COMPARATIVE PRODUCER COSTS OF GAP AND GHP STANDARDS: CAN THE PLAYING FIELD BE MADE LEVEL?

Mechel Paggi, Fumiko Yamazaki, Luis Ribera, Ronald D. Knutson, Juan Anciso, Marco Palma, and Jay Noel

Paggi, Yamazaki, California State University, Fresno; Ribera, Knutson, Palma, Anciso, Texas A&M University; Noel, California Polytechnic State University, San Luis Obispo

mpaggi@csufresno.edu

THE ECONOMICS OF FOOD, FOOD CHOICE AND HEALTH
1st joint eaae/aaea seminar

2010

Selected Paper

prepared for presentation at the 1st Joint EAAE/AAEA Seminar

"The Economics of Food, Food Choice and Health"

Freising, Germany, September 15 – 17, 2010

Abstract

A number of microbial contamination incidents have continued to raise questions regarding the safety of the U.S. food supply with calls for improved food safety control initiatives and standards by both the private and public sectors. As a reaction to these incidents, there have been increased efforts to enhance food safety by the government and industry groups. Increasingly, process standards are being specified that recommend or prescribe Good Agricultural Practices (GAP) standards for production, Good Handling Practices (GHP) standards for handling products, and Good Management Practices (GMP) for responsibilities in overseeing production and handling operations. A primary concern is the potential that the costs associated with implementing food safety related standards will prohibit small producers and handlers from taking part in certain market segments, such as supplying the supermarkets that sell most of the production in developed and more advanced developing countries. Previous study results are presented that suggest economies of scale effects for larger farm size operations leading to lower per-unit compliance cost. This analysis utilized specialty crop representative farm stochastic simulation models that were designed to analyze the impacts of current and changing market conditions and government policies on a number of key operating variables (KOV). The results of the analysis provide an initial indication that the cost associated with compliance to regulatory standards does have an effect on the profitability of individual enterprises.

Keywords: Food safety, citrus, fresh produce, and regulatory costs

JEL: Q12

Introduction

A number of microbial contamination incidents have continued to raise questions regarding the safety of the U.S. food supply with calls for improved food safety control initiatives and standards by both the private and public sectors (Palma et al., 2010). Among the most are microbial contamination incidents in fresh produce such as the 2006 *Escherichia coli* (*E. coli*) *O157:H7* incident associated with the consumption of bagged spinach; the 2008 *Salmonella* outbreaks associated with cantaloupes imported from Honduras, and the 2008 Mexican Jalapeño/Serrano pepper salsa incident, which was initially attributed to tomatoes. These recent outbreaks are not unique. According to the Centers for Disease Control and Prevention (CDC), foodborne agents cause an estimated 76 illnesses annually in the United States (Mead et al 1999). However, the great majority of these cases are mild and cause symptoms only for a day or two. The estimated illnesses are based on FoodNet surveillance data and other sources. In 2007 (the most recent finalized data), the FoodNet surveillance data reported 1097 outbreaks resulting in 21,244 cases of foodborne illness and 18 deaths, with the number of outbreaks 8 percent lower and illnesses 15 percent lower than reported on average from 2002 to 2006 illness outbreaks annually (CDCP, MMWR, 2010)[1].

The most common food-borne illnesses are *Campylobacter*, *Cyclospora*, *Salmonella*, and *E. coli*. Over the past 12 years, all of the 22 reported leafy green associated *E. coli O157:H7* incidents indicated a California source (Cassens, 2008). Other products, both domestically produced and imported, have also been linked to other food-borne illness such as salmonella and hepatitis. Since the mid-1990s outbreaks have occurred that were linked to raspberries, green onions, and strawberries.

[1] Foodborne Active Disease Surveillance Network (FoodNet), In 2007, the FoodNet surveillance area included 45.9 million persons, or 15.2% of the United States population. FoodNet is an active sentinel surveillance network designed to produce stable and accurate national estimates of the burden and sources of foodborne diseases in the United States through active surveillance and additional studies. FoodNet is a collaborative project among CDC, ten state health departments, the Food Safety and Inspection Service (FSIS) of the United States Department of Agriculture (USDA), and the Center for Food Safety and Applied Nutrition (CFSAN) and the Center for Veterinary Medication (CVM) of the United States Food and Drug Administration (FDA).

In part as a reaction to these events, increased efforts to enhance food safety have been undertaken by the government and associated industries groups. Efforts have focused on increased scrutiny of imported products and the improvement in domestic standards (Galvin, 2003). In some cases, product standards have been establish tolerance levels for certain pathogens, in other cases process standards have been adopted that address activities related to the production and handling of products designed to reduce the potential for contamination (Alston, et al, 2005).

Food related illness is not just a U.S. problem. Contaminated food contributes to 1.5 billion cases of diarrhea in children each year, resulting in more than three million premature deaths, according to the World Health Organization (WHO, 1999). High profile events have occurred in such as the milk contamination with melamine in China are illustrative of the problem. Also, *Listeria* contamination linked to deli meats led to a series of recalls and a plant closing by Maple Leaf, the largest Canadian meat processor and one of the top 50 global food manufacturers in the world. Accordingly, there is a general concern across countries about the safety of all food products in an increasingly globalized food industry (Gereffi and Lee, 2009).

