

A Market Analysis for Berry Crops in Virginia

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Abstract

This thesis analyzes the potential for producers in Virginia to successfully participate in the market for berry crops, which include strawberries, blueberries, raspberries, blackberries, and other novelty berries. A survey of current berry crop producers in Virginia is used to gain insight into the supply-side of the market, and a series of personal interviews with direct market berry crop producers and buyers from retail, wholesale, and processor outlets are conducted to assess the demand-side of the market. The results show that berry crop producers in the state are diverse along many dimensions, with certain groups better positioned to serve the unsaturated demand that exists through direct outlets and others better aligned to serve the increasing demand that exists among indirect buyers. Diversification into berry crop production involves high levels of risk, but the potential returns are likewise high.

Keywords: Berry Crops, Small Fruit, Market Analysis, Diversification, Virginia

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Finally, I would like to dedicate this thesis to the 32 innocent students and faculty who lost their lives on April 16, 2007 on the Virginia Tech campus. They will forever be remembered in my heart.

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Chapter 1:

Introduction

1.1 Problem Statement

1.1.1 Agricultural Economy in Virginia

Traditionally, agricultural producers in Virginia have been dependent on land-intensive commodity production as a principal source of their income. In 2002, there were a total of 47,606 farms in the state, averaging 181 acres in size (NASS, 2004). Collectively, these farms covered approximately one-third of Virginia's total land surface. In recent years, however, the price of land has risen in the state due to urban pressure and many commodity prices have fallen. As a result, there is a general need for alternative high-value agricultural production among farmers in the state.

Tobacco is one example of a land-intensive crop that has been historically produced in Virginia, with heavy concentration in the Southwest and Southside districts of the state. As a whole, tobacco farms in Virginia accounted for approximately \$113 million in sales in 2002 (NASS, 2004). Much of the financial success of these producers was linked to the Tobacco Program, a federal-regulated quota system established under the Agricultural Adjustment Act in 1938. Under this program, individuals were only allowed to grow and sell tobacco if they owned quotas. With restrictions on supply, U.S. tobacco prices were supported above world market price levels. Over time, however, the U.S tobacco quota level was forced to shrink as imports of lower-priced tobacco increased from abroad.

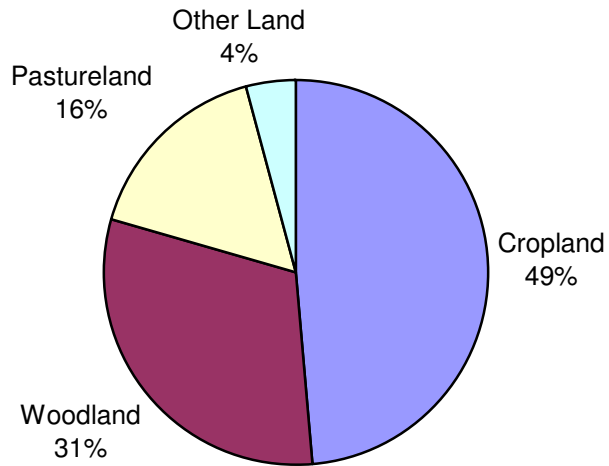
On October 22, 2004 the Fair and Equitable Tobacco Reform Act, more commonly referred to as the Tobacco Buyout, was signed into law by President George

W. Bush as a component of the American Jobs Creation Act. Under the buyout stipulations, the government-regulated quota system was terminated, which in turn ended all price support for U.S. tobacco growers. In 2004, the final growing season before the Tobacco Buyout, Virginia tobacco producers received an average of \$1.87 per pound for their output¹ (NASS, 2004a). One year later, in 2005, this same set of farmers could only sell their tobacco crop for an average of \$1.50 per pound (NASS, 2005). This sharp decline in price was an immediate effect of the buyout legislation.

Besides tobacco, many producers in Virginia have been reliant on other conventional commodities that require extensive land resources, such as grains and oilseeds. In fact, nearly half of the state's total farmland (4.2 million acres) was allocated to cropland in 2002 (NASS, 2004). A complete illustration of the distribution of farmland in Virginia in 2002 is presented in Figure 1.1. Not only do land-intensive crops represent a significant portion of Virginia's agricultural economy in terms of acreage, they also account for approximately two-thirds of the market value of all cropland products sold in the state (Table 1.1). Consequently, as farmland becomes more difficult to preserve and several commodity prices continue to decline, many farmers in Virginia will have to transition into high-value production on a smaller-scale, in order to remain profitable.

¹ In comparison, the estimated variable cost of production for Burley Tobacco (historically grown in Southwest Virginia) is \$1.58 per pound (Groover, 2007).

