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Hayride Participation in the Mid-Atlantic States: A Logistic Approach

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ABSTRACT

The primary objective of this study was to develop and econometric model to identify a prospective participant who is likely to participate in the hayride agritourism activity. An Internet survey was conducted in the mid-Atlantic United States to collect information from those who participated in direct marketing, visits to agritourism operations and farm events. This study examined the influence of demographic characteristics on the likelihood of participants to engage in a hayride event during an agritourism visit. A total of 1,134 respondents from New Jersey, Delaware, and Pennsylvania completed the survey. A logit model developed to predict demographic characteristics of participants who are likely to participate in the hayride agritourism activity. Approximately 67% of respondents participated in hayrides during agritourism visits, and based on model results, respondents were more likely to participate if they lived in suburban areas, were male, between age 21 and 50, had a two-year college degree, and had an annual household income between $40,000 and $59,999. However, those who lived in urban areas, have lived at their current residence for more than 20 years, were under age 20, and who have a graduate degree were less likely to participate in a hayride agritourism activity. Hence, famers may be able to target these subgroups of general population to improve participation in hayride agritourism activity at their farm.

Keywords: Hayrides, logit model, consumers, demographics, survey

In general, small and medium-sized farmers with limited land and capital resources may not be able to continue traditional farming activities due to increasing cost of production and portion of farmland has been shifting to large farms in the United States (Gale, 1997; MacDonald *et al.*, 2013), especially in urban areas. Agritourism, including pick-your-own farm, community farmers' markets, community support agriculture (CSA), agricultural fairs/festivals, corn maize, on-farm markets, and wine tastings, are used by small and medium-sized farms to increase farm income. Growth of this direct marketing activity has been spurred by the fact that producers capture a greater portion of the marketing margin by selling directly to the consumer, and consumers understand that they can get fresh, high quality produce for a better price compared to the identical product sold in supermarkets (Tracy *et al.*, 1982; Onyango *et al.*, 2015). In most regions, agritourism is frequently considered as a sustainable way of raising the economic activity of the small and medium-sized farm (Hall, 1995; Tew and Barbieri, 2012; Koutsouris *et al.*, 2014; Chiu *et al.*, 2016). These economic opportunities can motivate farmers to identify consumer trends, desires, shopping habits, and demand for value-added products and focus their attention to on-farm agricultural activities that may provide a profit.

In the United States, according to the 2012 Census of Agriculture, the money made by agritourism has grown up to 24 percent since 2007, totaling $704 million in 2012. Nearly 33,000 farms in the

U.S. providing on-farm activities to the public, and in the Southeast alone there were 42% more farms engaging in agritourism in 2012 than there were in 2007 (Jameson, 2015). Agritourism and direct marketing can create positive interactions between farmers and participants, sharing a "culture of understanding" that is necessary for both to coexist and for consumers to establish an emotional connection with farms (Nickerson *et al.*, 2001; Schilling, 2006ᵃ; Bondoc 2009; Rich *et al.*, 2011). The diversification of farm/environmental activities also contributes to the well-being of local people in rural areas and expands recreational opportunities (Linstrom, 1978; Henderson and Linstrom, 1982; Govindasamy *et al.*, 1999; Surendran and Sekar, 2011; Onyango *et al.*, 2015). In addition, other outcomes include increasing on-farm income, helping rural community become economically (Hall and Mitchell, 2003; Kneafsey, 2000; Surendran and Sekar 2010; Getz *et al.*, 2014), and improving industry development and service activities (Feher, 2007).