As a reaction to these incidents, there have been increased efforts to enhance food safety by the government and industry groups. In addition to the long-standing zero tolerance for pathogens, there is increased surveillance and third-party testing for conditions leading to microbial contamination. Increasingly, process standards are being specified that recommend or prescribe Good Agricultural Practices (GAP) standards for production, Good Handling Practices (GHP) standards for handling products, and Good Management Practices (GMP) for responsibilities in overseeing production and handling operations. These standards are designed to reduce the potential for contamination. They increasingly resemble the detailed Pathogen Reduction Hazard Analysis Critical Control Point (PR/HACCP) procedures that have been adopted for processed meat and poultry products. However, livestock PR/HACCP procedures are firm specific and incorporate specific corrective actions when problems are identified in the enclosed packing plant, while the produce practice standards apply generally and focus on preventive steps to head off potential contamination in various stages including outdoor production.

In the absence of one universally accepted set of standards, producers and food providers are often faced with having to comply with a different set of standards for different customers resulting in increased costs with little evidence of a corresponding increase in compensation in the form of higher product prices. The current labyrinth of food safety and protection standards being promoted by international organizations, national governments, private sector retail food sales, food processors and producers may have a common foundation. All of these standards generally apply to four basic areas and how agricultural producers and handlers accommodate potential biohazards related to them: soil, water, animals and people. However, across the various standards there are many complementarities and conflicts that have an effect on the costs that producers and other members of the industry face as they attempt to implement and/or document the multitude of activities required for compliance.

A primary concern is the potential that the costs associated with implementing food safety related standards will prohibit small producers and handlers from taking part in certain market segments, such as supplying the supermarkets that sell most of the production in developed and more advanced developing countries. Indeed the impact on market structure from standards imposed as conditions for access to certain market segments may lead to the development of a system of fruit and vegetable production that is characterized by a bimodal distribution of production enterprise. On the one hand, large scale producers with the financial resources necessary to incur capital costs and the expense of third party audit certifications may evolve as the preferred suppliers for major retail and export markets. On the other hand, small holders may not have the financial resources necessary to cover private and/or government mandated standards and be relegated to servicing local farmers markets, roadside sales or pick-your-own type operations (Woods, Thornsbury and Weldon, 2006).

This paper focuses on the plight of producers within this environment. The paper first provides an overview of previous attempts to determine the cost of compliance with food safety standards in a variety of crops and growing regions. Next we discuss the methodology used as part of an ongoing farm level study to examine the differences in compliance costs for producers of like specialty crop commodities in selected U.S. states. Results of the analysis of representative farms in Texas and California are then presented. The paper concludes with a discussion of the likely policy options and consequences for the continued evolution of food safety related standards.

Differing Standards and Compliance Costs

In the absence of public resources devoted to testing and certification and/or the group collective actions, the costs of compliance with food safety related standards is the responsibility of individual producers and food firms. Despite the obvious importance and impacts of technical standards on food production costs, there has been a minimal amount of objective economic analysis to quantify their impacts. Developing quantitative estimates of these effects is important for several reasons, including: (1) Added information contributes to and clarifies the debate over the efficiency and costs impacts of such regulations and standards. (2) Such information has important implications for private and public sector decision makers in charge of setting standards. (3) This information assists in international efforts to assess the potential for the creation of technical barriers to trade. For example, a study of firm level data from 16 developing countries suggest a one percent increase in compliance cost in importing countries increases short-run production costs by 0.06 percent due to increased labor and capital requirements. (4) Needed information is provided to undergird public policies designed to create a more level playing field across countries and producer segments. While small, these results begin to document how compliance with standards and technical regulations can be a source of increasing production costs (Makus, Otsuki, and Wilson, 2004).

The horticulture industry in Kenya provides a rich source of information on the impact of food safety compliance costs on small-holder producers. Kenyan vegetable production for export, primarily to the United Kingdom and sales to local markets increasingly reflect the requirements for producer compliance with both international standards such as GLOBALG.A.P. as well as mandatory local standards (KS 1758:2004). It is reported that there are 2569 and 300 farms in Kenya that are GLOBALG.A.P. and KenyaGAP certified respectively (GOK 2010). The proliferation of private company standards that often do not recognize one another as equivalent has created an industry of "auditors" increasing production costs in the absence of clear scientific justification. As an example, the standards facing producers in Kenya and Zambia in 2004 are presented in Table 1 (Okello, Narrod, and Roy 2007). Estimates of compliance costs compiled for a group of Kenya green bean producers in provided in Table 2. As indicated in Table 2, the overall cost may be small in percentage terms for large producers, small holders however must devote a much larger portion of revenues to comply with the same standards.

