers led to an experiment that tested the importance of letter dating on response rates. The cover letter with the first wave was printed with an incorrect date of December 2, 2014. This error was corrected (using a date of January 6, 2015) for half of the operations: a random sample of 146 operations were sent the December 2nd letter, while the remaining 145 businesses were sent the January 6th letter. The numbers of returned surveys associated with the different dated letters were nearly identical, so no statistical tests were performed to determine if there was a significant difference in response rates.

All 291 operators were contacted a second time with a postcard, which was mailed on January 14 (Figure C3). This postcard expressed our gratitude to those who had returned the survey and served as a reminder for those who had not.

Two weeks were allowed to pass before a second wave of surveys was mailed on January 28. This wave was sent to the operators who had not responded by that date. This survey packet was again sent in a 9x12 white envelope, which contained a replacement questionnaire, postage-paid return envelope and a new cover letter (Figure C4). The printer used for the first wave of surveys was again hired to print the materials used in the second wave. A small edit was made to the questionnaire to correct wording that asked some respondents to skip to a later question, because the original questionnaire directed these respondents to the wrong question. In this wave the cover letters were printed on high quality, ivory 8.5x11 stationery paper. These letters did not include the written thank you note, but did retain the hand written signature in blue ball-point pen ink. Other differences from the first wave were that that the packet was posted with standard mail, rather than first class, and some of the return envelopes were sized #10. For some

businesses that had undeliverable surveys in the first wave due to wrong address, new addresses were identified through an online search. These updated addresses were used in the second wave.

The final mail contact consisted of a postcard sent on February 4, which was one week after the second wave of surveys was mailed. These postcards were only mailed to the businesses that were mailed the second wave of surveys. This postcard expressed our gratitude for their participation and noted that this would be the last time that they would be contacted (Figure C5).

The unique identifiers were used to link survey responses to the list of individual agritourism operators. The responses and unique identifiers in returned surveys were recorded into an excel spreadsheet. The names, street addresses and web addresses were deleted from this excel spreadsheet, which only retained the operation's resident county, main attraction and other services offered, in addition to the information collected from the survey. Businesses that were sent a questionnaire in the second survey wave received a second, new unique identifier. This new identifier was added to the excel database to keep track of whether the returned survey was from the first or second survey wave.

The first wave of surveys resulted in 140 completed, returned surveys, 143 non-respondents and 8 non-deliverables. This resulted in an unadjusted response rate of 48% from the first mailing. The second wave of surveys resulted in 43 completed, returned surveys, 136 non-respondents and 3 non-deliverables. This second mailing had an unadjusted response rate of 24%. In total, 183 surveys were returned, 104 operators did not respond and 6 operators did not have deliverable addresses. The overall unadjusted

response rate was 63% (see Table C1 below). Regression analysis was used to test whether there was a significant difference in the response rates between different types of agritourism businesses. It was found that there were no statistically significant differences in response rates at the 5% and 10% levels, leading to the conclusion that whether an operator returned a survey or not did not depend on the type of attraction they offered.

SURVEY RESULTS

The most popular marketing methods, according to the survey results, are internet methods such as business websites and social media with 85% and 74% of businesses using these methods, respectively. This suggests that the primary way agritourism businesses reach their customers is through the internet. This is consistent with the responses from a recent survey of Oklahoma agritourism customers, which found that, other than word of mouth, the most common way customers find out about an agritourism business is through internet searches and social media (Murphy and Melstrom, 2015).

Despite the growing popularity in organics, only 17% of business owners were interested in getting certified to sell organic foods and products. However, 53% of businesses would be willing to attend a day-long meeting to learn about specialty crops and products relevant to Oklahoma. These responses do not take into account that some businesses may already possess organic certification, nor does it consider that some may currently offer specialty crops or products.

The average respondent indicated that their revenue from agritourism sales was in the \$10,000 to \$24,999 range. Businesses on average hired 6 paid employees and 3

volunteers, including themselves and their families. The typical owner worked 53 hours per week, which includes non-agritourism work, and their business had been in operation for 14 years. The majority of businesses were profitable, 69%, and on average, they became profitable after 5 years. The businesses that were currently not profitable expected to be profitable in a little over 3 years on average. Table C2 provides summary statistics regarding agritourism business characteristics.

The average agritourism business has 6,637 customers per year; 41% of whom live within 30 miles of the business, while 32% live in other parts of Oklahoma. 24% of customers live outside of Oklahoma but in the United States, while 3% live outside of the United States. Visitors from Germany were identified as the most common foreign customers. These numbers are based on business owners' own estimates.

When owners were asked about the attraction that they most recently added to their agritourism operation, several respondents indicated that they had added several attractions at once. However, the majority of respondents had never added a new attraction. Figure C6 breaks down the different attraction categories. 95% of the businesses that had added an attraction still operate that attraction today. Table C3 provides summary statistics pertaining to customers and added attractions.

The survey asked business owners about issues and challenges they have possibly encountered. Among those that were not considered a serious challenge was identifying customers and visitor safety. Instead, weather was the greatest challenge recognized by operators. A specific type of weather was not identified due to the design of the survey.

Table C4 provides more information regarding the possible challenges that businesses faced.

In regards to the Oklahoma Agritourism Liability Limitations Act, 77% of the businesses surveyed were aware of this new law, and 66% of businesses registered with ODAFF to meet one of the requirements to be protected under the law. The majority of businesses considered the requirements to be protected under the law (to register with ODAFF and have a sign posted on site warning visitors that the business is not liable for injury) to be not burdensome. The majority of business owners were unsure of how the law will affect the operations of their business. Table C5 shows the summary statistics regarding the Oklahoma Agritourism Liability Limitations Act.