The U.S. Department of Agriculture assessed that more than 62 million Americans, who were at least 16 years of age or older, and 20 million children, under the age of 16, visited agricultural farms Between 2000 and 2001 (NSRE 2002; Wilson, Thilmany and Sullins, 2006). This interest in agritourism and direct marketing patronage also fuels travel and tourism. It has also been shown to enables farmers to keep farming, enhance and diversify their market, respond better to market openings, and rise on-farm income (Ollenburg and Buckley 2007; Bondoc 2009; Tew and Barbieri 2012). Many agritourism studies have concentrated on outcomes and benefits that inspire farmers to jump into agritourism and other on-farm activities (Nickerson *et al.*, 2001; Mc Gehee and Kim, 2004; Tew and Barbieri, 2012; Kline *et al.,* 2016). While others absorbed on demand for on-farm agritourism activities such as farm visits, pick-your-own and on-farm recreational trips (Govindasamy *et al.,* 1997; Schilling, 2006; Carpio *et al.*, 2008; Schilling *et al.*, 2014). In order to encourage direct marketing and agritourism as a method for raising on-farm income, it is crucial to explore participant's interests, preferences and needs pertaining to these activities and opportunities. Agritourism opportunities in the mid-Atlantic have not yet been fully realized, especially for activities such as hayrides. Therefore, the objective of this study was to identify the consumer who were more likely to participate in the hayride agritourism activity. Study outcomes could motivate farm owners to develop strategies for offering agritourism activities and identify specific consumer segments who would likely participate and respond to related promotions.

Methodology

A 15-minute online survey was conducted between the 21 and 29 June 2010 to gather information from consumers living in three mid-Atlantic states (Delaware, New Jersey, and Pennsylvania) and who stated engaging in agritourism activities and direct marketing events. Respondents were randomly selected from a panel managed by a survey research company (Sampling International, LLC, and Shelton, CT). Of the 2,594 members who were registered with this panel and accessed the survey (952 from NJ, 309 from DE, and 1,384 from PA), 1,134 met the screener criteria and began the questionnaire (424 from NJ, 133 from DE, and 577 from PA), with 993 completing the survey (122 from DE, 364 from NJ, and 507 from PA). Potential respondents were screened and asked to participate if they were: 1) primary food shopper for the household; 2) age 18 and older; and 3) had previously attended agritourism and direct marketing events or activities. Panelists accessed the online electronic consent form and used the survey link developed by researchers. Survey questions were pre-tested using a random sample of 93 respondents, selected Survey Sampling International, LLC panelists. Respondents answered questions regarding participation in agritourism activities and events, as well as questions about their gender, age, occupation, household size and annual gross household income.

Model

Respondents were asked to indicate whether they respondent participated in hayride activity. In the logit model framework, the dependent variable is defined as '1' if the respondent participated in hayride agritourism activity and '0' otherwise. A logistic regression analysis used to examine the relationship between binary responses and a set of dependent variables or covariates. For binary response models, the response variable (Y) can take

one of two possible values as 1 and 0. Suppose x is a vector of dependent variables that denotes the socio-demographic characteristics. The relationship explored as:

$$P_i = F(\beta_j \chi_{ij}) + \varepsilon \qquad \ldots(1)$$

$$= \beta_0 + \beta \text{ Socio–Demographic Characteristics} + \varepsilon$$

Where:

P_i is the probability of participating in the hayride activity,

$\beta_j \chi_{ij}$ is the combination of independent variable.

β is the parameters to be estimated.

ε is a disturbance term or error term.

Logistic distributional assumption for the random term, the probability can be expressed as:

$$P_i = F\left(\beta_0 + \sum_{j=1}^{j} \beta_j \chi_{ij}\right) = F(\beta\chi_i) = 1/[1 + \exp(-\beta \chi_i)] \qquad \ldots(2)$$

The estimated coefficients in Eq. 2 do not directly represent the marginal effects of the independent variables on the probability P_i.