Table 1. Food Safety Related Standards Facing Horiticultre Producers

Food safety standard		**Countries complying**
Foreign standards		
British Retail Consortium		Kenya, Zambia
EurepGAP		Kenya, Zambia, Ethiopia
Ethical Trading Initiative		Kenya, Zambia
HACCP		Kenya, Zambia
Nature's Choice		Kenya, Zambia
Farm to Fork		Kenya, Zambia
Sanitary and Phytosanitary Standards		Kenya, Zambia, Ethiopia
Domestic standards		
Industry		
ZEGA code of practices		Zambia
KenyaGAP		Kenya
EHPEA code of practices		Ethiopia
Horticultural Ethical trading initiative		Kenya
Company/exporter code of practices		Kenya, Zambia
Public		
Kenya Bureau of Standards		Kenya
HCDA code of practices		Kenya
Zambia Standards Bureau		Zambia
IFPRI Discussoin Paper, No. 00737,page 13, 2007.		

Table 2. Costs and incomes (in Kenya shillings) associated with IFSS compliance and certification by Grower Type, 2006			
Cost item	**Farmer group**	**Small farmer**	**Large farmer**
Grading shed	59,800	20,000	34,000
Charcoal cooler	41,000	5,400	32,000
Toilet	5,000	-	7,000
Pesticide storage unit	24,450	8,000	37,000
Disposal pit	1,000	-	1,000
Needs assessment & QA manuals	24,750	21,500	31,000
Analyses (soil, water, MRL)	45,064	40,000	41,800
Pre-audit (1)	132,000	56,750	32,000
Certification	105,890	94,540	94,540
Total IFSS investment costs	438,954	228,190	311,340
Cost per farmer	29,264	228,190	311,340
Year 1 income	3,600,000	96,000	384,000
Year 2 income	7,520,000	240,000	864,000
Total income over investment period	11,120,000	336000	1,248,000
Cost of compliance as % of total income	4	68	24

Source: IFPRI Discussion Paper, No. 00737, 2007.
The exchange rate during time of survey was 1US$ = 74 Kenya shillings

Producers in California and throughout the United States, like those in Kenya and other countries, also face a multiple set of standards that are food safety specific. A snapshot of many of those various standards was presented at recent working group meeting to examine possible pathways to harmonization of Good Agricultural Practices hosted by the United Fresh Produce Association is provided in Table 3 (DeCosta, 2010). The working group discussions revealed a number of areas of differences among standards including: food safety plans or risk assessments; traceability and recall programs; audits; corrective actions; worker education, and others. Information from the working group discussions helped identify areas where harmonization among the various standards might be targeted, however issues related to compliance costs were not reported.

Table 3. Identification of Selected Standards For Consideration in Harmonization Efforts	
SQF 1000 (Safe Quality Food; Food Marketing Institute)	Commodity Specific Food Safety Guidelines for Watermelon
GlobalGAP F&V	Primus GAPs V 704
USDA GAP	California Strawberry Industry Food Safety Program
SENASICA GAP (Mexico National Health Service, Food Safety and Food Quality)	USDA National Organic Standard Food Safety Only
Georgia GAPs	CanadaGAP Combined Veg
Mushroom GAPs	AFDO Model Code for Produce Safety (Association of Food and Drug Officials, York, PA)
AIB GAP (AIB International, North American Wholesale and Retail Baking Industries)	California Tomato Farmers GAP
SCS GAP (Scientific Certification Systems, auditor services, Emeryville, CA	Steritech GAP/GHP (The Steritech Group, brand protection services, North America)
Silliker GAP (Silliker Food Safety & Quality Solutions, Homewood, Il.	California Leafy Green Marketing Agreement

Source: Produce GAP Harmonization Initiative Technical Working Group, March 11, 2010.

In California, determining the costs associated with the adherence with of food safety related standards can be complicated by the fact that producers must also comply with other regulatory standards such as those associated with air and water quality initiatives. In those cases, producers' enterprise budgets must be detailed enough to assign values to each regulatory compliance activity. For example, a study of fresh orange production in California reported the total costs associated with regulatory compliance to be $225 per acre (Table, 4, Hamilton et al, 2007). However close to 60 percent of the reported costs are associated with chipping of orchard pruning to comply with new air quality regulations and workers compensation insurance. Actual costs for specific compliance with food safety are not reported in identifiable categories but presumably would be no more than $90 per acre, the total of the remaining reported costs.

Table 4. Regulatory Compliance Costs for California Fresh Orange Producers

Compliance Category		**Value of Time**	**Total cost/year**	**Cost Per/Ac**
Education/Training for Regulatory Complian	**Total Hrs/year**	**Per/Hour**		
Labor/Employment Issues	100	$35.00	$3,500	$2.50
Pesticide/Fertilizer Issues	100	$35.00	$3,500	$2.50
Water Quality Issues	52	$55.00	$2,860	$2.04
Air Quality Requirements				
Application Fee for CMP plan			$800	$0.57
Time Spent in filling out forms, drawing maps, e	20	$35.00	$700	$0.50
Sanding roads				
Time	40	$35.00	$1,400	$1.00
Equipment Cost	40	$32.00	$1,280	$0.91
Labor	40	$16.00	$640	$0.46
Materials			$7,000	$5.00
Chipping groves				
Chipping cost (per acre)	304		$45,600	$32.57
Labor to clean up field	304		$15,200	$10.86
Water Quality Requirements				$0.00
Cost to join water waiver coalition			$600	$0.43
Permits/paperwork to comply with ground water				$0.00
quality	20	$35.00	$700	$0.50
Department of Pesticide Regulation				$0.00
Filing paperwork/record keeping	100	$20.00	$2,000	$1.43
Increased cost of biologically based pesticides			$20,000	$14.29
Increased application time	336	$16.00	$5,376	$3.84
Extra PCA Cost	4500	$2.00	$9,000	$6.43
Labor Requirements				$0.00
Worker's Compensation Costs	$1750.14 per			$0.00
	employee		$131,260.50	$93.76
Capital Investment				$0.00
Increased technology expense to offset regulatory				$0.00
cost			$50,000	$35.71
Increased liability insurance cost			$12,461	$8.90
Legal costs related to regulatory compliance			$2,000	$1.43
Total Costs of Regulatory Compliance			**315,877.50**	$225.63

