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The Small Farmer-Tuskegee University-Walmart Project: Observations of the Steps within Commercial Supply

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THE SMALL FARMER-TUSKEGEE UNIVERSITY-WALMART PROJECT: OBSERVATIONS OF THE STEPS WITHIN COMMERCIAL SUPPLY

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Abstract

Observations of the various efforts necessary in an initiative, the Small Farmer-Tuskegee University-Walmart Project, to assist small farmers to comply with produce industry standards and supply produce to a major retailer over a six-year period were documented through an illustrative case study. The observations were taken from meetings with commercial buyers and farmers, site visits to processing centers and corporate farms, conference calls, and, mainly, from the authors' "hands-on" participation with the functioning and preservation of this initiative. Consequently, these observations were organized into a framework of criteria that must be successively satisfied to be able to supply produce commercially. These criteria were capacity, capability, quality, food safety, consistency, sustainability, and marketability. A key finding was that for small farmers to meet these criteria, they required organization and support. It was concluded that although the effort was successful, the information gained through the effort was perhaps more valuable.

Keywords: Small Farmers, Produce Markets, Commercial Supply, Capacity

Introduction

In 2011, after several months of discussions between USDA and Tuskegee University, Walmart agreed to facilitate a research-based initiative, Small Farmer-Tuskegee University-Walmart (SFTW) Project, to explore how to incorporate small-scale produce growers into their supplier pool. At that time, Walmart was interested in the potential for increased marketing opportunities and transportation costs savings from "locally-grown" branding and supply. In facilitating this effort, Walmart enlisted the assistance of their co-managers, essentially brokers (e.g., Lipman Produce, Pura Vida Farms, W. P. Rawls), who are contractually responsible for providing certain classes of fruits and vegetables to particular distribution centers (DCs); that is, warehouses that stock the stores in a region of one or more states. Several co-managers agreed to take on the task (or challenge) of helping Tuskegee University by providing technical knowledge and assistance on the breadth of issues involved with supplying produce according to the commercial industry standards. These standards pertain to acceptable practices from arranging an order, through delivery, to invoicing.

From the retail standpoint, the methods used in supply are as integral and important as the produce supplied; both had to conform to rigorous industry standards. Although there were some significant variances offered for facilitating this effort, for example, agreements instead of contracts, lower or variable amounts of supply, direct-to-DC delivery, etc., by and large, these standards were maintained. This was to ensure the integrity of the produce supply system and provide a genuine, "real-world" environment for the effort. From Walmart's perspective, the

fruits and vegetables sold through the DCs and stores to the customers had to meet their usual specifications (Hill et al., 2014). At the beginning of the SFTW Project it was fairly understood among Walmart executives that there would need to be a commitment to providing a reasonable amount of “shepherding” to ensure that the information gathered in practice was of value. With changes in Walmart personnel, co-managers, and the progress of the effort, the underlying objectives were regularly reinforced to promote the continuance of the support.

From 2011 to 2016, Walmart approved the supply of and accepted some amount of five crops in the SFTW Project. The crops were watermelon; shelled purple hull peas; bundled, crated collard greens; yellow and zucchini squash, and eggplant. Each of the different types of crops was purchased by the associated Walmart corporate buyer and managed by the particular co-manager for the targeted DCs in Alabama, and in other states when applicable. The co-managers determined the processes by which they communicated with Tuskegee University concerning the produce supplied through the effort; Walmart, of course, approved purchases, determined destinations, and set amounts in the business day-to-day. However, matters such as pricing, supply weeks, and specifications were negotiated in advance of the season, with Tuskegee University on behalf of the farmers in the effort. The co-managers also determined to what extent they were willing to assist through providing technical and clerical assistance, collective buying power for supplies such as containers, site visits held on their farms, and presentations.

From these various exchanges with Tuskegee University, the requirements for commercial supply were discerned. There were five primary criteria that had to be met, or ‘steps’ to be taken towards approval of supply. Also, there was one, significant underlying assumption for the effort; a criterion that was inherently qualified from the start. Moreover, there was an additional, somewhat optional, criterion that would be beneficial to meet (explained in detail under results). The overall goal of this research-extension initiative was to determine the various “components” necessary to allow small-scale and limited-resource farmers to access this produce food system. The collaboration between USDA, Walmart and its associated co-managers, and Tuskegee University and its educational, community, and governmental partners, allied to approach this challenge. Up to this point, small-scale farmers, and most certainly limited-resource farmers, have made only minor yet notable entrances into this commercial supply arena. The objective of the SFTW Project was to pilot a model of how these targeted farmers would be able to access the commercial system and to grow the level of supply, over time. The focus of this study was to document and organize the observations made of the efforts taken in the SFTW Project.

Literature Review

The progress of the SFTW Project was documented after the first three years regarding broader aspects of the effort. For instance, Hill et al. (2014) explored the expansion of produce marketing opportunities presented by a partnership between Tuskegee University, a large commercial retailer, Walmart, and, socially and historically disadvantaged farmers (SHDFs). The authors concluded that, although there have not been many instances of SHDFs breaking into the commercial markets and remaining viable over time, it is not unattainable given the commercial success stories of U.S. agricultural cooperatives. Hargrove et al. (2014) assessed an agricultural

consortium of five 1890 land grant universities working in partnership with farmer-based cooperatives to market fruits and vegetables to Walmart. They concluded that because the farmers were able to negotiate price points, develop a cold chain management system, properly package and store produce, and cultivate and build a mutually beneficial relationship with Walmart, several benefits were attained, such as supplemental income to farmers, expansion of the existing regional food system, and promotion of good farm management practices. Robinson et al. (2014) also reported on the formation of the Small Farmers Agricultural Cooperative, which comprised members/farmers from several regions in Alabama. These farmers received training necessary to understand the importance of farmers working together, internal management and controls, sharing of knowledge, resources and experience, doing business at higher volumes/quantities, and operating at a higher level of quality assurance. They noted that the success of the Cooperative would require that members work closely together, especially in communications; be totally committed; learn the importance of quality control, and be in “lock-step” with every aspect of the commercial marketing effort.