If the dependent variable is continuous, the marginal effect of χ_i on P_i is given as:

$$\partial P_i / \partial \chi_{ij} = [\beta_j \exp(-\beta\chi_i)]/[1 + \exp(-\beta\chi_i)]^2 \ldots(3)$$

In the case of a binary explanatory variable which take values of 1 and 0, and the marginal effect is determined as:

$$\partial P_i / \partial \chi_{ij} = [P(\chi_{ij} = 1) - P(\chi_{ij} = 0)]/[1 - 0] \ldots(4)$$

The description of means and standard deviation of explanatory variables included mid-Atlantic agritourism model are shown in Table 1. Respondents' demographic attributes used were similar to a Govindasamy *et al.* (2014) study relating to farmer-to-consumer direct market visit by type of facility like wine testing event and quantified the effects of different factors influencing customers decisions to visit farms in the United States (Carpio *et al.*, 2008). The model framework and computed results were based on the LIMDEP Econometric Software (Econometric Software Inc., 2007). The following model was developed to predict demographic characteristics of respondents participated in the hayride activity of agritourism.

The Logit model is formulated as:

HAY_RIDES = β₀ +β₁ URBAN +β₂ SUBURBAN +β₃ LIVE6TO10 +β₄ LIVE11TO20 +β₅ LIVE>20 +β₆ HSIZE +β₇ GENDER +β₈ AGE<20 +β₉ AGE21TO35 +β₁₀AGE36TO50 +β₁₁ 2YEAR_DEG +β₁₂ 4YEAR_DE +β₁₃ GRAD_DEG +β₁₄ INC<$20K +β₁₅ INC$20K_40k +β₁₆ INC$40K_60k

$$\ldots(5)$$

RESULTS

Data Description

Demographic attributes were used as explanatory variables to construct the logit model. Dependent and independent variables used in the logit model to predict consumers who are willing to participate in the hayride event are presented in Table 1. On an average, 67% of respondent participated in hayrides (HAY_RIDES) during their agritourism farm visit and the remaining 33% had not. Of the consumers who participated in hayrides, 69% lived in suburban areas (SUBURBAN), whereas 11% resided in urban settings (URBAN). Respondents were asked to specify the number of years they lived at their current residence. About 20% responded that they lived at their current residence between 6 and 10 years (LIVE6TO10), 21% of them lived at their residence between 11 and 20 years (LIVE11TO20), and 26% had lived more than 20 years (LIVE>20) at their current location.

Respondents were asked to respond to questions pertaining to their demographic status. Data revealed that the average household size included three people (HSIZE) and about 25% of respondents were male (MALE).

In terms of respondents' age, 2% were less than 20 years of age (AGE<20), 29% were between 21 and 35 years of age (AGE21TO35) and an additional 29% were between 36 and 50 years of age (AGE36TO50). In the case of respondents' education, on average 27% completed a two-year college degree (2YEAR_DEG), 29% had a four-year college degree (4YEAR_DEG) and 16% had obtained a graduate degree (GRAD_DEG).

Regarding the respondents' annual household income, only 9% had an annual income of less than $20,000 (INC<$20K), about 19% of them had an annual income between $20,000 and $39,999 (INC$20K_40K), and 22% of them had an annual income between $40,000 and $59,999

Table 1: Descriptive statistics of the variables

Variable	Variable Description	Mean Units /%	SD Units /%	Number of Cases
HAY_RIDES (DV)	1 if respondent participated in hayrides; 0=Otherwise	67%	47%	1134
SUBURBAN	1 if respondent resided in a suburban area; 0=Otherwise	69%	46%	1003
URBAN	1 if respondent resided in an urban area; 0=Otherwise	11%	31%	1003
HSIZE	Household size	2.89	1.40	1002
GENDER	1 if respondent was male; 0=Otherwise	25%	43%	971
LIVE6TO10	1 if respondent lived in their current residence for six to 10 years; 0=Otherwise	20%	40%	999
LIVE11TO20	1 if respondent live in their current residence for 11 to 20 years; 0=Otherwise	21%	41%	999
LIVE>20	1 if respondent lived in the present location for more than 10 years; 0=Otherwise	26%	44%	999
AGE<20	1 if respondent was less than 20 years old; 0=Otherwise	2%	15%	996
AGE21TO35	1 if respondent was between age 21 and 35 years; 0=Otherwise	29%	46%	996
AGE36TO50	1 if respondent was between age 36 and 50 years; 0=Otherwise	29%	45%	996
2YEAR_DEG	1 if respondent completed a two-year college or technical degree; 0=Otherwise	27%	44%	1002
4YEAR_DEG	1 if respondent completed a four-year college degree; 0=Otherwise	29%	45%	1002
GRAD_DEG	1 if respondent completed a graduate degree; 0=otherwise	16%	36%	1002
INC<$20K	1 if respondent's income was < $20,000;0=Otherwise	9%	28%	999
INC$20K_40k	1 if respondent's income was between from $20,000 to $39,999;0=Otherwise	19%	39%	999
INC$40K_60k	1 if respondent's income was between from $40,000 to $59,999;0=Otherwise	22%	41%	999