While limited, some prior attempts to quantify costs specifically attributable to food safety standards compliance have been made. In a study of fresh strawberry production in the Florida, California and Baja Mexico the costs of implementing a group of five GAP practices as part of a food safety management program were derived in detail (Woods and Thornsbury, 2006). The information provided in Table 5 reports results similar to the situation facing the Kenyan green bean producers. Smaller growers have many of the same costs of compliance but a much smaller base upon which to apply the per unit charge.

Table 5. Total and per acre Costs (U.S. $) of GAPs used in the Empirical Model

GAP	Small u-picks		Florida and Baja		California	
Average farm size(acres)	4.8		30		47	
Season length (months)	1		5		11	
	Total Cost	Cost/Acre	Total Cost	Cost/Acre	Total Cost	Cost/Acre
Toilet and handwashing facilities	$220.00	$46.00	$3,375.00	$113.00	$5,288.00b	$113.00
Training on hygiene	58.00	12.00	691.00	23.00	1,056.00	47.00
Packing shed or cooling pad	400.00	83.00	464.00	15.00	1,022.00	22.00
sanitation and single use trays for u-picks						
Monitoring irrigation water	32.00	7.00	149.00	5.00	149.00	3.00
Developing a crisis management plan	670.00	139.00	721.00	24.00	721.00	15.00
Total	$1,380.00	$287.00	$5,400.00	$180.00	$2,948.00	$200.00

a This list of practices was developed with the help of GAPs expert Elizabeth Bihn (Cornell University), through discussions with strawberry growers, and by reviewing private and public third party certification. Detailed calculations are available in Woods and Thornsbury (2005).

b Dropped from total since this cost is already included in the cost of production estimates from California.

Source: Woods, Thornsbury, Raper and Weldon, 2006.

More recently, a survey of the California producers who are signatures of the voluntary Leafy Green Marketing Agreement (LGMA), reported seasonal food safety costs more than doubled after the implementation of the LGMA (Hardesty and Kusunose, 2009). The results of a grower survey indicated that the seasonal food safety costs associated with LGMA compliance increased from a mean of $24.04 per acre in 2006 to $54.63 per acre in 2007(Table 6). In addition, the cost of modifications to operations to meet LGMA GAP standards, such as installing additional fencing, modifying bathroom facilities, etc., averaged $21,490, about $13.60 per acre (Table 7). The results of the survey are consistent with other studies indicating that growers with larger acreage appear to be better able to absorb these costs. Medium-sized growers with revenues between $1 million and $10 million had seasonal food safety cost that were 159% larger than the average cost for larger growers with revenues in excess of $10 million.

Table 6. Growers' Seasonal Compliance Impacts per Operations, 2006 and 2007

			Respondents Reporting Impacts		
Food safety impact	Unit		Percent	Mean	Median
		2006	38	3,247	2,000
Animal activity**	Cartons	2007	73	6,387	3,000
		2006	7	28,583	5,000
Flooding concerns	Cartons	2007	5	1,000	1,000
	Hours/	2006	89	16.07	5
Field monitoring***	week	2007	97	24.18	10
Procedures	Hours/	2006	83	10.86	3.5
documentation***	week	2007	100	17.54	6
	Tests/	2006	87	12.27	3
Water testing***	Tests/Month	2007	100	19.36	9
	Hours/	2006	97	99.25	10
Personnel training*	season	2007	100	130.69	18
		2006	31	240,250	65,000
Compost Expenses	$	2007	27	264,959	50,000
Food safety		2006	36	1.31	1
specialists***	FTE	2007	53	1.45	1
Average food safety costs		2006		24.04	15
$/acre		2007		54.63	40

*Difference between 2006 and 2007 is statistically significant at .10 level.
**Difference between 2006 and 2007 is statistically significant at .05 level.
***Difference between 2006 and 2007 is statistically significant at .01 level.
Source: Hardesty and Kusunose, 2009