The more specialized efforts in irrigation, pest management, and food safety towards the first three years of progress of the SFTW Project were also documented. Shange et al. (2014) demonstrated the development, utilization, and education on a sustainable irrigation system, in both energy and water conservation. This was intended to provide opportunities for SHDFs to have steady production capacity while offsetting energy costs, allowing them to take part in the expanded marketing opportunities in the SFTW Project. Quarcoo and Bonsi (2014) documented the integrated pest management (IPM) activities, pest problems encountered, IPM methods recommended for SHDFs, and pesticide residue issues found through the provision of technical expertise to farmers. Wall et al. (2014) shared the challenges of African-American women in successfully securing food safety certification, as required by Walmart. The certification process was an effort undergirded by Tuskegee University Extension and Research staff, the commercial partners, and support from USDA agencies and state offices. Vaughan et al. (2014) examined the methods used in a food safety educational program with SHDFs, designed to assist them with obtaining certification. He identified the various challenges for these farmers, such as the need for motivation and information, and offered strategies to address these challenges. Also, Vaughan et al. (2016) examined good agricultural practices used to assist a small-scale produce processor to obtain food safety certification, as required by Walmart standards. It was concluded, from detailing the changes needed for successful audits, that broad and extensive Extension training and technical assistance may be necessary to help small-scale processors become food safety GAP certified.

Methodology

Illustrative Case Study

This study followed the illustrative case study method. Illustrative case studies, as defined by Becker et al. (2015, p. 5), are “primarily descriptive... typically utiliz[ing] one or two instances of an event to show what a situation is like.” Morra and Friedlander (1999, pp. 9-10) described the illustrative case study as a type of descriptive case study:

“These case studies primarily describe what is happening and why, to show what a situation is like. This is especially useful to help interpret other data that may be

available, such as survey data. [The World Bank Operations Evaluation Department] has many examples of this type of case study. Its study of structural and sectoral adjustment (Jayarajah and Branson, 1995) sampled and reviewed 99 loan operations in 42 countries, and provides an annex with case studies of 5 countries... Illustrative case study sites are usually selected as typical or representative of important variations. They provide the realism and vividness of anecdotal information. The number is kept small to help keep the reader's/user's interest. Data often include visual evidence. Reports may use self-contained, separate narratives or descriptions. In using the illustrative case study, the challenge is in selecting the instances. The case or cases should adequately represent the situation. Where considerable diversity exists, it may not be possible to select a "typical" site."

The event, or case, in this study, was the multi-faceted effort to comply with produce industry supply standards by an educational institution working with a group of small farmers.

Data Sources and Analysis

This study documents observations made by several university personnel over the six-year period of this effort. These myriad observations were taken from meetings with commercial buyers, co-managers, and farmers, site visits to processing centers, corporate farms, and small farms, conference calls, symposia, Extension meetings and conferences, and mainly from authors personally participating, "hands-on," daily, with the functioning and preservation of the effort.

The data were analyzed by organizing the observations by their importance and role in facilitating the farmers to be able to supply through the SFTW Project. Essentially, each observation was "examined" to determine specifically how it impacted the effort. For example, it was observed that Walmart considered accepting certain crops such as watermelon, but the watermelon had to be of a certain size, about 20 pounds, and it was observed that Walmart issued to the SFTW Project their tolerances on physical and coloration defects. The first observation went towards the issue of capability, that is, the farmers' ability to grow the crop to that size. The second went toward the issue of quality; that is, the farmers' ability to stay within the tolerances of defects. It was possible that the farmers could not have grown a watermelon at the size that was acceptable, but could have met the limits on defects. Similarly, it was possible that the farmers could grow a watermelon at the acceptable size, but not have stayed within the acceptable tolerances for defects.

These two observations were, therefore, distinguishable as they pertained to two separate criteria; that is, capability and quality. When food safety certification was required (although it always was, the requirements just changed over time), the observations of the efforts necessary to meet this criterion were organized separate from the first two, as it was possible to have met either or both of the first two criteria, and not this third, or vice versa. Also, many of the conversations

with the co-managers and Walmart guided this process of understanding and distinguishing the importance and roles of the observations.

Results

Framework

The observations presented in this article are given in a framework as shown in Figure 1. The development of an understanding of this framework was ongoing throughout the collaboration between the small farmers and Tuskegee University on the one hand and Walmart on the other hand over the six-year period examined. As mentioned earlier, the criteria in this framework, displayed as ordered steps, are both given in terms of the progression of time as well as the progression of their importance within the project. The ‘base’ assumption of the steps is capacity. The progressive criteria ‘steps’ are capability, quality, food safety, consistency, and sustainability. The optional criterion ‘step’ is marketability.