Figure 1.1 Virginia Farmland Use in 2002



National Agricultural Statistics Service (2004)

Table 1.1 Market Value of Land-Intensive Crops Produced in Virginia in 2002

	Total Commodity Receipts	Share of Total Cropland Receipts
Grains, Oilseeds, Dry Beans, and Dry Peas	\$157,985,000	22%
Tobacco	\$112,503,000	16%
Cotton and Cottonseed	\$20,718,000	3%
Vegetables, Melons, and Potatoes	\$79,345,000	11%
Cut Christmas Trees and Woody Crops	\$9,633,000	1%
Other Land-Intensive Crops and Hay	\$78,384,000	11%

National Agricultural Statistics Service (2004)

1.1.2 Berry Crops as an Alternative Enterprise

One possible alternative to land-intensive commodity production is berry crop (small fruit) production. Diversification into berry crops, which include strawberries, blueberries, raspberries, blackberries, and other non-tree fruits, is potentially attractive to

producers for several reasons. First, berry crops are considered to be high-value agricultural products, because their value per acre is substantially greater than agronomic commodities, such as wheat and soybeans. This means that berry crop producers are capable of earning higher returns while farming less land. In addition to their high-value potential, the demand for berries has steadily increased in recent years. Specifically, from 1990 to 2004, U.S. per capita consumption of total berries rose by 55 percent (ERS, 2004).

Several factors have contributed to the rising demand for berries. First, U.S. consumers have become more health conscious in their dietary selection (Kaufman *et al.*, 2000; McLaughlin *et al.*, 1999). As a result, consumers are eating more berries because they contain high levels of anti-oxidants, such as vitamin C and ellagic acid, which have been proven to lower cholesterol levels, and reduce the risk of cancer and heart disease (Collins, 2006). Along with the health benefits associated with berries, consumption has consistently climbed because fresh produce is more readily available and the average consumer has more disposable income to purchase higher quality foods such as berries (Kaufman *et al.*, 2000).

1.2 Research Objectives

Although nation-wide demand for berries is strong and its production can provide growers with high returns, it is important to fully analyze the market to understand its potential for producers in Virginia. This thesis will examine the market for berry crops grown in Virginia with the objective of informing extension efforts for local producers and all other farmers who are considering diversification into an alternative agricultural

enterprise. The information presented in this thesis will also provide a more general contribution to the literature on market opportunities for high-value crops.

The three main objectives of this market analysis are to:

- Analyze the current structure and organization of berry crop producers in Virginia along farm characteristics, production systems, marketing strategies, and demographic information, and identify producers' educational needs to direct extension programming.
- Assess current demand among various market outlets for berry crops grown in Virginia, and examine the requirements that must be met for producers to sell through each type of outlet.
- Identify specific opportunities and entry strategies for farmers in Virginia to profitably sell berry crops through both direct and indirect marketing channels.

1.3 Methods

The first objective will be carried out in the next two chapters using data from a 2006 survey of berry crop producers in Virginia. Specifically, this objective will be addressed quantitatively through an in-depth descriptive statistic report in Chapter 2 and qualitatively via clustering techniques in Chapter 3. The descriptive analysis in Chapter 2 will also draw comparisons to state and county level statistics and include a section that synthesizes the educational needs of the berry crop producers. The cluster analysis in Chapter 3 will take the results from the previous chapter one step further by identifying distinct grouping of berry crop producers within the entire sample. A comprehensive

understanding of berry crop producers as a whole and the relatively uniform clusters that exist within the larger group will help advise future extension programs.

The second objective will be addressed through a series of personal interviews with local berry crop growers and buyers from various market outlets. The results from these interviews will be presented in Chapter 4 as they relate to a series of qualitative hypotheses about berry crop merchandising and procurement drawn from the literature on U.S. produce markets. Market outlets of interest for this part of the study consist of both direct outlets, including pick-your-own operations, farmers' markets, and farm stands, and indirect outlets, including supermarkets, wholesalers, and wineries.

The third objective will be carried out through a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis in Chapter 5. Here, the results from the supply-side objective in Chapter 2 and Chapter 3 will be matched with the results of the demand-side objective in Chapter 4 to examine the opportunities that exist in berry crop markets and the ability for farmers in Virginia to successfully participate in these markets. The SWOT analysis will be used to identify the most favorable berry crops to produce and the most promising market outlets to sell them through. Potential entry strategies for new berry crop producers will also be detailed in this chapter.

Finally, the thesis will conclude in Chapter 6. Here, the results and implications from the previous chapters will be synthesized, and limitations and directions for further research will be identified.

Chapter 2:

Structure and Organization of Berry Crop Producers in Virginia: A Descriptive Analysis

2.1 Introduction

This chapter presents a detailed overview of the current supply of berry crops in Virginia. Specifically, it provides insight into the location of berry crop producers, their demographic makeup, the methods they use in production, the mix of products they produce, the marketing strategies they employ, the constraints they face in production, and the needs they have for further education. Together, this information offers a first glance at the current structure and organization of berry crop growers in the state, and provides a solid foundation to guide the remainder of the market analysis. The following section describes the methodology and data that were used to carry out this portion of the analysis.