The typical agritourism business owner is white, 59 years old and possesses at least an associates degree. The average household contains 2 adults. Table C6 provides more information pertaining to agritourism business owner demographics.

Several questions in the survey contained answer categories that were assigned numbers for the sole purpose of categorizing responses. The statistics for these questions, marked with asterisk (*) in the tables, should not be used to interpret the results due to the numbers not having cardinal meaning. Further analysis is required to interpret the responses to these questions.

Table C1. Disposition of Survey Mailings

Contact	Number Mailed	Completed Returned Surveys	Non-responses	Non-deliverables	Response Rate¹
First Mailing	291	140	143	8	48%
Second Mailing	182	43	136	3	24%
Overall	N/A	183	104	6	63%

¹Response rate was determined using completed returned surveys.

Table C2. Summary statistics for general business questions (Section A)

Variable	N	Mean	Std. Dev.	Min	Max
bus_reason	169	2.792899	2.690096	1	13
bus_staterate*	168	1.446429	0.635845	1	4
mark_website	169	0.852071	0.356085	0	1
mark_social	169	0.745562	0.436839	0	1
mark_onlinead	169	0.207101	0.406433	0	1
mark_deals	169	0.112426	0.316829	0	1
mark_email	169	0.384615	0.48795	0	1
mark_newsp	169	0.372781	0.484982	0	1
mark_tele	169	0.100592	0.301681	0	1
mark_mail	169	0.159763	0.367475	0	1
mark_road	169	0.289941	0.455083	0	1
mark_partner	169	0.165681	0.372899	0	1
mark_assoc	169	0.337278	0.474186	0	1
mark_broch	169	0.449704	0.498942	0	1
mark_radio	169	0.177515	0.383239	0	1
mark_other	169	0.201183	0.402076	0	1
bus_organic	168	0.172619	0.379047	0	1
bus_meet	161	0.52795	0.500776	0	1
bus_month	172	8.436047	4.238708	0	12
bus_days	166	222.5181	129.8683	0	365
bus_county*	167	41.23353	22.28673	6	78
bus_rev	156	2.788462	1.876887	1	8
bus_fypaid	158	1.873418	10.2899	0	120
bus_fyunpaid	151	0.940397	1.244892	0	6
bus_pypaid	159	0.842767	1.791452	0	12
bus_pyunpaid	147	1.14966	4.667512	0	50
bus_fspaid	157	0.980892	5.236058	0	49
bus_fsunpaid	145	0.724138	6.284331	0	75
bus_pspaid	157	2.955414	8.700202	0	80
bus_psunpaid	147	1.176871	4.150756	0	40
bus_paidtotal	172	6.093023	15.11554	0	125
bus_unpaidtotal	172	3.424419	8.522422	0	75
bus_hours	161	52.63354	21.19218	2	130
bus_source*	166	1.50000	7.618757	0	99
bus_time*	163	3.233129	7.65020	1	99
bus_opyrs	169	13.92308	12.63581	0	75
bus_profit	160	0.69375	0.47579	0	2
bus_esyrs	102	5.073529	4.454054	0	22
bus_noyrs	35	3.257143	2.638436	0	10

* The numbers here are used to categorize response and do not having a cardinal meaning.

Table C3. Summary Statistics for customer-related questions (section B)

Variable	N	Mean	Std. Dev.	Min	Max
cust_visitors	155	6637.294	18824.89	0	162000
cust_staytime*	167	2.131737	1.893397	1	10
cust_live30	166	41.36747	33.86413	0	100
cust_liveok	165	31.61212	24.14478	0	100
cust_liveus	165	23.53939	26.97684	0	100
cust_liveout	165	2.963636	9.358634	0	100
cust_foreign	146	5.664384	7.053761	0	27
cust_spent	147	157.3639	372.7688	0	2750
cust_admiss	150	21.20447	35.3212	0	100
cust_onfood	150	15.66667	33.99243	0	100
cust_concess	150	4.6	11.79978	0	85
cust_othfood	150	5.526667	17.7925	0	100
cust_nonfood	150	16.02	32.37313	0	100
cust_lodging	151	21.14788	35.1726	0	100
cust_other	150	15.14667	31.50293	0	100
cust_websat*	168	2.494048	1.64516	1	5
cust_webinc*	165	3.236364	10.68044	1	99
cust_hostwed	167	0.383234	0.499838	0	2
cust_wednum	57	11.91228	20.86374	0	90
cust_wedvenue	59	0.915254	0.280894	0	1
cust_wedtable	59	0.457627	0.502478	0	1
cust_wedfood	59	0.474576	0.50364	0	1
cust_wedbev	59	0.305085	0.464396	0	1
cust_wedequip	59	0.288136	0.456782	0	1
cust_wedother	54	0.092593	0.292582	0	1
cust_wedmrkt*	58	3.362069	12.81268	1	99
cust_wedrev*	56	1.839286	1.074951	1	4
cust_weddemand*	57	1.649123	1.109878	1	4
cust_added*	163	7.539877	5.318551	1	27
cust_addyr	108	1991.074	193.4913	0	2015
cust_contop	111	0.945946	0.22715	0	1

*The numbers here are used to categorize response and do not having a cardinal meaning.

