ASSESSING GROWER WILLINGNESS TO ACCEPT FOR INCENTIVES IN SUSTAINABILITY PROGRAM PARTICIPATION

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Abstract

Consumers are becoming more and more environmentally conscious and within the last 3-5 years, brands and retailers have begun aggressive marketing campaigns for sustainable products. This has put added pressure on the cotton industry to document field-level practices. The objective of this study was to evaluate producers' willingness to accept for incentives to participate in sustainability programs and adopt sustainable farming practices. Data for this project came from a survey conducted by named researchers via telephone, email, and text links all to be completed via Qualtrics. Results indicate barriers to adoption and potential pricing mechanisms for producers located in Oklahoma and Texas.

Introduction

Sustainability has been defined, researched, and explained in hundreds of ways. "Sustainable agriculture is an integrated system of plant and animal production practices having a site-specific application that will, over the long term: satisfy human food and fiber needs, enhance environmental quality and the natural resource base upon which the agricultural economy depends, and make the most efficient use of nonrenewable resources and on-farm resources and integrate. It will also ensure that where appropriate, natural biological cycles and controls will be prosperous, sustain the economic viability of farm operations, and enhance the quality of life for farmers and society as a whole" (U.S. Code Title 7, Section 3103). The overall idea of agricultural sustainability is built upon three basic pillars for this research: economic viability, social equitability, and friendliness towards the environment as defined by Hansmann, Mieg, and Frischknecht (2012).

Sustainable Development Goals (SDG), are those that encompass 17 goals, each with multiple underlying targets and associated data indicators that are to be achieved by 2030 and predicted to use $5 to $7 trillion around the world each year to obtain the sustainability goals that will occur over a 15-year period between 2015 and 2030 states Vorisek and Yu (2020). According to Mkele (2021), sustainable attributes are becoming more essential in agricultural products, consumers are becoming more environmentally conscious. Farmers are facing demand for benchmarking sustainable practices at the field level.

Voluntary sustainability programs such as the Better Cotton Initiative (BCI) and U.S. Cotton Trust Protocol utilize farm-level data to provide reliable data to brands and retailers. The Fieldprint Platform is a data management software that allows growers to enter their field data and analyzes their sustainable across in eight metrics (land use, irrigation water use, energy use, greenhouse gas emissions, soil conservation, soil carbon, water quality index, and biodiversity). An example of the Fieldprint Platform results is shown in Figure 1.

The objective of this study was to address various types of financial and mechanical procedures to incentivize growers in Texas and Oklahoma to participate in sustainability programs while conceptualizing farmers' views and knowledge of sustainability and the practices required to abide by it. A choice-based conjoint analysis was used to evaluate grower willingness to accept (WTA) and variables affecting the different choices for contracts of various incentive combinations that require growers to participate in sustainability programs to determine the most effective forms of incentive contracts to offer various sectors and clusters of growers. This research was conducted to explore and find out the various options that are the most efficient incentive mechanisms to use to promote conservation and sustainability throughout the cotton supply chain.

Materials and Methods

Online surveys were created in Qualtrics. Snowball recruitment was conducted through Twitter, Facebook, and distributed through industry newsletters and mailing lists. Respondents were sent emails or text messages containing the link to the survey. Respondents were offered a $25 Amazon gift card upon completion of the survey. Researchers and advocates for the project sent out over 500 emails, texts, and letters to try and get more participants, however only 220 surveys were received back and 160 were completed to be included in the sample size for the analyses. Respondents were primarily cotton producers across Oklahoma and Texas (see Figure 3). There were five versions of the survey with three main sections per survey.

The first section to the survey contained questions regarding social demographic questions such as age, gender, location, operation-specific questions such as total acres owned and rented, main crop grown by acreage, what sustainable practices they were currently using, etc. They were asked about their views and perceptions about sustainability. The second survey section had a double-bounded contingent valuation question asking them first if they would take $5 per acre to adopt a sustainable practice, if they said yes, they were then offered $2.50, and if they said no, then they were offered $10. The third and final section to the survey contained a choice-based conjoint analysis and was only available to growers that said they had or currently were growing cotton. Each choice set contained five attributes with varying levels of each as expressed in Table 1. In the choice set comparison, a cotton grower was asked to state which of the two contracts appeared to be more enticing to get them to enroll in a sustainability program, as shown in Figure 2. Each subject was given 3 choice sets to compare, with 5 blocks creating a total of 15 choices of contracts to compare and a total of 30 contracts that were created using SAS code.