2.2 Methods and Data

Data reported in this chapter come directly from the results of a 2006 mail-based survey of commercial berry crop producers in Virginia. This survey was designed to probe into production and marketing processes currently being used by producers in Virginia (Appendix A). Since a comprehensive list of berry crop growers in Virginia does not exist, the survey was mailed to a broad range of potential respondents identified through numerous sources, including the Virginia Department of Agriculture and Consumer Services, the Virginia Small Fruit and Specialty Crop Growers' Association, and Virginia Cooperative Extension agents. In all, approximately 1,250 surveys were

sent to possible berry crop or specialty crop growers in Virginia. In response, a total of 345 surveys were completed and returned with usable results. Of these respondents, 115 were presently involved in commercial berry crop production. Accordingly, these producers alone constitute the total sample size used in the following report of frequencies and descriptive statistics. This sample accounts for 31 percent of the total number of producers included in *Census of Agriculture*² who grow berry crops commercially in the state. Thus, it is assumed that the results reported below in Section 2.3 are representative³ of all berry crop growers in Virginia.

2.3 Results

2.3.1 Distribution of Berry Crop Production

According to county-level statistics, berry crops are commercially grown in 75 different counties in Virginia (79 percent of all counties in the state) (NASS, 2004). While the sample used in this study only consists of respondents from 40 counties throughout Virginia (42 percent of all counties in the state), it closely mirrors the distribution of berry crop farms outlined in the *Census*. For example, both the *Census* and the survey results reveal that berry crop operations are more heavily concentrated in Northern Virginia, with Loudoun County accounting for the highest number of operations and more than twice as many as the next highest county. See Appendix B for a complete breakdown of the allocation of berry crop operations accounted for in the *Census* and in the sample by county.

² All state-level and county-level statistics reported in this chapter come from the *2002 Census of Agriculture*, which was conducted by the United States Department of Agriculture (NASS, 2004).

³ Salant and Dillman (1994) suggest that one can be 95 percent confident that this particular sample size, given the total number of small fruit producers included in the *Census*, will generate estimates that are no more than ± 5 percent different from the true population parameter.

2.3.2 Characteristics of Berry Crop Producers

2.3.2.1 Demographics

Berry crop producers are diverse along most demographic dimensions⁴, with the exception of ethnicity. Similar to state-level statistics in which 96 percent of all Virginia farmers identify themselves as White, non-Hispanic (NASS, 2004), 94 percent of the survey respondents are White, non-Hispanic. The age distribution of berry crop producers is almost identical to that of all agricultural producers in Virginia, with the largest grouping between 45 years old and 59 years old (Figure 2.1). Unlike age and ethnicity, state-level statistics differ from the survey results along the lines of gender. Namely, a higher proportion of females (29 percent) participate in berry crop production compared to the state as a whole (14 percent) (Figure 2.2).

⁴ All demographic variables in this section are specific to the principal farm operator.