(INC$40K_60K). No a priori sign expectations were made on the coefficients of these demographic variables while formulating the logit model.

Logit Model Results

Results from the Logit model (Tables 2 and 3) confirm the factors that influenced respondents' participation in a hayride activity. Of the 1,134 observations that were used in this model, 67% respondents participated in hayride events, while 33% did not. The goodness of fit for this model, shown by the McFadden's R^2, was 0.04 and the chi-squared value was reported as 56.07. The overall model was significant at 0.00 level. The prediction success is shown in the classification Table 2. With a 50-50 classification system, almost 67.64 percent of the individuals in the sample were correctly classified as those who place high degree of importance on hayrides events when participating in the agritourism activities.

Table 2: Predictive accuracy of logit model

Actual Value	Predicted		Correct Total
	0	**1**	
0	37 (3.3%)	336 (29.6%)	373 (32.9%)
1	31 (2.7%)	730 (64.4%)	761 (67.1%)
Total	68 (6%)	1066 (94%)	1134 (100%)

Number of correct predictions: 767;   *Percentage of correct predictions: 67.64%*

McFadden R^2: 0.04;   *Chi squared: 56.07;*
Degrees of freedom: 16   Overall Model Significance: 0.00.

The logit model summary for participation in hayrides event is displayed in Table 3. In the logit model, all the explanatory variables were defined as binary dummy variables. A total of 17 explanatory variables were used in the logit model, of which, six variables were positively significant and four

Table 3: Logit model results

Variable	Coefficient	SE	t-ratio	Probabilities	Change in ME
Constant	0.4341	0.1071	4.051	0.00	0.0948
SUBURBAN	0.2139 **	0.0994	2.151	0.03	0.0467
URBAN	-0.2256**	0.0997	-2.262	0.02	-0.0493
HSIZE	0.0009	0.0014	0.599	0.55	0.0002
GENDER	0.0008**	0.0004	2.214	0.03	0.0002
LIVE6TO10	0.1674	0.1266	1.323	0.19	0.0366
LIVE11TO20	0.1554	0.1237	1.257	0.21	0.0339
LIVE>20	-0.3224***	0.1154	-2.793	0.01	-0.0704
AGE<20	-0.5520***	0.2173	-2.54	0.01	-0.1205
AGE21TO35	0.3013**	0.1435	2.1	0.04	0.0658
AGE36TO50	0.2509*	0.1433	1.751	0.08	0.0548
2YEAR_DEG	0.4037***	0.1189	3.397	0.00	0.0882
4YEAR_DEG	-0.0746	0.1128	-0.661	0.51	-0.0163
GRAD_DEG	-0.3228***	0.1270	-2.542	0.01	-0.0705
INC<$20K	-0.1492	0.1643	-0.908	0.36	-0.0326
INC$20K_40k	-0.1283	0.1363	-0.941	0.35	-0.0280
INC$40K_60k	0.2799**	0.1364	2.052	0.04	0.0611

*** *Significant at 1%; ** Significant at 5%; * Significant at 10%*

were negatively significant. A positive sign shows that the variable was estimated to have a positive coefficient with a positive marginal effect, and hence had a positive impact on the dependent variable. A negative sign indicates that the variable was estimated to have a negative coefficient with a negative marginal effect, and hence had a negative impact on the dependent variable. The star symbol represents the significance level of the variable at 1%, 5% and 10% level respectively.