Results and Discussion

Tables 2-6 summarize the survey results. Some interesting finds here are that the majority of farmers claim to know a moderate amount about sustainability as it pertains to agriculture and the largest group finds it most difficult to obtain and maintain the economic viability pillar of sustainable agriculture as well as struggling with profitability being their biggest current challenge within their farming operation. A rather large group believes that there might or might not be a forced implementation of sustainable practices within their realm of expertise, but 99% of respondents already do some sort of a sustainable practice with the top five practices including crop rotation, cover crops, no-till, integrated livestock and row crops, and terracing, respectively (Table 8).

The double-bounded contingent valuation found producers were, on average, willing to adopt a sustainable practice such as a cover crop, crop rotation, etc. for $6.11 per acre (Table 10).For the choice-based conjoint analysis, produces were willing to accept $29.25 per acre if grower training was the supplemental benefit and only $1.45 if it was on a per bale basis, and willing to pay $1.40 if while they were offered crop insurance rebate as the supplemental benefit. Growers were more likely to accept an incentive contract if it was based upon a per bale pay out versus per acre (Table 9).

Summary

The objective of this project was to address various types of financial and mechanical procedures to incentivize growers in Texas and Oklahoma to participate in sustainability programs while conceptualizing farmers' views and knowledge of sustainability and the practices required to abide by sustainable standards. Results indicate that producers are willing to participate in sustainability programs with some cash incentives.

Acknowledgements

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References

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Appendix

Table 1. Levels of Attributes for the Choice Set

Attribute:	Levels:
Premium Type	Per acre Per bale
Primary Incentive Amount	$2 $5 $7 $10
Supplemental Benefits	Grower training Cost-sharing Crop Insurance rebate None
Length of Contract	1 year 2 years 3 years
Verification	USDA Third-party Industry

Table 2. Summary of Farmers' Understanding of Sustainability

Please indicate your understanding of agricultural sustainability:	Number:	Percentage:
None at all	1	0.63%
A little	12	7.50%
A moderate amount	58	36.25%
A lot	50	31.25%
A great deal	39	24.38%

Table 3. Summary of if farmers' thought there will be forced implementation of sustainable practices

Do you anticipate that the market will force you to consider implementing sustainable practices in your operation?	Number:	Percentage:
Definitely not	1	0.63%
Probably not	17	10.63%
Might or might not	64	40.00%
Probably yes	59	36.88%
Definitely yes	19	11.88%

Table 4. Summary of which sustainability pillar farmers' find the hardest to meet

Of the 3 standards of sustainability which would be the most challenging for your operation to meet?	Number:	Percentage:
Economic viability (the ability to maintain profitability over time)	119	74.84%
Social equitability (ensuring equal access to adequate food, clothing, and employment)	24	15.09%
Friendliness towards the environment (measure of reduced minimal or no harm on ecosystems or the environment)	16	10.06%

Table 5. All current sustainable practices farmers are using

Please select all sustainable practices that you currently use on your operation:	Number:	Percentage:
Crop rotation	119	74.38%
Strip-till	38	23.75%
No-till	90	56.25%
Variable rate irrigation	38	23.75%
Carbon credits	5	3.13%
Soil-moisture probes	27	16.88%
Cover crops	95	59.38%
Integrated livestock and row crops	74	46.25%
Terracing	64	40.00%
Integrated pest management	45	28.13%
Honeybees	17	10.63%

Table 6. Summary of all current challenges farmers were facing

Please select all current challenges you might be facing in your operation:	Number:	Percentage:
Soil preservation and health	79	49.38%
Maximizing crop yield	111	69.38%
Profitability	123	76.88%
Reduction in greenhouse gas emissions	13	8.13%
Declining water supply	70	43.75%
Farm succession	50	31.25%
Other	3	1.88%