Figure 2.1 Age Distribution

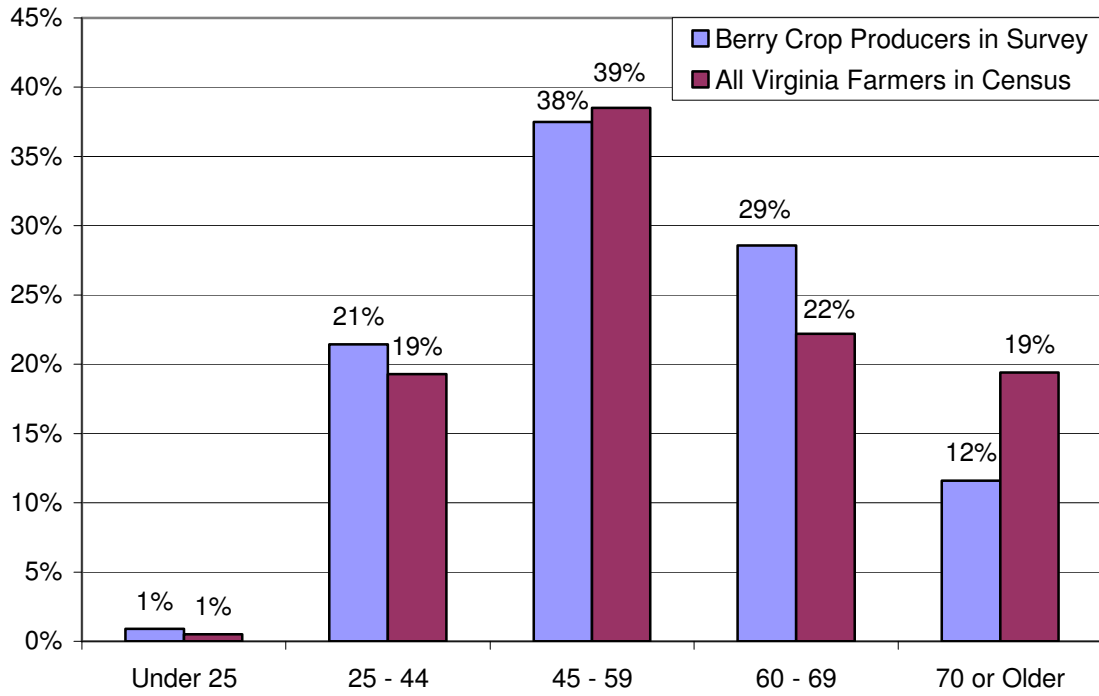
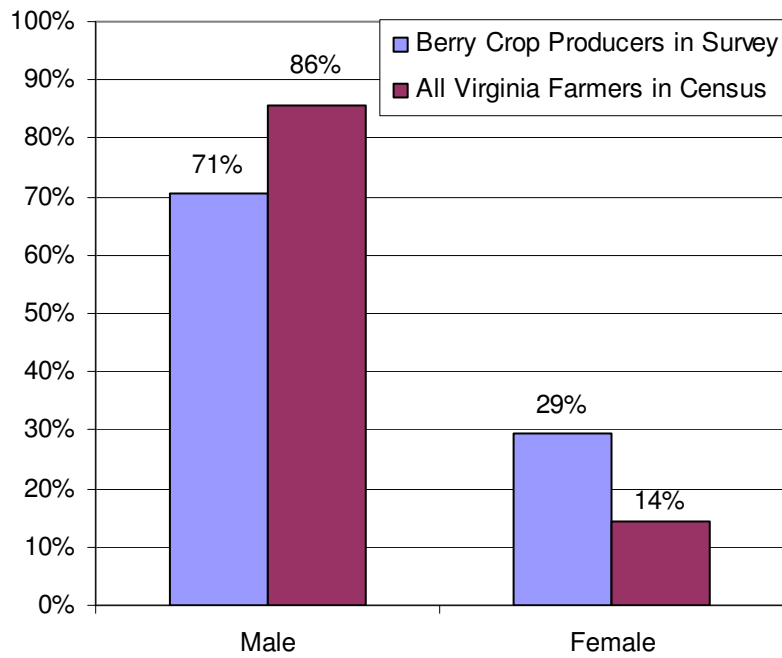
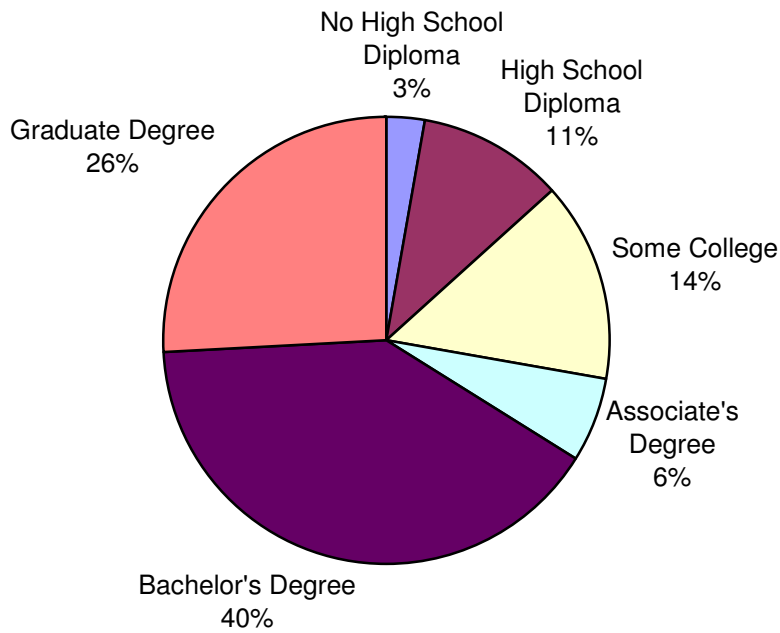


Figure 2.2 Gender



Berry crop growers are generally well educated. Specifically, 40 percent of berry crop producers have a Bachelor's degree, 26 percent have a graduate degree, and only 3 percent lack a high school diploma or equivalent (Figure 2.3)⁵.