Table 7. LGMA-Related Investments/Modifications ($ Per Operation)					
Respondents who have ...	Percent making modification	Cost ($ mean)	Standard Deviation	Minimum	Maximum
Installed additional fencing	57	28,354	36,977	1,200	148,000
Increased/modified bathroom/hand-washing facilities	57	6,964	19,627	0	100,000
Lined wells/irrigation canals, made other changes to water system	23	3,167	4,008	0	10,000
Modified compost storage area	11	2,625	4,922	0	10,000
Modified packing area	2	10,000	--	10,000	10,000
Made other modifications/investments, any examples?	16	2,416	3,878	0	10,000
Total cost (41 observations)		21,490	36,331	0	150,500
Cost per acre of leafy greens		13.60	20.40	0	106.00
Source: Hardesty and Kusunose, 2009					

Regional Differences

The previous discussion has highlighted the potential cost effects of compliance with GAPs and HACCP type standards in crop production and the difficulties associated with different buyers adopting different standards. Previous study results are presented that suggest economies of scale effects for larger farm size operations leading to lower per-unit compliance cost. In addition to variations among buyers, regional differences may exist in compliance costs that are attributable to differences in local government regulations. In the United States different states, in some cases different counties within the same state, may impose their own standards that govern production practices and processes. If such differences in regulatory regimes across boundaries exist they may have an effect on the relative profitability of production enterprises for the same or substitutable commodities depending on the resident set of standards being enforced in their area.

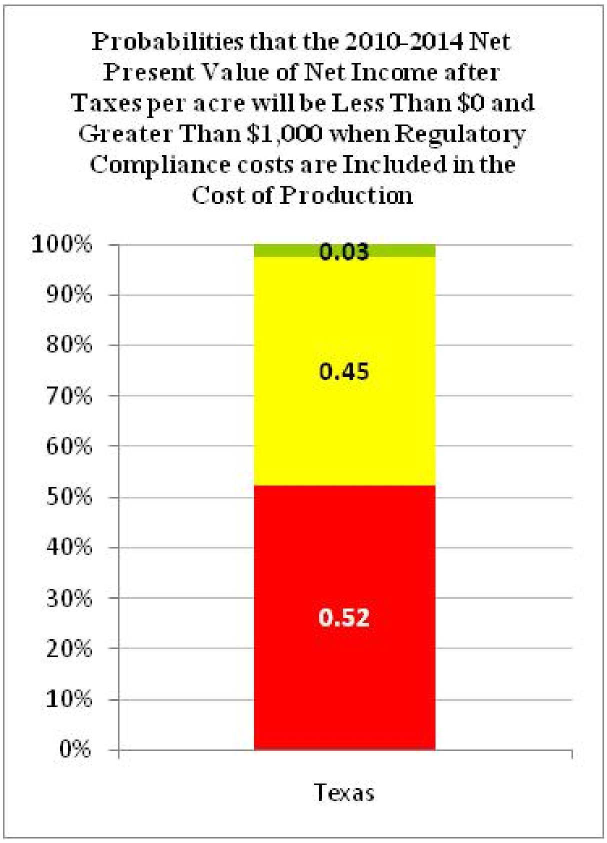
In this study we use an example from the United States based on fresh citrus production in the states of Texas and California where different regulatory standards are in place. In this case differences among standards affect the overall compliance costs incurred by producers in their efforts to meet food safety standards and other production/process regulations. In addition we utilize representative farm level simulation models for each area to derive the implications of variable compliance cost for their relative profitability. In order to accomplish this we collected input data on production and regulatory compliance costs from panels growers in the citrus growing region of California and in the Texas Rio Grande Valley (Table 8). In each case agricultural extension service enterprise budgets were used as the basis for production costs categories. Regulatory compliance costs categories were based on those utilized in previous efforts to identify differences among states (Hamilton, 2006).

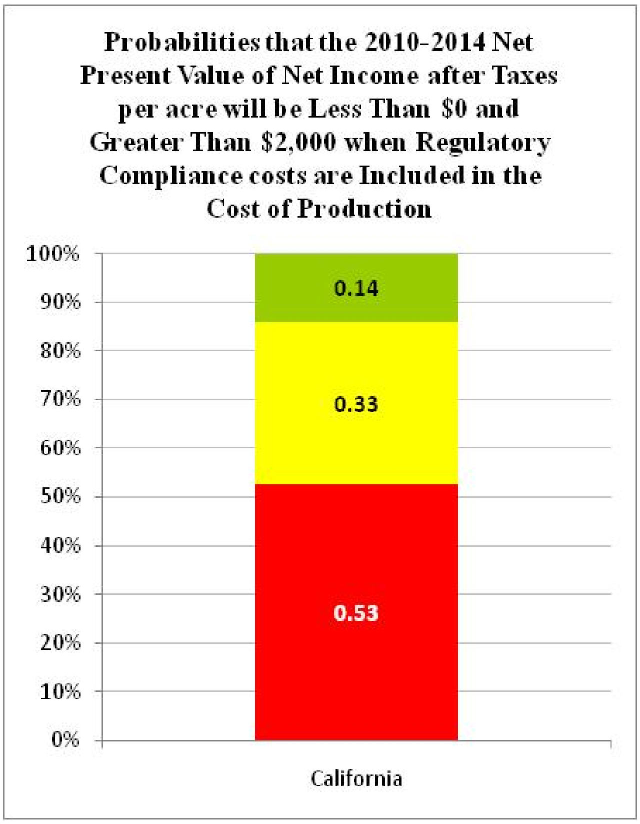
Table 8. Comparative Compliance Costs Per Acre		
Policy Variables		
Regulatory Compliance Costs ($/acre)	California	Texas
Education/Training for Regulatory Compliance ($/acr	$15.04	$18.00
Air Quality Requirements ($/acre)	$18.34	$1.00
Water Quality Requirements ($/acre)	$1.11	$12.00
Department of Pesticide Regulation ($/acre)	$21.44	$0.00
Labor Requirements ($/acre)	$32.66	$13.00
Capital Investment ($/acre)	$100.00	$0.00
Risk Management / Food Safety ($/acre)	$25.00	$0.00
Clerical / Assessment Expenses ($/acre)	$2.60	$0.00
Total Regulatory Compliance Costs	$216.19	$44.00
Source: Author's Grower Panel Response Data		