Table 7. Summary statistics of respondents' characteristics

Variable and category	Category percentage (n=160)	Mean	Standard deviation
Age		44.69	1.48
Gender		0.87	0.03
0 = Female	13.12		
1 = Male	86.88		
College educated		0.91	0.02
0 = No	8.81		
1 = Yes	91.19		
Income		101424.10	2996.98
Less than $75,000	37.97		
$75,000-150,000	36.71		
Greater than $150,000	25.32		
Marital status		0.74	0.03
0 = Not married	25.63		
1 = Married	74.37		
Household size		2.58	0.08
1	15.09		
2	39.63		
3+	45.28		
Farming full time		0.51	0.04
0 = No	49.38		
1 = Yes	50.62		
Length of farming		2.92	0.10
1 = 5 years or less	20.63		
2 = 6-10	13.75		
3 = 11-15	8.75		
4 = 16 years or greater	53.77		
Generation of farmer		2.59	0.06
1st	13.75		
2nd	11.88		
3rd or longer	73.77		
Main crop grown		2.70	0.12
1 = cotton	34.38		
2 = corn	6.25		
3 = wheat	33.75		
4 = soybeans	12.50		
5 = sorghum	3.75		
6 = other	8.77		
Total acres farmed		2370.68	368.96
1500 or less	52.50		
1501-2999	25.00		
3000 or greater	22.50		
Sell through a cooperative		0.51	0.04
0 = No	48.75		
1 = Yes	51.25		

Table 8. Further question regarding farmers' perceptions about farming and operations

Variable and category	Category percentage (n=160)	Mean	Standard deviation
Think forced implementation of water regulation		1.76	0.08
1 = Definitely yes	14.84		
2 = Probably yes	50.00		
3 = Might or might not	35.16		
4 = Probably no			
5 = Definitely no	0.00		
	0.00		
Currently enrolled in a sustainability program		0.18	0.03
0 = No			
1 = Yes	82.50		
	17.50		
Satisfaction with the sustainability program		2.29	0.12
1 = Dissatisfied			
2 = Neutral	10.71		
3 = Satisfied	50.00		
	39.29		
Attentiveness to economic viability		1.39	0.05
1 = A great deal	68.13		
2 = A moderate amount	25.00		
3 = A little	6.87		
4 = None at all	0.00		
Attentiveness to social equitability		2.48	0.07
1 = A great deal	8.86		
2 = A moderate amount	41.77		
3 = A little	38.61		
4 = None at all	10.76		
Attentiveness to friendliness towards the environment		1.80	0.06
1 = A great deal	34.59		
2 = A moderate amount	49.69		
3 = A little	15.72		
4 = None at all	0.00		
Currently do a sustainable practice		0.99	0.01
0 = No	0.01		
1 = Yes	99.99		

Table 9. Mixed logit estimation results for model 1 and model 2

	Model 1		Model 2	
Attribute	**Coefficient**	**Standard deviation**	**Coefficient**	**Standard deviation**
Contract	3.83 (2.48)	7.23* (3.86)	0.06 (0.28)	-1.10** (0.53)
Cost-sharing	0.40 (2.08)	13.22* (7.74)	-0.56 (0.58)	-1.85 (1.20)
Crop insurance rebate	5.69 (4.20)	19.32* (10.28)	1.40** (0.63)	0.22 (1.32)
Grower training	-29.25* (17.77)	35.18 (21.92)	-1.45** (0.67)	-0.07** (1.36)
Industry	-4.26 (2.82)	-94.83* (51.25)	-0.35 (0.55)	1.38 (0.99)
Third-party	5.41 (4.51)	36.07* (20.46)	-0.31 (0.58)	0.72 (1.09)
ASC	11.45 (7.57)	18.18* (9.43)	-4.39 (3.56)	10.04* (5.59)
Acre incentive	0.68 (0.51)			
Bale incentive			-0.89*** (0.34)	
Observations	639		639	
Log-likelihood	-183.67		-160.45	
Wald χ^2	13.38		57.54	
n = 73				

Notes: Panel Mixed Logit model using 100 Halton draws (Zeng 2016). Attributes assigned a normal distribution with exception of acre incentive that was designed to follow a lognormal distribution. ASC, alternative specific constant.