Figure 2.3 Education Level among Berry Crop Producers

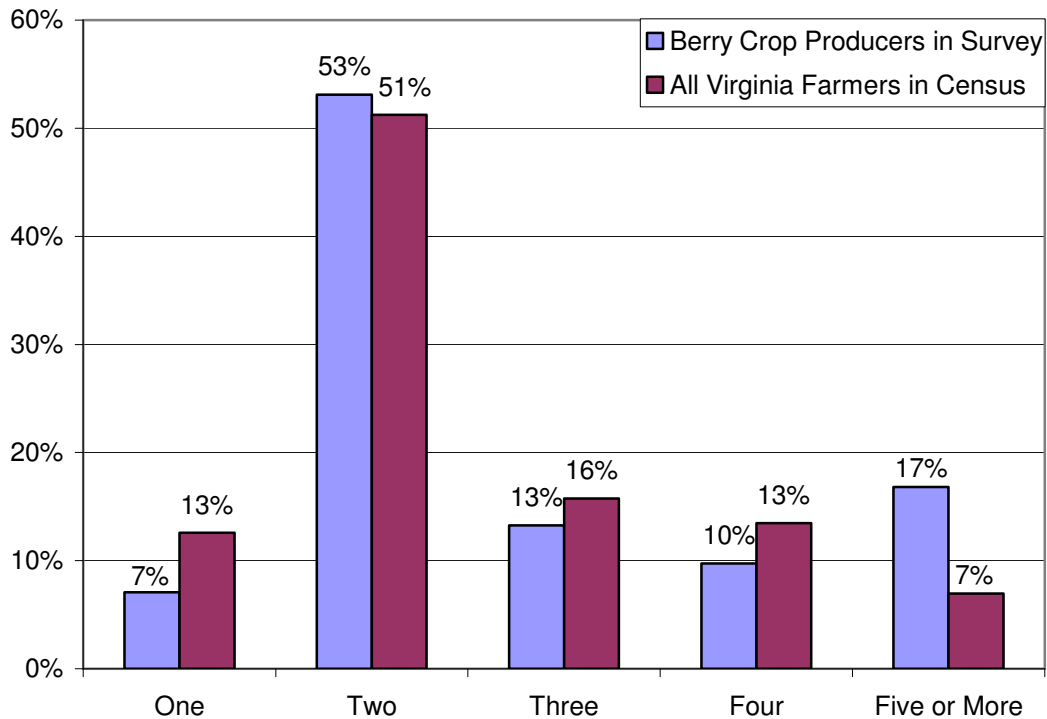


2.3.2.2 Household Composition and Income

The distribution of household size among berry crop producers is practically identical to state-level statistics, with two-person households comprising 53 percent and 51 percent, respectively (Figure 2.4).

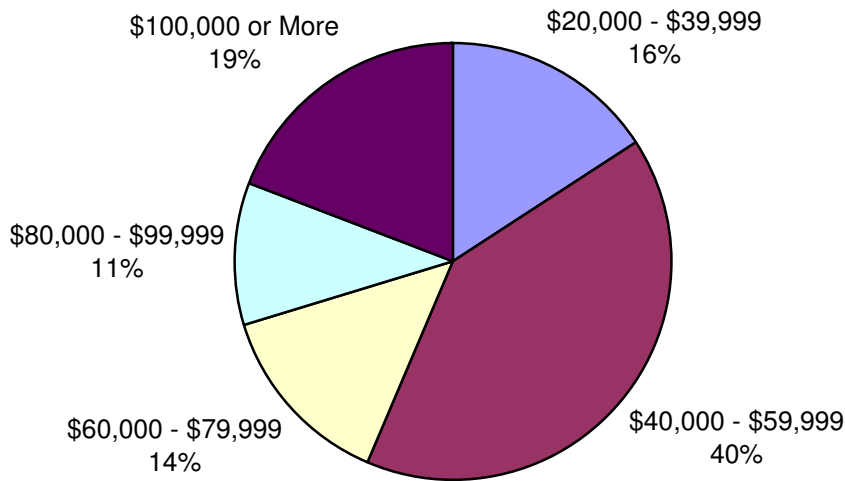
⁵ No corresponding statistics on education are available from the *Census*.

Figure 2.4 Household Size



The annual income of each household varies across berry crop growers, with the largest grouping (40 percent) earning between \$40,000 and \$59,999 (Figure 2.5). The mean and median respondents earn 43 percent and 33 percent of their annual household income from farming activities, respectively. In contrast, the majority of farmers in Virginia (69 percent) earn less than 25 percent of their annual household income from farming (NASS, 2004). Of the mean and median producer's total farming income, 26 percent and 10 percent comes specifically from berry crop production, respectively.

Figure 2.5 Annual Household Income among Berry Crop Producers



2.3.2.3 Experience and Farmland Tenure

Although respondents have been involved with commercial berry crop production from less than one year to 45 years, the average grower has 12 years of experience producing berry crops. The majority of these growers (90 percent) own the land they farm (Figure 2.6), which is similar to state-wide statistics that indicated 95 percent of all farmers in Virginia own their farmland (NASS, 2004). Additionally, more than half of berry crop producers (55 percent) have farmed their current land for fewer than 21 years (Figure 2.7), which is the state average among all agricultural producers (NASS, 2004).

Figure 2.6 Farmland Tenure among Berry Crop Producers

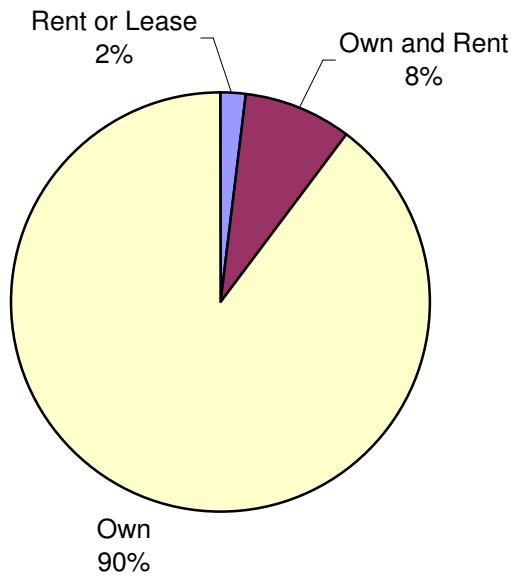
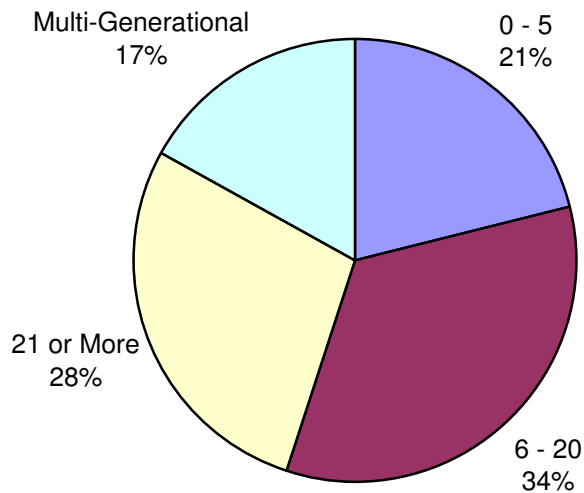