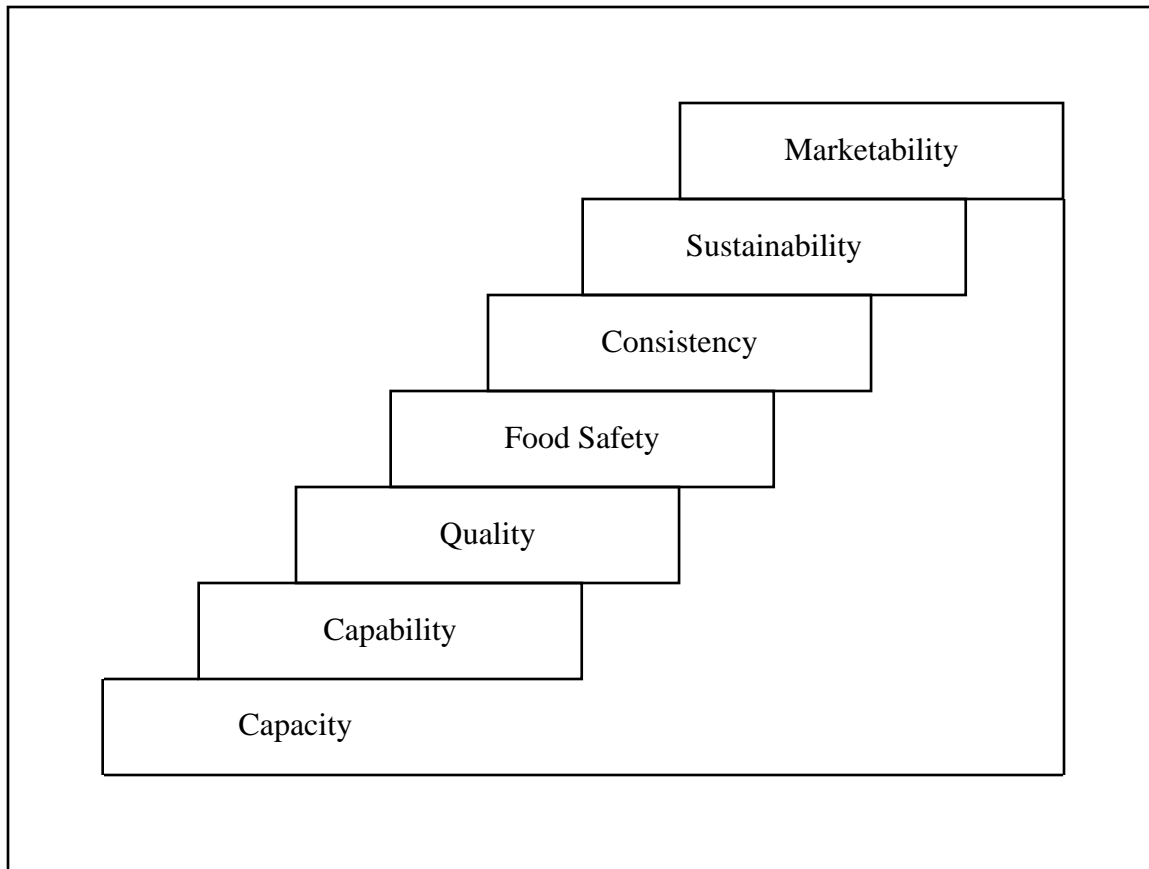


Figure 1. Observation Framework for Criteria Depicted as a Set of ‘Steps’

Capacity

Over the past few decades, the national, and now global, food system has become more sophisticated in order to provide for the needs of the growing population. The scientific, management, and regulatory aspects of the process of bringing food – from the farm or ranch,

through whatever preparation and transportation are necessary, on to the retail outlets – to consumers have changed and modernized mostly in tandem over this period. Nowadays, much of the processes involved in the global food system, particularly for perishable, fresh produce; that is, fruits and vegetables, have become uniform and streamlined. In fact, new industries, such as reusable packing container (RPC) rental and sterilization companies, have been created to support the system. Walmart and other major retailers over the decades have encouraged these changes which have continued to shorten the time between the supplier and the consumer, improve the quality of the products, and maximize profits. These changes have included standard procedures in four major areas, packing and processing, storage and transportation, ordering and invoicing, and staffing and management.

The steps taken in the SFTW Project were certainly trial-and-error, and iterative. The first, necessary steps to take, past the negotiations, were to develop capacity in the four areas of packing and processing, storage and transportation, ordering and invoicing, and staffing and management.

Packing and Processing

Packing and processing, in short, handling, comprises all of the manual and automated steps it takes to prepare harvested produce for shipment to market. From the retail standpoint, Walmart and other major retailers intend that there be uniformity and quality in what they offer to customers. That is to say, what they present in any store at all times will be fairly similar. The requirements for packing and processing are determined from produce and retail industry standards. Produce which is delivered must be ready to enter the distribution system on to the stores. This readiness includes the produce meeting the grading standards, being picked, pre-processed, or processed, having code stickers and tags, being packed in approved containers (e.g., boxes, crates, clamshells, bags), having traceability and origin labeling, etc.

Storage and Transportation

Storage and transportation, an aspect of logistics, includes all of the facilities, structures, equipment, and vehicles necessary to move the produce, in stages, from the harvesting on the farm, through handling, to sale in the stores. The characteristics of the particular fruit or vegetable will dictate the storage and transportation method and procedures. Certain produce will require refrigeration at all times; others, only for shipping; some produce may be stored at room temperature. In terms of transportation, facilities will need to be designed for convenience in shipping and receiving. The equipment for loading and unloading must also be available. Walmart and other major retailers will also require that vehicles coming to their facilities conform to their standards for delivery.

Ordering and Invoicing

The key communications include ordering and invoicing. Walmart and the co-managers have standard and acceptable methods of keeping and validating records of shipments and deliveries; these methods are uniform and the documents involved must contain the information necessary

to permit delivery at distribution centers or stores. Certain documents are common to commercial sales, orders, bills of lading, invoices, etc. The acceptable means of communication must also be available, email, facsimile, and phone.

Staffing and Management

The other aspects of capacity – packing and processing, storage and transportation, and ordering and invoicing – require personnel to undertake those tasks. There is an expectation from commercial buyers, such as Walmart and other major retailers, that a supplier will have an adequate and capable workforce to maintain standards, procedures, and performance levels with the product supplied. Packing requires a set of workers, perhaps intermittently, who are knowledgeable and reliable in grading and quality, with supervisors who can account for and coordinate a shipment. Similarly, processing requires a set of knowledgeable workers, but who are, in addition, trained in safe food processing and handling, hygiene, and sanitation, with supervisors who are also equipped to monitor and document the processing and packaging.

Also, storage and transportation require workers who can inspect and maintain equipment and vehicles, operate them correctly and safely, and be available at the early or late hours if necessary; supervision requires the training to keep records and communicate with the buyers and transporters. Competence with the use of various office technologies is critical for persons tasked with oversight of orders and invoicing. Orders, invoices, and other communications may necessitate the use of a scanner, fax, computer, mobile phone, etc. Accurate documentation and record keeping is integral to supervision as this information leads to payments.