The logit model indicates that, respondents were more likely to participate in a hayride event if they reside in suburban areas (SUBURBAN), were male (GENDER), between from 21 to 35 years of age (AGE21TO35) and between from 36 to 50 years of age (AGE36TO50), finished a two-year college degree (2YEAR_DEG), and had an annual household income between from $40,000 to $59,999 (INC$40K_60K). Consumers who were less likely to participate in hayrides can be described as having lived in urban areas (URBAN), lived at their current residence for more than 20 years (LIVE>20), were under age 20 (AGE<20), and had completed a graduate degree.

Those who reside in suburban (SUBURBAN) areas were 5% more likely to take part in a hayride event

than those who resided in rural areas. The results shows that (Table 1) 69% of mid-Atlantic consumers reside in suburban areas and therefore, based on the logit model, there is a likelihood that many consumers residing in the three states are likely to participate in agritourism activities.

Gender (GENDER) also played a vital role in participating in a hayride activity. Although significant, only males were more likely to participate in hayrides than females. In the case of a respondent's age, individuals between from 21 to 35 years of age (AGE21TO35) were 7% more likely to take part in hayrides compared to those who were 51 years of age or older. Also, those between from 36 to 50 years of age (AGE36TO50) were 6% more likely to participate in hayrides compared to those age 51 years and older. A similar result was observed pertaining to consumer participation in a wine tasting agritourism event (Govindasamy and Kelley, 2014). Those younger than 20 years (AGE<20) were 12% less likely to participate in hayrides compared to those aged 51 years and older. Among respondents, those who had a two-year college education (2YEAR_DEG) were 9% more likely to take part in hayrides than those who had a high school education or less. Pertaining to a wine tasting

event, graduates were more likely to take part in a wine tasting event than in a hayride activity (govindasamy *et al.*, 2014). Those who completed a graduate degree were also 7% less likely to take part in hayrides compared to those who attained some level of high school education.

Further, those with an annual household income between $40,000 and $59,999 (INC$40K_60K) were 6% more likely to participate in a hayride event compared to those with annual household incomes of over $60,000. This indicates that those with a lower income were less likely to participate, perhaps due to the costs associated with entertainment and recreational activities. Those who resided in urban areas (URBAN) were 5% less likely to participate in hayrides compared to those who resided in rural areas. This might be due to the overall greater availability of recreational activities and events in urban areas compared to rural areas. Finally, those who lived in their current residence for more than 20 years (LIVE>20) were 7% less likely to participate in hayrides than those who lived in their residence for less than six years.

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CONCLUSION

This study analyses demographic characteristics that influence respondents' willingness to participate in a hayride activity, a component of on-farm agritourism. On average 67% of the respondents participated in hayrides during their agritourism farm visit. The logit model results indicate that respondents were more likely to participate in hayrides if they resided in suburban areas, were male, between 21 and 35 and 36 and 50 years of age, completed a two-year college degree, and had an annual household income between $40,000 and $59,999.

However, those who lived in urban areas, have lived at their current residence for more than 20 years, were under age 20, and who completed a graduate degree were less likely to participate in a hayride activity of agritourism. The results of the logit model should provide valuable information for those developing marketing strategies to increase agritourism participation and future interest in support of local agriculture. However, some mechanism must be developed to educate the public about agritourism, and the importance of supporting local agriculture. The logistic regression analysis results were similar to past agritourism marketing research. As per collected data, a majority of agritourism visitors in the mid-Atlantic States have participated in hayride activity. Hence, famers may be able to increase the portion of their land devoted to agritourism events as a tool for increasing participation.

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