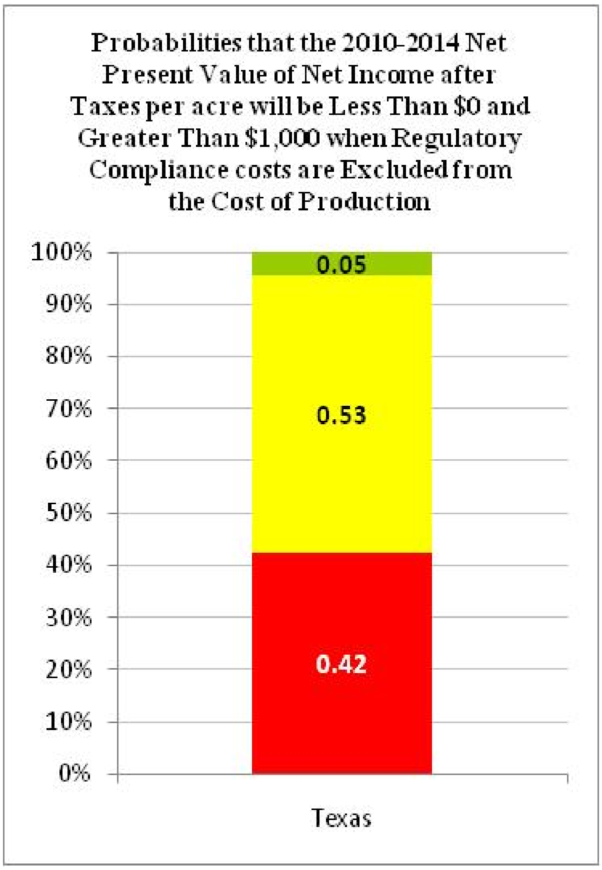
This analysis utilized specialty crop representative farm stochastic simulation models that were designed to analyze the impacts of current and changing market conditions and government policies on a number of key operating variables (KOV). The KOVs included in there specialty crop representative farm models are yearly net income; cash flow position; financial ratios such as return on assets; debt to equity or liquidity; and net present values of net income after taxes. Each of these KOVs may be analyzed over a multi-year period. Currently 20 representative farm models have been developed for California specialty crops by staff at the California Institute of Specialty Crop and Center for Agribusiness. In this study we determine the differences in probability distributions of net farm income when regulatory compliance costs are included and excluded from the cost of production. The basis for these models originates from the pioneering work by the faculty of Agriculture and Food Policy Institute at Texas A&M University, (Richardson, 1976).

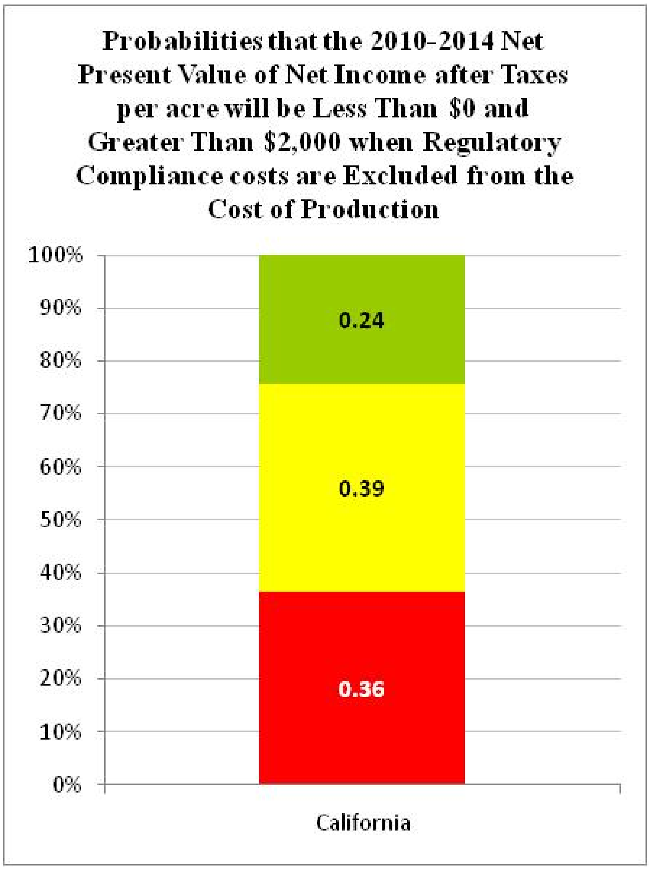
One of the outputs available from the model is a chart that provides a breakdown of the percentage probability of various outcomes of interest, in this case the net present value of returns above operating cost per acre. In Figures 1 – 4 the probabilities that the representative farm will have a net return of zero or less, achieve a positive return and exceed the target revenue are displayed in red, yellow and green respectively. In our comparison, the cost of compliance with regulatory standards results in an increase in the probability of a negative return per acre for the citrus operations in both Texas and California over the 5 year time horizon. In the case of California, where total compliance cost are greater, the probability of a negative outcome calculated to be 17 percent greater, while the Texas example experiences an increase of 10 percent. The variability in net returns is observed from differences in gross revenue based on 500 simulations for each year with random values for prices and yields drawn for their historic probability distribution functions. Costs are adjusted each year based on estimated inflationary indices for the associated input category.