There were significant efforts made to provide the capacity to support the SFTW Project. Tuskegee University leveraged USDA funding with state and other funds to provide the infrastructure and personnel required. The items necessary for the building of capacity in the various areas is shown in Table 1. Much of the capacity in the last area, Staffing and Management, was provided by existing Tuskegee University Extension and research-outreach employees. However, for the processing of the purple hull peas, this task was outsourced to a farmer who has a processing facility; this effort was initially assisted through staff help with the labeling of clamshells and bags. The tasks necessary for the building of capacity in the various areas is shown in Table 2.

Capability

Over the years, through the selective breeding, and now genetic engineering, of more traditional varieties of fruits and vegetables, commercial varieties have been developed. Commercial varieties are “designed” to express properties that make the commercial production, handling, and sales processes as efficient and as effective as possible. For production, commercial varieties may have desirable qualities such as high yields, drought tolerance, or morphology favorable for harvesting. For post-harvest handling or processing, commercial varieties may have desirable qualities such as moisture retention, a thicker, shock or scratch-resistant outer layer, or ease of

use, peeling, or shelling. With sales, the desirable qualities could be color, flavor, shape, shelf life, or nutritional value.

Table 1. Items Necessary for the Building of the Various Areas of Capacity

Area	Fruit or Vegetable	Items Necessary
Packing and Processing	Watermelon	Bins and pads Lids Stickers Bin labels Pallets
	Purple hull Peas	RPCs Clamshells or bags Labels RPC labels Shellers Blower Pallets
	Collard Greens	RPCs Rubber bands Band tags RPC labels Ice maker Pallets
	Squash/Eggplant	RPCs Papers (eggplant) RPC labels Pallets
Storage and Transportation (Facilities)	All	Walk-in cooler(s) In-field coolers (at farms) Forklifts Pallet jacks Indoor storage Covered outdoor storage Refrigerated truck
Ordering and Invoicing	All	Computer Internet access Fascimile or scanner Cellular phone

Table 2. Tasks Necessary for the Building of Capacity in the Various Areas

Area	Fruit or Vegetable	Tasks Necessary
Packing and Processing	Watermelon Collard Greens Squash/Eggplant (packinghouse or farm)	Grade produce for quality and size Pack or ice produce in bins and crates Assemble bins or inspect or clean crates Label produce and bins or crates Account for traceability of shipments
	Purple hull Peas (processing facility)	Operate and maintain shellers and blowers Inspect peas and pack containers and crates Label containers and crates Account for traceability of shipments
Storage and Transportation (Facilities)	All	Operate and maintain coolers and equipment Handle produce for receiving and shipping Drive forklift for receiving and shipping Drive shipments to distribution centers (DCs)
Ordering and Invoicing	All	Coordinate with farmers to determine loads Communicate with co-managers Handle and confirm bills of lading (BOLs) Invoice co-manager and manage accounting

The efforts and expense to develop these optimized varieties are customarily reflected in the cost of the seeds and plants. Also, producing these high-performing, commercial varieties often require more technical knowledge, agricultural inputs – fertilization, irrigation, pollination, etc. – and management than the traditional varieties. In essence, commercial varieties typically cost more and cost more to grow. However, for Walmart and other major retailers, the commercial varieties are integral to the food system in ensuring that the produce will be able to be profitably produced, acceptably transported, and effectively marketed in the stores.

Over the six-year effort, the farmers have grown many different varieties of the crops accepted for the SFTW Project. Each of the fruits and vegetables had to meet the basic retail criteria and be of high quality. Though in this ‘step’ there were observed few major hurdles; most of the crops that were negotiated for the program were those that the farmers initially indicated to Tuskegee University that they were able to grow. There was some effort put into determining which of the commercially available varieties fit into the retail standards. For example, the watermelons typically grown by the farmers were mature at weights greater than the maximum allowable weight for Walmart. Therefore, in some cases, other varieties had to be grown. Some of the crops that were supplied later, such as straightneck yellow squash (as opposed to

crookneck) or zucchini squash were not typically grown, or in large amounts, by the farmers. The crops that were supplied and the varieties grown are shown in Table 3.

Table 3. Fruit and Vegetable Varieties Grown and Supplied through the SFTW Project

Fruit or Vegetable	Varieties Grown
Watermelon, Seeded	Crimson Sweet Estrella Jamboree Jubilee Sangria SSX8585 Starbright Sweet Fashion Vista 720
Purple hull Peas	Mississippi Pinkeye Quick Pick Pinkeye Top Pick Pinkeye
Collard Greens	Bulldog Flash Top Bunch
Yellow Squash/	Enterprise
Zucchini	Respect
Eggplant	Santana

Quality

In conjunction with the commercially desirable properties that come with commercial varieties, the quality of the produce plays a major role in making sure that the produce will “sell-through” the stores. Although aesthetics are important with consumer appeal, the condition of the fruits and vegetables are as much important towards factors such as shelf life, storage viability, and spoilage prevention. Walmart, and other retailers, in accordance with these realities, institutes a rigorous quality assurance program for incoming produce. Walmart provides to its suppliers the specifications for each type of fruit and vegetable purchased. These specifications include acceptable ranges for weight, color, shape, size, packing containers, packing configuration, grades, etc. The specifications also designate the allowable number or prevalence of defects in a lot, if any. Images of ideal produce are also typically included.

At the distribution centers, the produce in every incoming delivery is inspected against the specifications. Any portion of or the entire delivery may be rejected. With a rejection, record of

the reasons, with images, are documented and sent electronically to the supplier. Consequently, the supplier has the choice of allowing the distribution center to dispose of the delivery, or to have the delivery returned, at the supplier's expense.

The standards for quality are well documented and were readily available from the co-managers and Walmart. Many of the farmers were diligent in making sure that farm workers were observant to the quality specifications. For example, with watermelon, the fruit was graded both in the field and on-site by workers in the packinghouses. Non-conforming watermelon, by weight (too small or too large) or defect, were culled, and discarded or diverted to local markets. Watermelons were rigorously screened at the packinghouse for the presence of the disease anthracnose. There were very few rejections in the entire program, and those few were caused by late-season anthracnose and underweight. With collard greens, the farmers were specific on the desired weight of the bundles, four pounds each and with the packing of crates. The squash, zucchini, and eggplant, which had to be regularly picked, were picked to specifications of length, diameter, or weight. A summary of the most important quality specifications is given in Table 4.