Table C4. Summary statistics for Challenges and Future Plans questions (section C)

Variable	Obs	Mean	Std. Dev.	Min	Max
chal_getfin*	140	2.753571	1.590774	1	5
chal_permit*	141	2.347518	1.502312	1	5
chal_ins*	143	2.506993	1.262941	1	5
chal_zone*	140	2.471429	1.756562	1	5
chal_health*	140	2.314286	1.568969	1	5
chal_manfin*	140	2.196429	1.225767	1	5
chal_hireemp*	144	2.826389	1.506767	1	5
chal_manemp*	140	2.4	1.506819	1	5
chal_idcust*	139	2.086331	1.163964	1	5
chal_plcust*	144	1.6875	0.956894	1	5
chal_promo*	143	2.356643	1.090326	1	5
chal_safety*	144	1.805556	0.910527	1	5
chal_comp*	143	1.993007	1.21317	1	5
chal_weather*	145	2.744828	1.012281	1	5
chal_other*	13	4.0	0.816497	2	5
fut_rev*	160	1.59375	1.04789	1	4
fut_attr*	156	1.711538	0.936773	1	4
fut_emp*	156	1.935897	0.954983	1	4
fut_op*	160	1.9125	1.280662	1	4

*The numbers here are used to categorize response and do not having a cardinal meaning.

Table C5. Summary statistics for Liability Limitations Act questions (section D)

Variable	Obs	Mean	Std. Dev.	Min	Max
llaaware	167	0.772455	0.420508	0	1
lla_reg	131	0.664122	0.490066	0	2
lla_require*	152	3.552632	0.787228	1	4
lla_impact*	165	4.642424	10.58182	1	99

*The numbers here are used to categorize response and do not having a cardinal meaning.

Table C6. Summary statistics of respondent demographics (section E)

Variable	Obs	Mean	Std. Dev.	Min	Max
bg_age	164	58.65854	12.81508	22	86
bg_ethnic*	167	4.742515	1.108369	1	7
bg_adult	164	1.969512	0.536105	1	5
bg_child	165	0.472727	0.959952	0	5
bg_edu	166	5.090361	1.733178	2	7

*The numbers here are used to categorize response and do not having a cardinal meaning.

SURVEY MATERIALS AND CORRESPONDENCE

The survey instrument (Figure C7) was printed on four sheets of 17x11 paper and folded in half to produce an 8-page booklet. Scanned images of the questionnaire cover page, cover letters and reminder postcards are presented below. Note that the IRB approval stamps are present on these images as indication that the survey materials adhered to IRB guidelines and were not actually present on the mailed survey materials.