The results of the analysis provide an initial indication that the cost associated with compliance to regulatory standards does have an effect on the profitability of individual enterprises. The variation between regions also suggest that not only are the specific costs of preventive control actions associated with a given standard important, the degree that those standards lack universal application across governmental boundaries can have an effect on relative competitiveness as well. Clearly these results are limited in scope and implication for the industry as a whole and are intended only to demonstrate the potential for this approach. The authors are currently working to obtain additional information to conduct detail examination for other commodities and regions. However from this analysis and the work of others reported in this paper is would appear that there is no doubt the implementation of controls on farming operations designed to enhance food safety, address externalities associated with air and/or water quality or other goals comes at an increased operating cost for growers regardless of size or geographic location.


Probabilities that the 2010-2014 Net Present Value of Net Income after Taxes per acre will be Less Than $0 and Greater Than $1,000 when Regulatory Compliance costs are Included in the Cost of Production
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.03
0.45
0.52
Texas


Probabilities that the 2010-2014 Net Present Value of Net Income after Taxes per acre will be Less Than $0 and Greater Than $2,000 when Regulatory Compliance costs are Included in the Cost of Production
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.14
0.33
0.53
California


Probabilities that the 2010-2014 Net Present Value of Net Income after Taxes per acre will be Less Than $0 and Greater Than $1,000 when Regulatory Compliance costs are Excluded from the Cost of Production
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.05
0.53
0.42
Texas


Probabilities that the 2010-2014 Net Present Value of Net Income after Taxes per acre will be Less Than $0 and Greater Than $2,000 when Regulatory Compliance costs are Excluded from the Cost of Production
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.24
0.39
0.36
California

Conclusions and Implications

In many respects, GLOBALG.A.P. and related organizations and firms have become doorkeepers for which products enter the commercial market for produce. This is the case for both developed and for developing countries (Knutson and Josling 2009). Admittedly, the challenges for meeting those standards are greater for producers developing country than for producers in developed countries (Knutson and Josling 2009, Cervantes-Godoy et al. 2007). Yet even in developed countries those producers having a smaller-scale of operation face serious challenges in meeting this new era of produce standards. A concern related to these developments is that this segment of producers may either be foreclosed from serving commercial food outlets where the majority of products are sold. In this case, these smaller producers could be limited to serving farmers markets that do not adhere to these standards and represent a small share of the market for producer. Worse yet, they could be foreclosed completely from producing and marketing producer.

This study investigates only the cost dimension of the competitive disadvantage faced by smaller producers for only one commodity, oranges. It finds a substantially higher GAP compliance costs per acre for medium-size operations than for there larger counterparts. It finds substantial geographically state-to state differences in compliance costs. It also demonstrates that, extended over time, these higher costs medium-size operations adversely impact a number of important financial variables that can be expected to impact their ability to compete and survive.

The point of this study is not to be critical of the higher standards for food safety embodied in GLOBALG.A.P, LGMA, and related organizations. The need for these higher standards has been clearly demonstrated by the large number of produce-related microbiological disease-causing incidents and by the larger share of the population that is vulnerable to microbiological diseases. The challenge facing policy makers in both the public and private sectors is to:

(1) Determine the magnitude of the problem. There is need to replicate this study across a number of crops and sizes of operations.

(2) Evaluate the effectiveness of technical assistance and related educational programs in overcoming the cost disadvantages facing those producers that are the most adversely affected.
(3) Chart and implement the public and private sector options that are required to level the playing field across the spectrum of producers and crops.

In addition the harmonization of standards to achieve a unified set of preventive controls and practices for all producers may provide benefits that need to be outlined and quantified. For example savings may accrue to participants across the value chain from having universal acceptance of a single audit procedure. However finding a one size fits all solution that seeks to be size and location neutral will be a difficult task.

In the end improved food safety is a goal that is being pursued by the entire industry in both plant and animal product producers. Decreasing the likelihood of food borne illness is a benefit to all producers regardless of size. The role analysis such as described here can play in this pursuit is to help quantify the economic impact of alternative prescriptions for preventive controls. Hopefully this information will be taken under consideration as new standards and/or changes to existing regulatory mandates are formulated.