Food Safety

Food safety has been and will continue to be a critical aspect of Walmart and other major retailer-supplier approval programs. Audits of on-farm practices, worker training and conduct, and traceability record keeping were carried out by third-party firms give some measure of assurance that produce growers are making significant efforts to minimize the risks of contamination to fruits and vegetables. Perhaps much more important, requiring that produce suppliers are food safety certified also reduces legal exposure and may satisfy insurance carrier concerns. Walmart has required food safety certification at the highest levels since the SFTW Project began, and the accepted third-party firms and the variances offered, if any, have changed over the years. In 2013, USDA Agricultural Marketing Service released their Produce Harmonized Good Agricultural Practices (GAP) with Global Markets Program (formerly "Addendum") at an Intermediate Level which has met Walmart standards.

Tuskegee University started our educational outreach program on food safety out of necessity for the SFTW Project. Food safety addresses every aspect of a farming operation; the areas of concern are found in Table 5. Each of these areas requires a different set of actions for compliance from developing a policy or procedures, documenting a seasonally-taken action, to keeping a record of measure that must be taken regularly. Examples of such would be creating a jewelry policy for workers and visitors, maintaining the results of quarterly water testing for wells, and having a daily log for inspections of the fields for animals, their tracks or leavings or damage left by them. The requirements are comprehensive, and, in most cases, were novel to the small farmers in the SFTW Project.

Table 4. Specifications for Fruits and Vegetables Acceptable for Walmart

Fruit or Vegetable	Description	Size / Weight	Defects Tolerance
Watermelon, Red Seeded, US #1	Mature, similar varietal characteristics, fairly well shaped, not overripe, free from anthracnose, decay, and free from damage by any means.	Weight: 16 lb – 21 lb (35 ct.) 18 lb – 25 lb (28 ct.)	Defects, 12% Damage, 5% Decay, 2%
Collard Greens, Bunch, US #1	Color: Green. Collards should be well trimmed and formed. Free from any extraneous foreign material.	Length, 18” – 22” Diameter, 6” – 7”	Defects, 10% Damage, 5% Decay, 2%
Squash, Yellow and Zucchini, US #1	Straightneck. Firm.	Length, 5” – 8” Diam., 1.25” – 2.25”	Defects, 10% Damage, 5% Decay, 1%
Eggplant, US #1	Similar in size and shape. Firm.	Average count between 20 and 24 per 24 lb container	Defects, 10% Decay, 1%

Since 2011, there have been several different educational methods that were enlisted to introduce farmers to food safety Good Agricultural Practices (GAPs), and assist the farmers in the SFTW Project in becoming food safety certified. These methods included large group trainings, small group meetings, weekly conference calls, Extension publications (GAPs standard operating procedures, bulletins, pamphlets, etc.), on-farm educational (mock) audits, one-on-one consultations, tours of farmers to co-manager corporate farm and processing facilities, visits from the co-managers to the small farms, and various presentations by co-managers and Walmart representatives. The method that proved to be the most effective, in combination with some of the others, was one-on-one consultations. Extension and research-outreach personnel met with farmers on their farms to review the records, talk to workers, and observe the farms in advance of audits (Vaughan et al., 2014).

Table 5. Food Safety Areas from the USDA AMS Harmonized GAP Field Production Checklist

Checklist Section	Food Safety Area
General	Management Responsibility Food Safety Plan Documentation and Recordkeeping Worker Education and Training Sampling and Testing Traceability Recall Program Corrective Actions Self-Audits
Field Production	Field History and Assessment Worker Health/Hygiene and Toilet/Handwashing Facilities Agricultural Chemicals/Plant Protection Products Agricultural Water Animal Control Soil Amendments Vehicles, Equipment, Tools and Utensils
Harvesting	Pre-harvest Assessment Water/Ice Containers, Bins and Packaging Materials Field Packaging and Handling Postharvest Handling
Transportation (Field to Packinghouse)	Equipment Sanitation and Maintenance
Global Markets Primary Production Addendum	Food Safety Plan and Documentation Propagation Material Fertilizers and Biosolids Harvesting Agricultural Chemicals Waste Management Food Defense

Consistency

In order to meet the consumer demand for fresh fruits and vegetables that are in season year-round, Walmart and other major retailers work with co-managers in planning the amount and timing of the supply of produce sometimes a year or more in advance. Walmart records and follows sales trends, even down to the store level, to predict the needs for future seasons. This

approach allows for stability in providing produce, and also requires and facilitates the development of long-term relationships with suppliers. At any given sales week of the year, Walmart can accurately determine the potential needs of any fruit or vegetable, which fluctuate in a season. Accordingly, the agreements made with co-managers specify the quantities needed for each distribution center and the week that that quantity is needed. An agreement for the supply of any crop, among other things, will be a schedule, and there is an expectation that this schedule will be followed exactly. One of the guiding principles involved with retail sales is that customers gain an affinity for a product when they are able to consume it regularly. To support the building of that affinity, the product must be in stock, when the customers demand it. For a product to be unavailable may disappoint and deter customers from demanding it; it may even dissuade customers from seeking that product, and others, from that retail outlet altogether. As a result, the supply of the product, fruits and vegetables in this case, must be at the agreed upon amounts, and be delivered at the agreed upon times. In a word, the supply must be consistent.

For the SFTW Project, it would have been difficult, if not impossible for one small-scale farmer, who is indeed small-scale, to satisfy even the commercially minuscule amounts required for the program consistently over the weeks of supply. Early on, Tuskegee University adopted the strategy of helping the farmers to work together by forming a cooperative, the Small Farmers Agricultural Cooperative, in 2011. The leadership of this cooperative was formed from leaders of existing cooperatives throughout the state, to be represented of this effort that was intended to involve farmers from various counties in different regions of the lower half of the state of Alabama. One of the primary goals of this strategy, among many other goals, was to be able to maintain the consistency of supply to the co-managers (Robinson et al., 2014).