Figure 2.7 Number of Years Berry Crop Producers have Farmed their Land



2.3.3 Characteristics of Berry Crop Enterprises

2.3.3.1 Farm Size and Product Mix

Berry crop growers produce a wide range of products on farms ranging in size from one-half acre to 1,000 acres. The mean and median farm size of the respondents are

88 acres and 20 acres, respectively. This relatively low median indicates that most berry crop farms are small (20 acres or less in total) and a few are comparatively larger (with more than 88 acres in total)⁶. Furthermore, compared to the mean farm size in Virginia (181 acres), berry crop production takes place on substantially smaller farms (NASS, 2004).

The average berry crop grower allocates approximately two acres of his or her entire farm to berry crop production, which amounts to less than 3 percent of the mean farm size. Berry crop growers tend to produce a highly diversified combination of output on their farming operations. In addition to berry crops, 77 percent grow vegetables, 50 percent produce fruits other than berry crops, 39 percent produce specialty products, such as herbs and cut flowers, 30 percent raise livestock or dairy, and 22 percent produce commodity row crops, such as corn and soybeans (Figure 2.8). Table 2.1 provides a comparative descriptive analysis of the acreage farmers in Virginia and berry crop producers devote to the above categories, considering only those who produce each specific output.

⁶ Twenty-three percent of the respondents operate farms with a total surface area greater than 88 acres.

Figure 2.8 Percentage of Berry Crop Growers who Produce each Product

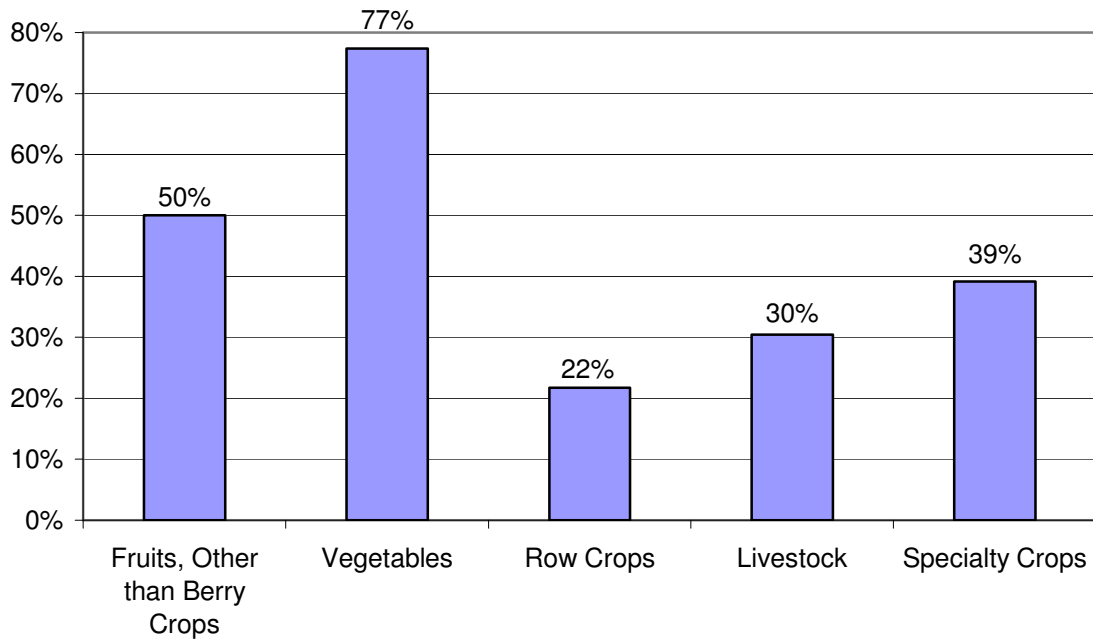


Table 2.1 Production Mix Acreage

	<i>Census</i>	Survey			
	Mean	Mean	Median	Minimum	Maximum
Fruits, Other than Berry Crops	14.30	19.89	2.00	0.15	324.75
Vegetables	20.40	15.26	2.00	0.01	200.00
Row Crops	86.38	64.30	10.00	0.10	450.00
Livestock and Dairy	N/A ¹	91.19	16.00	1.00	750.00
Berry Crops	1.97	2.16	1.00	0.05	10.00
Specialty Crops	N/A ²	0.62	0.38	0.08	5.25

¹ All livestock information in the *Census* is reported as herd size, not in acreage units.

² The definition of specialty crops is subjective and not quantified in the *Census*.