***indicates significance at 1% level, **indicates significance at 5%, and * indicates significance at 10%. Values in parentheses indicate the standard error of the coefficient.

Table 10. Double-bound contingent valuation results

	Coefficient	Standard Error	z	P>z	95% Confidence Interval	
WTA	6.11	0.94	6.47	0.00	4.26	7.96

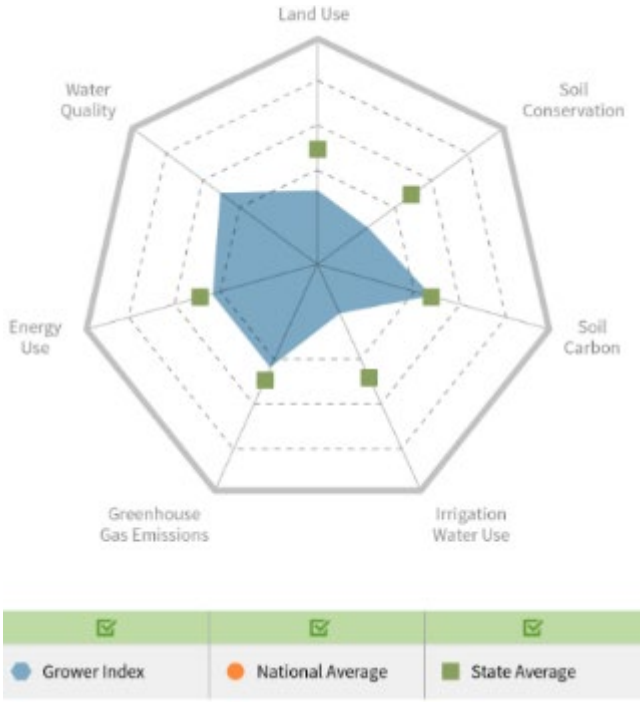

Figure 1. Example of a farming operation's spider-gram from the FieldPrint Calculator

Attribute:	Choice 1:	Choice 2:
Premium Type:	Per acre	Per bale
Primary Incentive Amount:	$7	$2
Supplemental Benefits:	Grower training	Cost sharing
Length of Contract:	2 years	3 years
Verification:	USDA	Industry

Figure 2. A scenario of the choice experiment

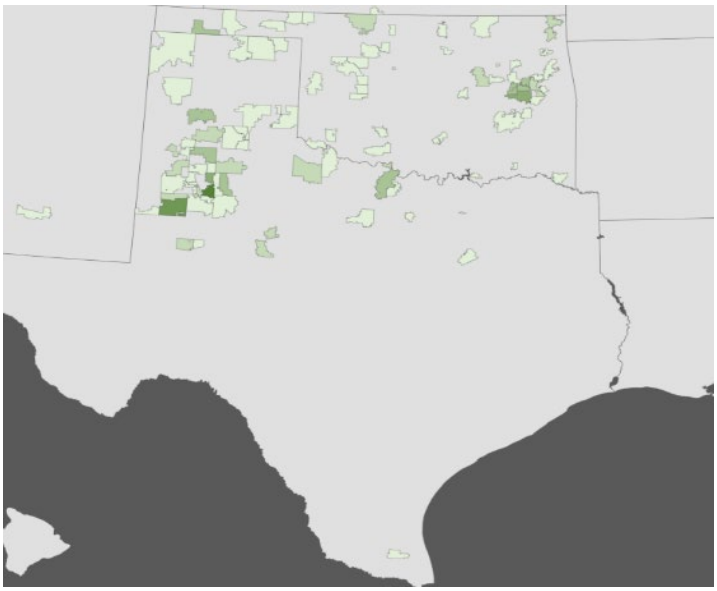

Figure 3. Heat map indicating respondents' locations