At the beginning of each season, an effort was made to schedule the planting and harvest of the crops, so that the crop would not all mature at the same time, and that the harvests would be staggered. This effort found various amounts of success as climate conditions could vary even between farmers situated only 100 miles away from each other. There were, as a result, several incidences of inconsistency in supply. In some cases, farmers who were counted upon to maintain the bulk of the supply during certain supply weeks had a small or even no harvest, due to drought, flood, or disease. In other cases, the weather made several farmers with consecutive weeks mature simultaneously, and all had to vie for what may have been a limited amount of supply.

Nevertheless, there were instances where the consistency of supply was maintained in a good season, for a particular crop. The key in these instances was not so much favorable agricultural or climate conditions, but to the farmers agreeing to work together. One such example was regularly found with watermelon. Watermelon is shipped in a tractor-trailer with a set, pre-determined amount of large cardboard bins, each holding 700 pounds of watermelon. In the 2015 season, this number was sixty bins. However, in harvesting, a farmer could have much more or significantly less than sixty bins mature, harvested, and ready. Understanding the situation, the farmers agreed to cooperatively make efforts to “complete a load” by supplying only the

remainder that was needed. On any load, bins from as many as four farmers might be included, and all of the farmers might or might not be actively harvesting. One example of a part of a season where the supply was consistent is found in Figure 2. This figure graphically demonstrates how the bins contributed from Farm B and Farm F in North Central Alabama, Farm J in South Central Alabama, and Farm S in East Central Alabama were combined – with bins from others who had small harvests – to consistently deliver full loads.

Sustainability

According to industry professionals, Walmart has the goal of satisfying a majority of the global food market before the end of the decade. To accomplish this goal, Walmart, in recent years, has focused its attention on maintaining relationships with suppliers who will be able to steadfastly respond to their increasing and changing requirements. As part of this shift, Walmart has evaluated the long-term potential for its suppliers to make adjustments and to maximize their current resources from an agronomic standpoint. For certain of their suppliers, production information such as land holdings, yield per area, and input use. Also, there has been a greater scrutiny on compliance with labor laws with the increased contracting of labor. Altogether, Walmart, along with other retailers, is assessing the sustainability of their supplier base.

Tuskegee University had for some years responded to requests for information on the farmers that were supplying through the SFTW Project. However, in 2015, representatives from one of the co-managers visited Alabama to conduct tours of all of the supplying small farms to make recommendations on how to improve the supply of produce. The major recommendation was to increase the amounts of inputs in three areas, irrigation, pest management, and labor. In response, Tuskegee University gathered information from the most successful supplying farmers on their inputs for watermelon, purple hull peas, and squash. This included the expenditures for plants or seeds, fertilizer, pesticides, irrigation, and labor. This information was compared with benchmarks found in the literature for these specific crops as grown in the Southeastern U.S. (University of Georgia, 2009). The results of the 2015 study, found in Figure 3, showed the extent to which the small farmers in the SFTW Project would need to increase these inputs to meet commercial industry standards. Subsequently, an effort was made by Tuskegee University to assist the farmers in obtaining USDA resources for irrigation and operating costs.