Figure C1. Cover page of questionnaire

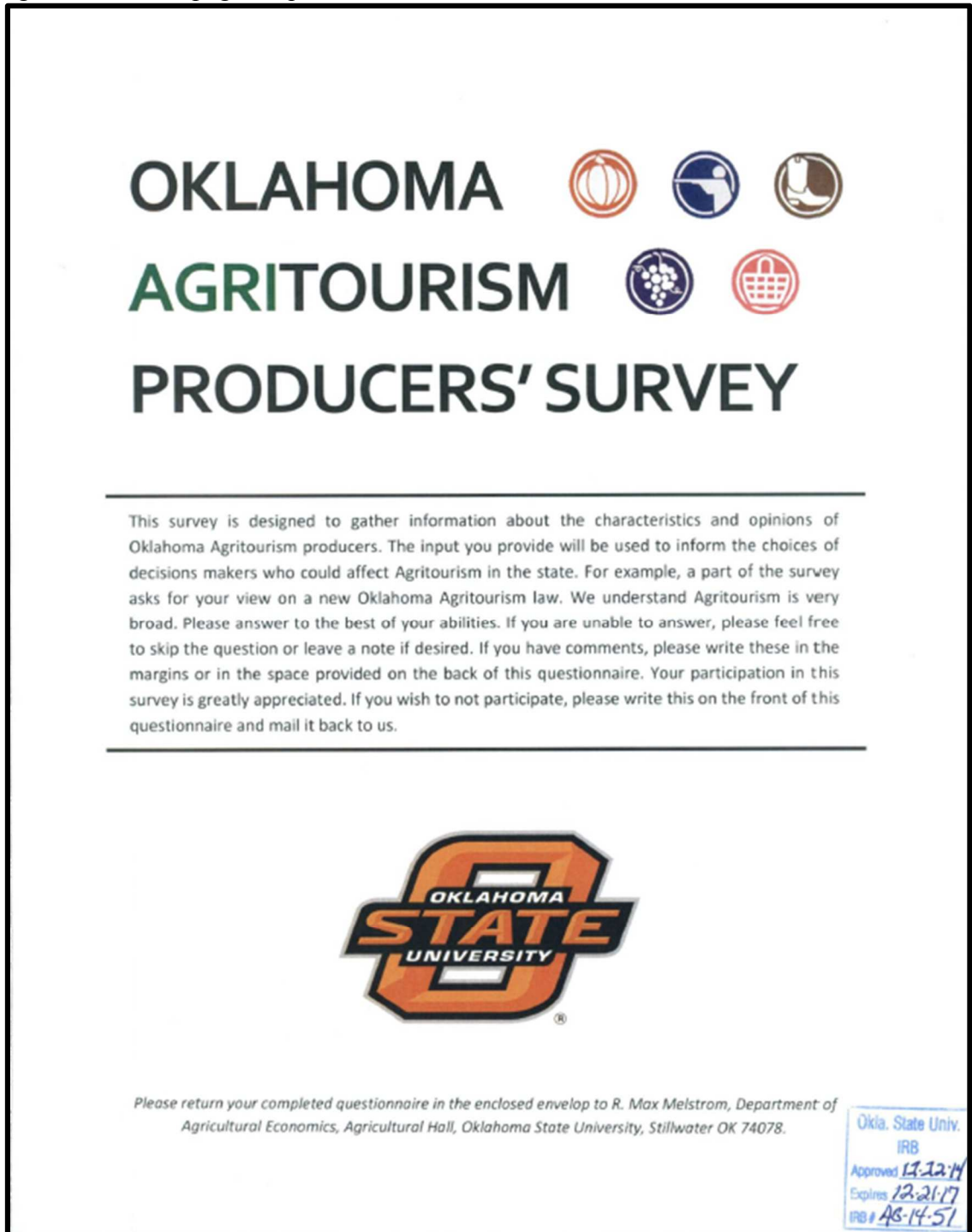


Figure C2. Letter used in the first survey wave

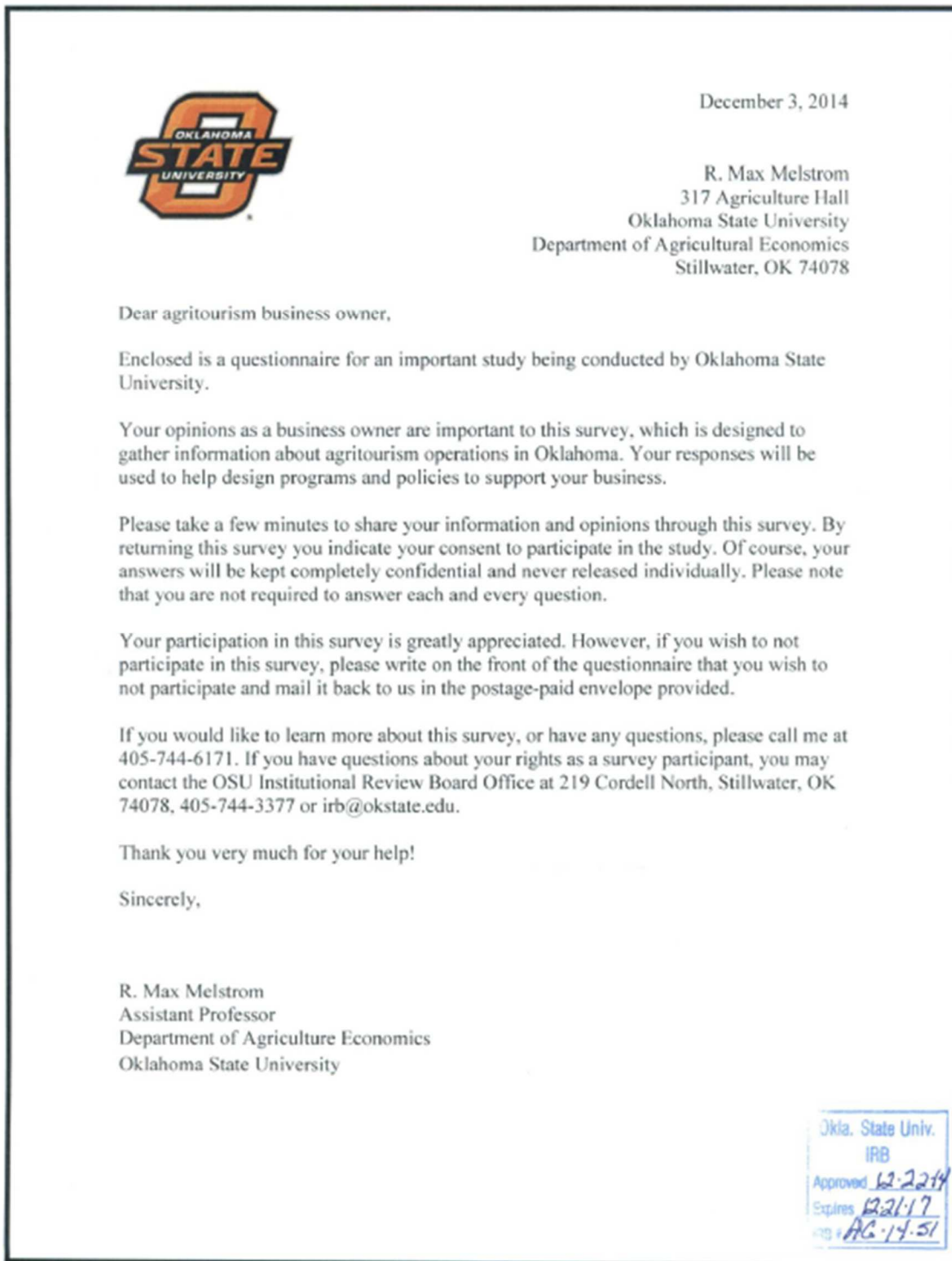


Figure C3. First reminder postcard with stamped IRB approval

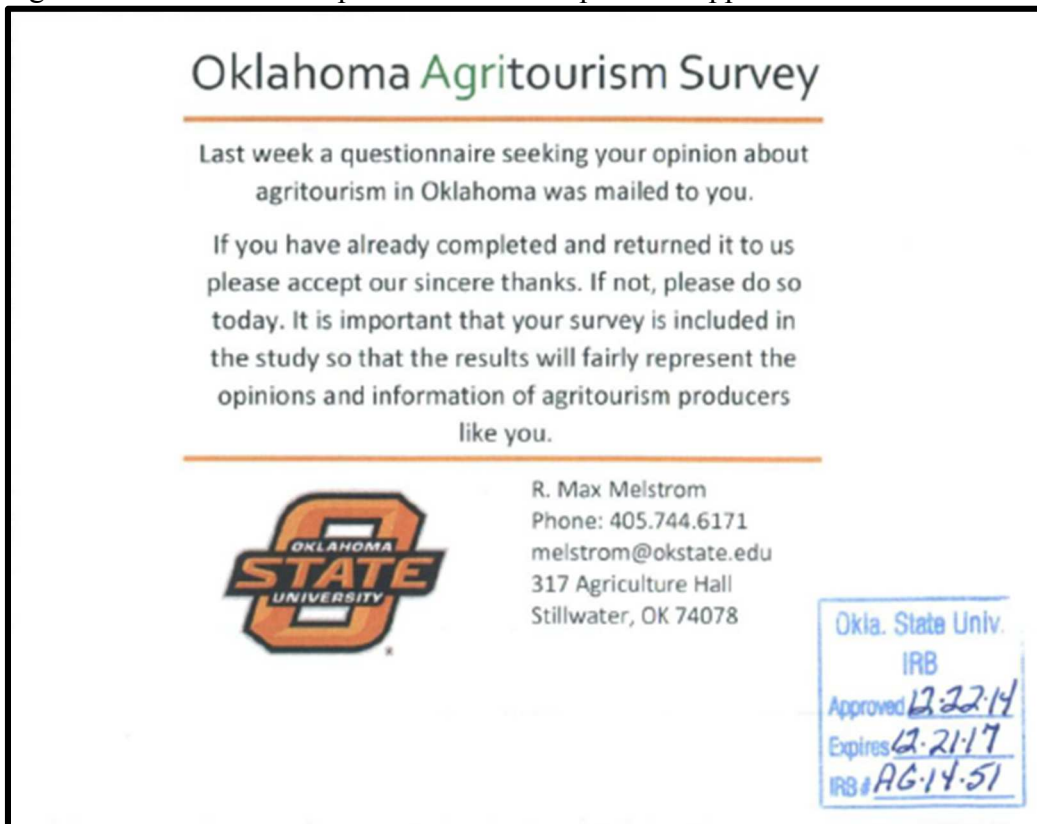


Figure C4. Letter used in the second wave

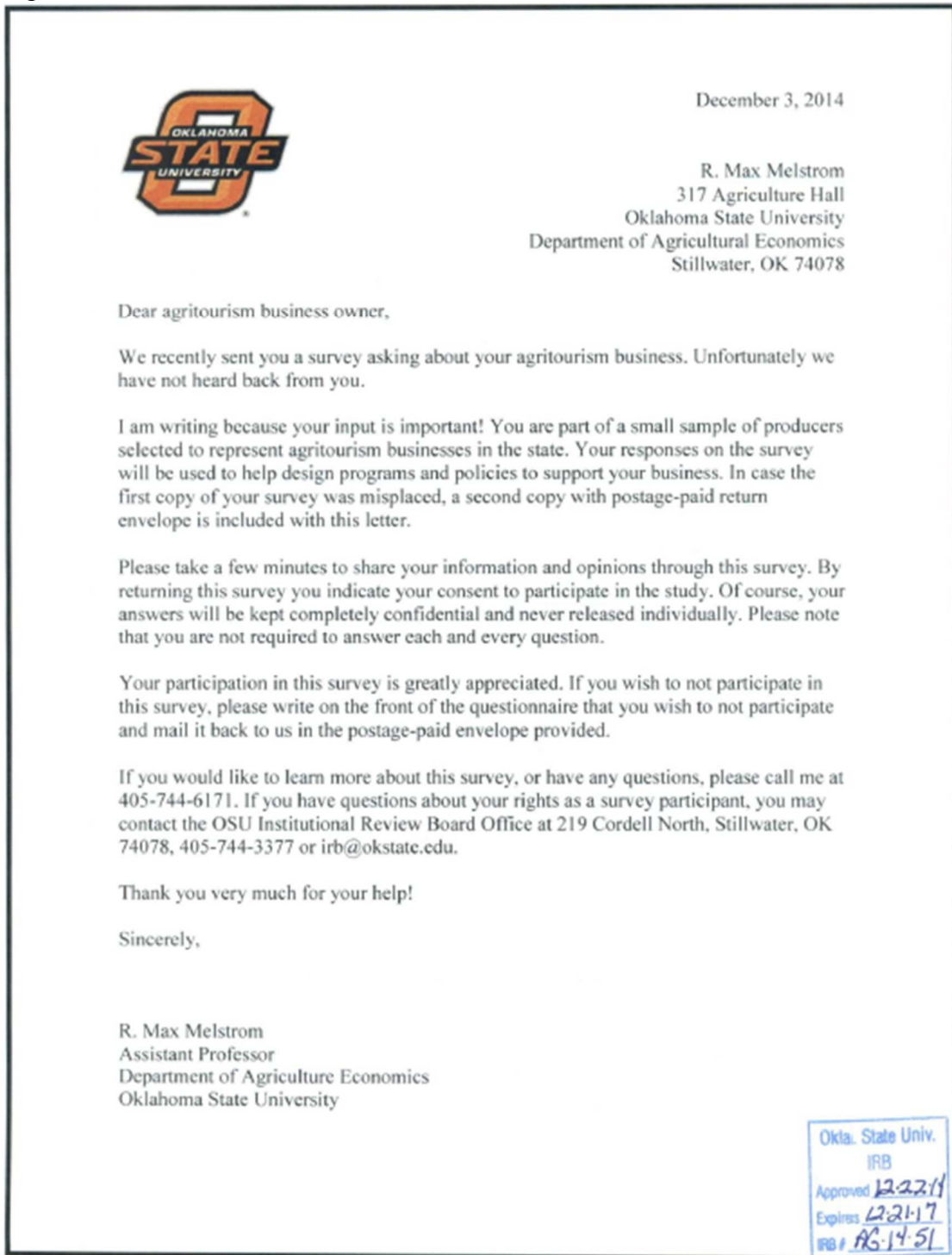



Figure C5. Second reminder postcard

Oklahoma Agritourism Survey

Over the past several weeks you have received surveys seeking information about your agritourism business. If you have already completed and returned the survey please accept our sincere thanks. If not, please do so today. This will be the last time that we contact you. It is important that your survey be included in the study so that the results accurately represent the opinions and information of agritourism producers like you.



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317 Agriculture Hall
Stillwater, OK 74078

Okla. State Univ.
IRB