References

Alston, et. al "Economic Consequences of Mandated Grading and Food Safety Assurance: *Ex Ante* Analysis of the Federal Marketing Order for California Pistachios", Gianni Foundation Monograph, No. 46.For an example California pistachio growers imposed standards on aflatoxin limits within the context of a marketing order in August, 2005. In another example the requirements for the pasteurization of Almonds is a case where process standards create a product standard.

Cervantes–Godoy, D., D. Sparling, B. Avendaño, and L. Calvin. 2007. "North American Retailers and Their Impact on Food Chains." Proceedings of the Fourth North American Agricultural Market Integration Consortium Workshop. Available at: http://naamic.tamu.edu/cancun2/sparling.pdf .

Calvin, Linda. Produce, Food Safety, and International Trade, AER-828, USDA, ERS, November, 2003.

Cassens, Barbara. "Produce Safety An FDA District Office Perspective", 2008 Ag Safe Conference, Monterey, California.

De Costa, Suresh. "Produce GAP Harmonization Initiative", presentation, Technical Working Group Meeting, Irvine, California, March 10-11, 2010.

Gereffi, Gary and Joonkoo Lee. "A Global Value Chain Approach to Food Safety and Quality Standards", Global Health Diplomacy for Chronic Disease Prevention, Working Paper Series, Duke University, February, 2009.

Government of Kenya, "Kenya Position Paper", Standards and Market Preferences: Opportunities and Constraints, East & South African Video Conference on High Value Horticulture, 27 June, 2010.

Hamilton, Lynn. "Comparing California's Cost of Regulation to Other States: A Case Study Approach for Agriculture", California Institute for the Study of Specialty Crops, CISSC No. 49958, October, 2006.

Hardesty, Shermain and Yoko Kusunose. " Growers' Compliance Costs for the Leafy Greens Marketing Agreement and Other Food Safety Programs", UC Small Farm Program Research Brief, September, 2009.

Knutson, R. and Josling T. 2010. "New Generation of Standards: An Overview." In *New Generation of NAFTA Standards*. Huff, K.M., K.D. Meilke, R.D. Knutson, R.F. Ochoa, and J. Rude (eds). Proceedings of the Fifth North American Agricultural Market Integration Consortium Workshop. Guelph, Canada: University of Guelph, Friesens Publications. Available at: http://naamic.tamu.edu/austin/knutsonjosling.pdf (accessed June 10, 2010).

Knutson, R. and Josling T. 2009. *A New Generation of Standards: Implications for the Caribbean and Latin America* . ECLAC Studies and Perspectives Series. ECLAC Santiago, Chili, United Nations, Available at www.eclac.cl/washington/publicaciones/xml/2/37602/Final2009-277_W.261.pdf - 2009-10-30 (accessed June 12, 2010).

Makus, Ketith E., Tsunehiro Otsuki and John S. Wilson. "The Cost of Complying with Foreign Product Standards for Firms in Developing Countries: An Econometric Study", Institute for Behavioral Science, University of Colorado at Boulder, Working Paper, PEC2004-004, 2004.

Okello, Julius Juma, Clare Narrod and Devesh Roy. "Food Safety Requirements in African Green Bean Exports and Their Impact on Small Farmers" IFPRI Discussion Paper 00737, December, 2007.

Mead, Paul S. Laurence Slutsker, Vance Dietz, Linda F. McCaig, Joseph S. Bresee, Craig Shapiro, Patricia M. Griffin, and Robert V. Tauxe, "Food-Related Illness and Death in the United States", *Emerging and Infectious Diseases* Vol 5, No. 5, September – October, 1999, http://www.cdc.gov/ncidod/eid/vol5no5/mead.htm , Centers for Disease Control and Prevention, Atlanta, Georgia, USA.

Palma, Marco, Luis A. Ribera, David Bessler, Mechel Paggi, and Ronald Knutson. 2010. Potential Impacts of Food Borne Illness Incidences on Market Movements and Prices of Fresh Produce in the United States. *Journal of Agricultural and Applied Economics* (In Press).

Richardson, James W. "Simulation of Applied Risk Management with Simetar**",** Department of Agricultural Economics, Texas A&M University, January 2005©

Richardson, J.W. and H.P. Mapp, Jr. "Use of Probabilistic Cash Flows in Analyzing Investment Under Conditions of Risk and Uncertainty." Southern Journal Agric. Econ., December, 1976.

U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. "Morbidity and Mortality Weekly Report, Vol. 59, No. 31, August 13, 2010, www.cdc.gov/mmwer.

Woods, Mollie, Suzanne Thornsbury, Kelly Curry Raper and Richard Weldon. "Regional Trade Patterns: The Impact of Voluntary Food Safety Standards", Canadian Journal of Agricultural Economics, Volume 54, Issue 4, pp. 531-553, December, 2006.

World Health Organization, Food Safety Program" Food Safety – An Essential Public Health Issue for the New Millenium", 1999, (WHO/SDE/PHE/FOS/99.4), [hereafter "*Food Safety* □ *An Essential Public Health Issue for the New Millenium*], at p. 7.