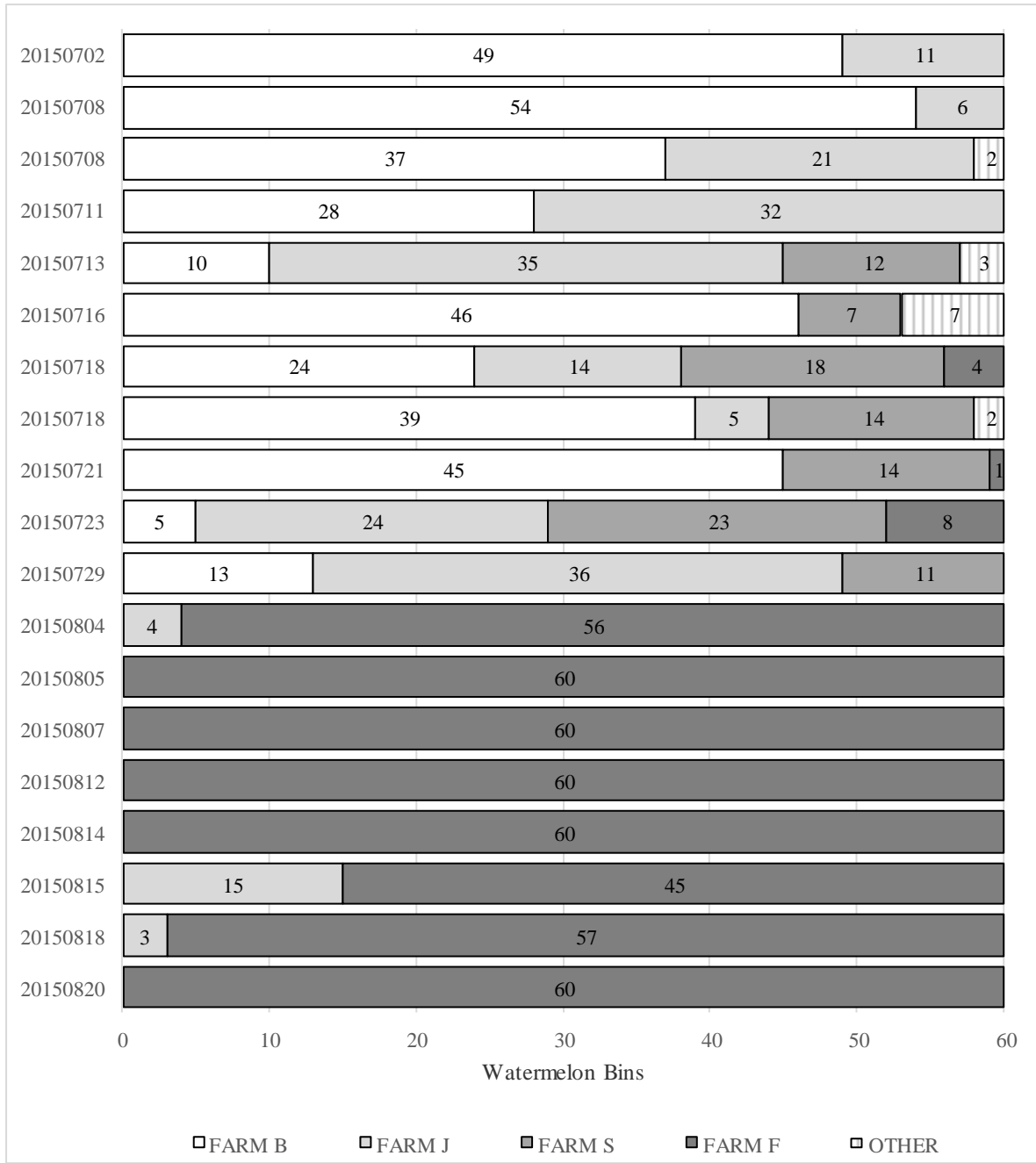


Figure 2. Composition, by Contributing Farmer, of Selected Watermelon Shipments in 2015 by Date

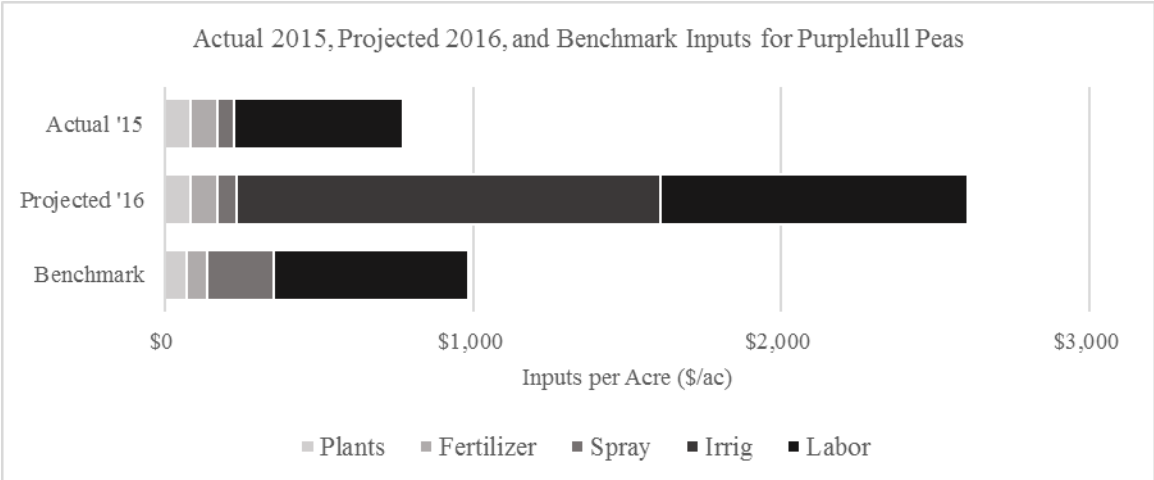
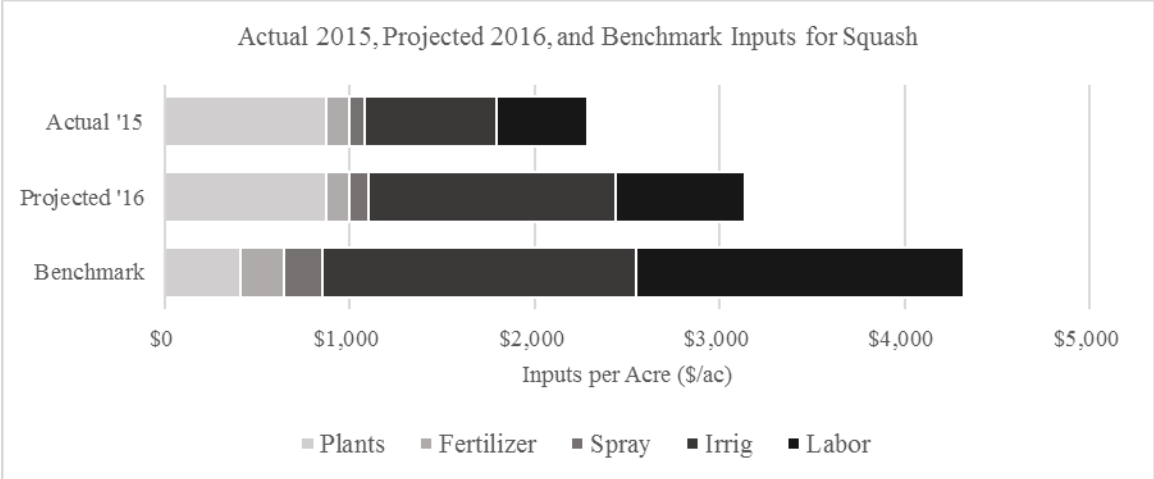
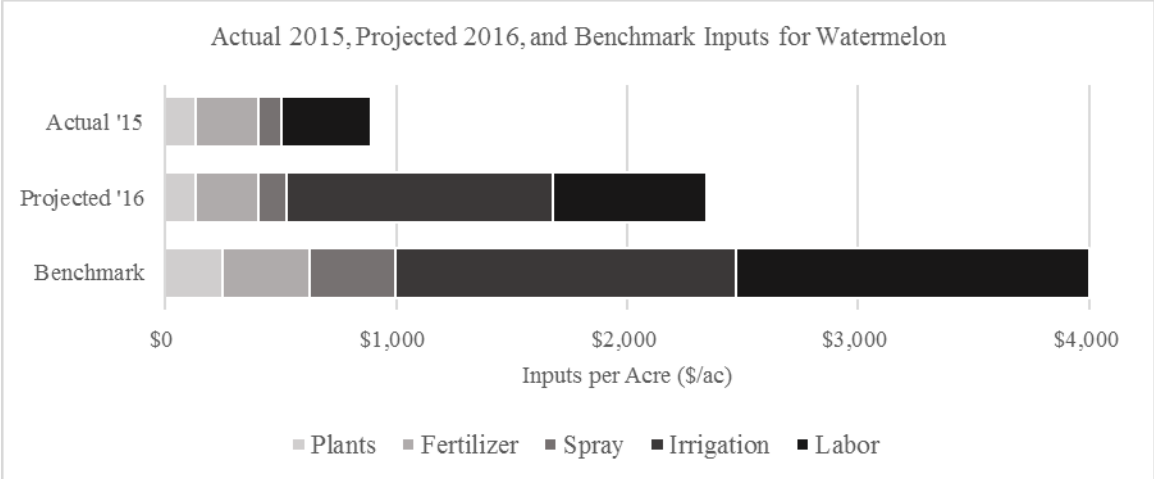