Approved 12-22-14
Expires 12-21-17
IRB # AG-1451

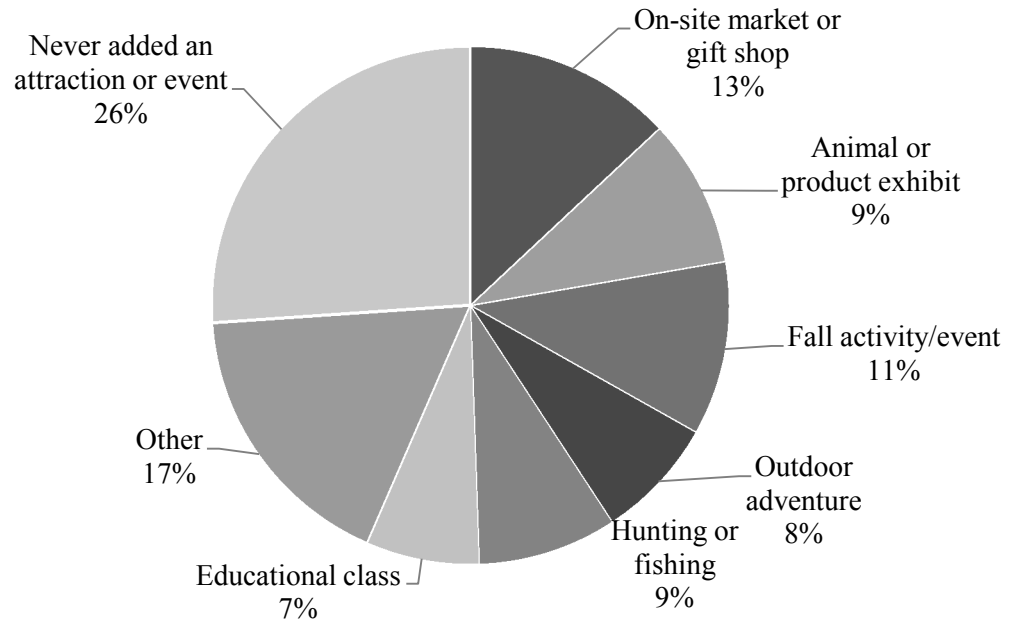


Figure C6. Types of attractions that respondents added most recently.

Figure C7. Questionnaire

SECTION A: Your Agritourism Business

1. What is the primary reason that YOU operate an agritourism business? *Please mark ONE:*

- Provide income or increase profitability of business
- Continue a business that is part of my family's heritage
- Provide opportunity to work outdoors
- Educate visitors about agriculture and outdoor heritage
- Other: _____

2. How would you rate the importance of the STATE program that markets Agritourism in Oklahoma (The Oklahoma Agritourism Program) to the success of your business? *Please mark ONE:*

- Very important
- Somewhat important
- Somewhat unimportant
- Not important at all

3. What marketing and promotion methods did YOUR business use in 2014? *Please mark all that apply:*

PROMOTION METHOD	PROMOTION METHOD
<input type="checkbox"/> Operation's own website/blog	<input type="checkbox"/> Direct mail
<input type="checkbox"/> Social media (Facebook, Twitter, etc.)	<input type="checkbox"/> Billboards/road signs
<input type="checkbox"/> Online advertisements	<input type="checkbox"/> Partnership with other business
<input type="checkbox"/> Online discount deals (Groupon, living social, etc.)	<input type="checkbox"/> Regional, County or local Association/ Chamber of Commerce
<input type="checkbox"/> Email or newsletter list	<input type="checkbox"/> Business brochures
<input type="checkbox"/> Newspaper advertising	<input type="checkbox"/> Radio advertising
<input type="checkbox"/> Television advertising	<input type="checkbox"/> Other: _____

4. Are you interested in marketing and getting certified to sell organic foods and products as part of your Agritourism business?

- Yes
- No

5. If given the opportunity, would you attend a day-long informational meeting to learn about specialty crops and Agritourism products relevant to Oklahoma?