2.3.3.2 Berry Crop Mix

Nearly half of berry crop producers only grow one berry product, and the remainder are more diversified: 23 percent grow two different berries, 14 percent produce three different berry products, 8 percent grow four different berries, and 6 percent produce five different berry products (Figure 2.9). When considering the production of each berry crop product separately, 52 percent of respondents from the entire sample

produce strawberries (two acres on average), 48 percent grow blueberries (one acre on average), 41 percent produce blackberries (one acre on average), 26 percent grow summer-bearing raspberries (one-half of an acre on average), 25 percent produce fall-bearing raspberries (less than one-half of an acre on average), and 8 percent grow other berry crops such as elderberries or gooseberries (one acre an average) (Figure 2.10 and Table 2.2). As seen in Figure 2.10 and Table 2.2, state-level statistics specific to berry crop production are nearly identical to the information mentioned above (NASS, 2004).

Figure 2.9 Number of Different Berry Products Grown by Respondents

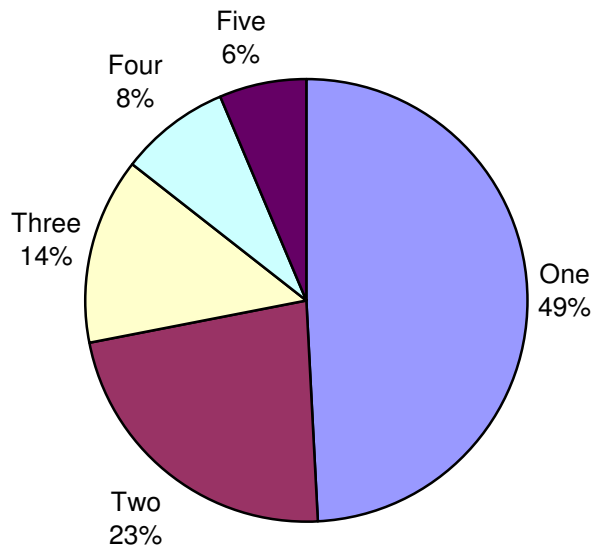


Figure 2.10 Percentage of Respondents who Produce each Berry Crop

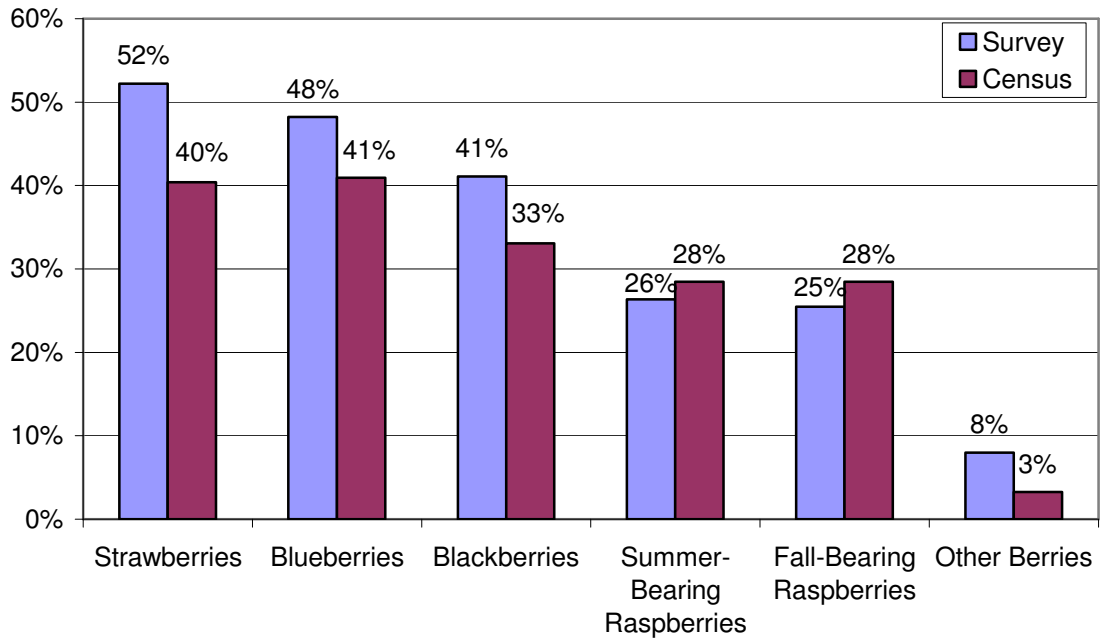


Table 2.2 Berry Crop Acreage

	<i>Census</i>	Survey			
	Mean	Mean	Median	Minimum	Maximum
Strawberries	1.85	1.52	1.00	0.05	7.00
Blueberries	1.48	0.94	0.25	0.02	8.00
Blackberries	1.26	1.19	0.25	0.08	10.00
Summer-Bearing Raspberries	0.67 ¹	0.49	0.23	0.02	4.00
Fall-Bearing Raspberries		0.40	0.25	0.01	1.50
Other Berries	0.50	0.91	0.10	0.10	4.00

¹ Summer-bearing and fall-bearing raspberries are reported in the same category in the *Census*.