Figure 3. Actual 2015, Projected 2016, and Benchmark Input Estimates for (a) Watermelon, (b) Squash, and (c) Purple Hull Peas; respectively, (a), (b), and (c)

Marketability

Walmart is a retailer that provides product manufacturers with the opportunity to sell their products in Walmart retail stores. In the vast majority of cases, each product sold in the store will have several options of brands and styles. Certain items, such as cereals or shampoos, will have several hundred options typically available. Even though placement is purchased and influences sales, the onus is on the product manufacturer to engage in activities outside and occasionally inside the retail stores to enhance sales. These activities outside the store include TV, radio, social media, and print advertising, promotion, sponsorships, etc. Inside the stores, these activities include tastings, in-store coupons, displays, etc. Whereas the in-store activities must be coordinated with the stores, the outside activities typically are not. The primary purpose of the latter activities is to prompt buyers to visit stores to buy the product; the primary purpose of the former is to distinguish the product from other similar products in the store for likely buyers. The co-managers work closely not only with the corporate buyers, but also with the store and department managers. Opportunities for product suppliers to merchandise are typically arranged by the co-managers through corporate with the local management.

Over the past few years, this aspect of increasing sales in the stores was discussed with the latest co-manager for peas, squash, and eggplant. There had been some minor effort to increase sales, such as having the University Communications to generate a press release, or having the College of Agriculture, Environment and Nutrition Sciences media team to post information in social media. To date, unfortunately, outside of these efforts and “word of mouth,” these opportunities have not yet been manifested. The most discussed effort was the possibility of in- or at-store tastings of foods made with the shelled purple hull peas. Though both the SFTW Project personnel and co-managers agreed that these efforts would be significant in increasing the “sell-through”, to date, such efforts are planned for the future.

Discussion

Over the period of 2011 to 2016, there were many outputs toward the goals of the SFTW Project. The goals and the outputs are found in Table 6. These goals were identified at the establishment of the multi-state Sustainable Agriculture Consortium for Historically Disadvantaged Farmers Program, or SACH Consortium, for which the SFTW Project was a component. The SACH Consortium determined these goals those to be necessary to “assist small farmers with the sale of their produce to commercial markets” (Hargrove et al., 2014).

As a result of the effort, the small farmers were able to supply five crops successfully to a major, commercial retailer, Walmart, in quantities that were significant to the farmers. The outputs were drawn from the observations made during the SFTW Project, and categorized by how they went towards satisfying the goals initially posed by the SACH Consortium. For example, it was observed that it was necessary for the farmers to negotiate with Walmart as a group. To get the farmers to work together, the Small Farmer Agricultural Cooperative was formed. This output went towards them giving them the “ability to market collaboratively,” one of the SACH Consortium goals.

Table 6. Walmart/Tuskegee University/Small Farmer Agricultural Cooperative Program Goals and Outputs

Goals	Outputs
Having access to a guaranteed market	Met quality, volume, and food safety specs Sold watermelons, peas, greens, and squash
Ability to market collaboratively	Small Farmer Agricultural Cooperative formed Majority of members sold under the Coop Functional logistics and communications
Receiving hands-on-training in food safety, cold chain management, value-added processing, record keeping, transportation, etc.	Farms and facilities were GAP certified Field coolers and refrigerated trucks were used Post-harvest handling and shelling was traceable Farms cooperated to meet shipping volumes
Increases in farmer incomes	Peak revenues in 2014, crops added in 2015 Farms explored market diversity
Promote and teach good farm management practices	Increased volume, but not consistency Lipman and Pura Vida assessed farm inputs onsite

Consequently, the framework for the observations shows the major ‘steps’ that must be taken for any farm operation to be successful in supplying to commercial markets, not just small farmers (Figure 1). In fact, at the time of this writing, several of the farmers that were involved with the SFTW Project were approved to supply to other national specialty grocery retailers.

Conclusion

Though the singular success of assisting and facilitating small farmers to supply to a major retailer is significant, perhaps more important is the absolute wealth of information that was gathered, in many cases, through trial and error in the SFTW Project. These observations have shaped the efforts made in the SFTW Project, in an iterative manner, and have also had an influence on how the Tuskegee University teaching, research, and outreach functions engage with and serve farmers.

Certain specific aspects of the “lessons learned” from the SFTW Project, such as irrigation, cooperative formation, food safety, have been and will continue to be documented and published. For example, it was learned through the study of farmer sustainability, that for the farmers to continue to be able to supply to the commercial market that they must have irrigation. This would allow them to manage the risk of drought, and to maintain the consistency of production. Also, it was learned from the farmers’ interactions with the co-manager farmers that pest management is a vital component of a commercial operation; however, the Tuskegee University Team experts on IPM have determined that SHDFs will necessarily need to approach that level of pest management in a sustainable and cost-efficient manner.

This study focused on the general steps necessary for the SFTW Project to be equipped to supply the commercial market. Future studies will examine the details of the more specialized efforts within the SFTW Project that assisted with helping the farmers to meet the criteria delineated here. The understanding of these criteria or “steps” will be modified and expanded based on farmer goals and market needs.

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