- Yes
- No

6. What months was your Agritourism business open in 2014? *Please mark all that apply:*

WINTER/SPRING MONTHS	SUMMER/FALL MONTHS
<input type="checkbox"/> January	<input type="checkbox"/> July
<input type="checkbox"/> February	<input type="checkbox"/> August
<input type="checkbox"/> March	<input type="checkbox"/> September
<input type="checkbox"/> April	<input type="checkbox"/> October
<input type="checkbox"/> May	<input type="checkbox"/> November
<input type="checkbox"/> June	<input type="checkbox"/> December

7. Approximately how many days was your Agritourism business open in 2014?

Total days

8. What county is your Agritourism business located in?

_____ County

9. Which of the following best describes your operation's annual revenue from Agritourism sales in 2014? Note that your responses are confidential and will not be linked to a single enterprise. Please mark ONE:

- | | |
|--|--|
| <input type="checkbox"/> \$9,999 or less | <input type="checkbox"/> \$100,000 - \$249,999 |
| <input type="checkbox"/> \$10,000 - \$24,999 | <input type="checkbox"/> \$250,000 - \$499,999 |
| <input type="checkbox"/> \$25,000 - \$49,999 | <input type="checkbox"/> \$500,000 - \$999,999 |
| <input type="checkbox"/> \$50,000 - \$99,999 | <input type="checkbox"/> \$1,000,000 or more |

10. Indicate the number of positions within each category that your business employed in 2014.

	NUMBER OF PAID WORKERS	NUMBER OF UNPAID WORKERS (SPOUSE, CHILDREN, ETC.)
a. Full-time, year-round		
b. Part-time, year-round		
c. Full-time, seasonal		
d. Part-time, seasonal		

11. How many hours do you work in a week? Include any work unrelated to your Agritourism business.

Hours per week

12. Does your household have a source of income other than from your Agritourism business?

- Yes
 No

13. What is the percent of time that you spend in employment unrelated to your Agritourism business?

Please mark ONE:

- | | |
|--------------------------------|--------------------------------------|
| <input type="checkbox"/> None | <input type="checkbox"/> 25-50% |
| <input type="checkbox"/> 1-25% | <input type="checkbox"/> 50% or more |

14. How long has your Agritourism business been in operation?

Years

15. Is this Agritourism business currently profitable?

Yes → a. How many years did it take for the business to become profitable?

Years

No → b. In how many years do you expect your business to become profitable?

Years

SECTION B: Your Customers

16. To the best of your knowledge, how many visitors did your Agritourism business receive in 2014?

Please include repeat customers as new visitors for each visit.

_____ Visits

17. What is the average length of time that a visitor stays at your Agritourism business?

- Less than 4 hours 2 days (1 night)
 4-8 hours 3 days (2 nights)
 8 hours or more (but not overnight) 4 days or more (3 nights or more)

18. To the best of your knowledge, what percent of customers come from the following areas?

- a. _____ % Live within 30 miles of my operation
b. _____ % Live in other parts of Oklahoma
c. _____ % Are not from Oklahoma but are from the United States
d. _____ % Are from outside of the United States
_____ 100 % Total (The preceding numbers should sum to 100%.)

19. From what country do you receive the most foreign (non-U.S.) customers?

_____ Country

20. To the best of your knowledge, how much did a typical Agritourism visitor spend per visit in 2014?

\$ _____ Per visitor per visit

What percentage of this amount was spent on...?

- a. _____ % Admission or entrance fees
b. _____ % Buying foods grown on-site
c. _____ % Restaurant or concession items
d. _____ % Buying other food items (jams, jerky, sauces, etc.)
e. _____ % Buying non-food items
f. _____ % Lodging
g. _____ % Other items: _____
_____ 100 % TOTAL (The preceding numbers should sum to 100%.)

21. Answer the following questions about Oklahoma's official Agritourism website. If you have never visited this website (<http://traveler.oklahomaaagritourism.com/>), please select the last option in the first question below.

- a. Overall, how satisfied are you with this website? Please mark ONE:
- Very satisfied
 Somewhat satisfied
 Somewhat dissatisfied
 Very dissatisfied
 I have never visited the website
- b. Do you think this website has increased the number of visitors to your Agritourism business?
- Yes
 No
 Not sure

22. Does your Agritourism business host weddings?

- Yes
 No (If this option is selected, please skip to question 26.)

23. How many weddings did your business host in 2014?

Number of weddings

24. The following list contains services your business may provide for weddings. Check the box for each service you provide, and then write in the average charge per wedding.

HOSTING SERVICE	I OFFER THIS SERVICE	AVERAGE AMOUNT CHARGED
a. Venue rental	<input type="checkbox"/>	\$
b. Table and chairs rental	<input type="checkbox"/>	\$ /person
c. Food service	<input type="checkbox"/>	\$ /person
d. Beverage service (wine, soda, etc.)	<input type="checkbox"/>	\$ /person
e. Equipment rental	<input type="checkbox"/>	\$
f. Other: _____	<input type="checkbox"/>	\$

25. The following list asks about possible changes over the NEXT 3 YEARS. Please check the box that best reflects your opinion.

Within the next 3 years...	INCREASE	NOT CHANGE	DECREASE	NOT SURE
a. My marketing aimed at weddings will:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. My Agritourism revenues from wedding hosting will:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. The demand for weddings held in outdoor/rural settings in Oklahoma will:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

26. Answer the following questions about the visitor attraction or event you MOST RECENTLY ADDED to your operation, whether or not you still operate this attraction or event. If you have never added an attraction or event, please select the last option in the first question.

a. What type of attraction was most recently added? Please mark ONE:

- On-site market or gift shop
 Animal or product exhibit (petting zoo, facility tour, etc.)
 Fall activity/event (corn maze, music festival, etc.)
 Outdoor adventure (camping, horseback riding, etc.)
 Hunting or fishing
 Educational class
 Other: _____
 Never added an attraction or event (If this option is selected, please skip to question 27.)

b. What was the year that you added this attraction or event?

Year

c. Do you continue to operate this attraction as part of your Agritourism business?

- Yes
 No

SECTION C: Challenges and Future Plans

27. The following list contains issues that you may have encountered in operating your Agritourism business. For each item, please check the box that best describes your own experience with these challenges.

	NOT A CHALLENGE	MINOR CHALLENGE	MODERATE CHALLENGE	SERIOUS CHALLENGE	NOT APPLICABLE
a. Getting financing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Getting permits/licenses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Getting insurance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Local zoning issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Satisfying health codes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Managing finances	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Hiring employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Managing employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Identifying customers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. Pleasing customers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k. Promotion/marketing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
l. Visitor safety	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
m. Competition from other businesses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
n. Weather/climate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
o. Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

28. If desired, please provide a brief explanation for the items that were a serious challenge:

29. The following list asks about possible changes over the NEXT 3 YEARS. Please check the box that best reflects your opinion.

Within the next 3 years...	INCREASE	NOT CHANGE	DECREASE	NOT SURE
a. My Agritourism revenues will:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. My operation's number of products or attractions will:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. The number of paid employees at my operation will:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. The number of Agritourism operations in Oklahoma will:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION D: Oklahoma Agritourism Liability Limitations Act

Please read the information in the box.

Description of the Oklahoma Agritourism Liability Limitations Act

The Oklahoma Agritourism Liability Limitations Act is a law recently passed in 2013 that aimed at limiting the risk of liability to Agritourism producers. Specifically, the law says that an Agritourism producer who is registered with the Oklahoma Department of Agriculture, Food and Forestry is not liable for the injury or death of a participant, provided that a warning label is posted on site and the injury was the result of an inherent risk of the Agritourism activity. However, the liability protection is void if the producer acts in a negligent manner or ignores the safety of the participant, such as if the equipment of an attraction is known to be defective but customers are allowed to participate in the attraction anyway.

30. Were you aware of the Oklahoma Agritourism Liability Limitations Act prior to receiving this survey?

- Yes
 No (If no is selected, please skip to question 32.)

31. Did you register your Agritourism business with the Oklahoma Department of Agriculture, Food and Forestry as a result of this law?

- Yes
 No

32. How burdensome would you rate the requirements (to register with the Oklahoma Department of Agriculture, Food and Forestry and have a warning label posted on site) for your Agritourism business to be protected under this law? Please mark ONE:

- Very burdensome
 Somewhat burdensome
 Somewhat not burdensome
 Not burdensome at all

33. What impact, if any, do you expect this law to have on how you operate your business? Please mark ONE:

- The number of attractions at my operation will increase
 The number of attractions at my operation will decrease
 The number of attractions at my operation will not change, but the law will affect other aspects of my operation
 The law will not affect any part of my operation
 Not sure

SECTION E: Your Background

34. What is your age?

Years of age

35. With what ethnic background do you primarily identify? *Please mark ONE:*

- American Indian or Alaskan Native
- Asian
- Black or African American
- Native Hawaiian or Pacific Islander
- White
- Other: _____

36. How many adults and children (under age 18) live in your household, including yourself?

a. Number of adults

b. Number of children

37. What is your highest level of education? *Please mark ONE:*

- Less than high school degree
- High school degree or GED
- Some college
- Technical/trade school
- Associates degree
- Bachelor's degree
- Graduate degree

Comments

If there is anything else you would like to add about Agritourism or your business, please include it here.

Thank you! Your involvement in this survey is greatly appreciated.

*If you misplaced your postage-paid envelope, please return your survey to: R. Max Melstrom,
Department of Agricultural Economics, Agricultural Hall, Oklahoma State University, Stillwater, OK 74078*

VITA

Cassandra Murphy

Candidate for the Degree of

Master of Science

Thesis: MODELING REVENUE AND VISITATION PATTERNS OF
AGRITOURISM OPERATIONS IN OKLAHOMA

Major Field: International Agriculture

Biographical:

Education:

Completed the requirements for the Master of Science in International Agriculture at Oklahoma State University, Stillwater, Oklahoma in December, 2015.

Completed the requirements for the Bachelor of Science in Agricultural Economics at Oklahoma State University, Stillwater, Oklahoma in 2014.

Experience:

Research Assistant for the Oklahoma State University Department of Agricultural Economics, Stillwater, Oklahoma from August, 2014 to present.

New Accounts Representative for First National Bank and Trust Company of McAlester, McAlester, Oklahoma from May, 2014 to August, 2014.

Teacher's Assistant for the Oklahoma State University Department of Agricultural Economics, Stillwater, Oklahoma from January, 2014 to May, 2014.

Bursar Office Assistant for Oklahoma State University's Bursar's Office, Stillwater, OK from August, 2012 to May, 2013.

Tutor for Eastern Oklahoma State College Student Support Services, Wilburton, Oklahoma from August, 2011 to May, 2012.

Extension Publications:

Murphy, C., & Melstrom, R. (2015). Know Your Customers: Oklahoma Agritourism Visitor Characteristics and Opinions about a New Liability Law. Retrieved from <http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-9695/AGEC-1053web.pdf>