2.3.4 Berry Crop Production Methods and Technologies

2.3.4.1 Organic Production

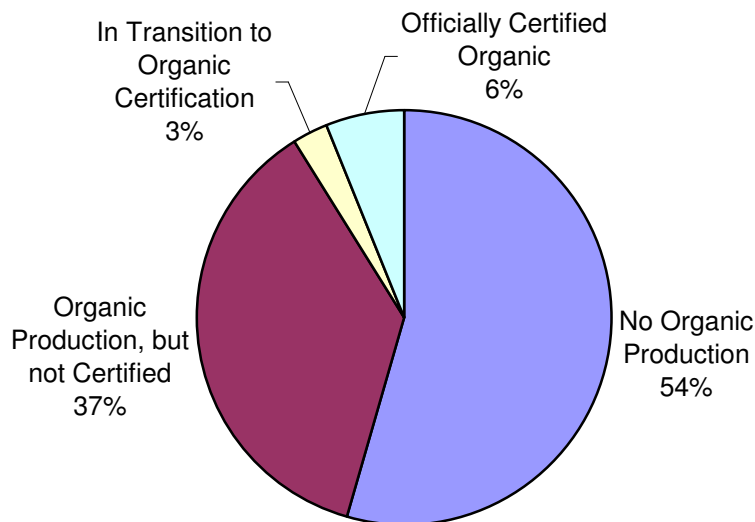
A total of 46 percent of berry crop producers report practicing some form of organic production method on all⁷ or a portion of their farming operation (Figure 2.11).

Of these producers, only 6 percent have the United States Department of Agriculture

⁷ Sixty-five percent of organic berry crop producers in the sample apply organic production methods to their entire farm, which is 16.62 acres on average.

(USDA) organic certification, and an additional 3 percent are in transition to becoming USDA-certified organic (Figure 2.11). The remaining 37 percent of producers report using organic production methods without USDA certification or an intent to become officially certified⁸. According to state-level statistics, less than 1 percent of all farms in Virginia are USDA-certified organic (NASS, 2004). Thus, organic certification is significantly more prevalent in berry crop production than it is for many other crops or commodities.

Figure 2.11 Organic Production among Berry Crop Producers



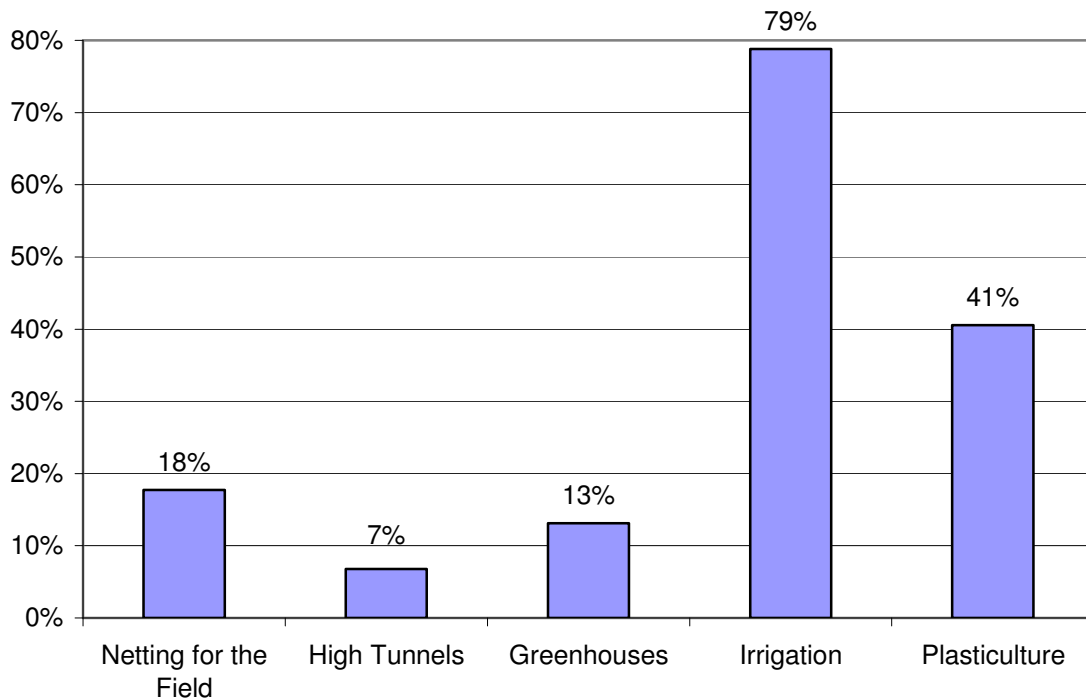
2.3.4.2 Irrigation and Crop Protection

Most berry crop growers (79 percent) apply irrigation to their berries (Figure 2.12). Of these, the average grower applies irrigation to 92 percent of his or her berry

⁸ Under the National Organic Program, farming operations with \$5,000 or less in gross annual income from organic sales are exempt from USDA certification (AMS, 2007).

crop acreage (2.47 acres on average) (Table 2.3)⁹. The second most frequently used technology to grow berry crops is plasticulture, which is implemented by 41 percent of the respondents (Figure 2.12). The average grower who uses plasticulture does so on 88 percent of his or her total berry crop acreage (2.34 acres on average) (Table 2.3)¹⁰. A few respondents (18 percent, 13 percent, and 7 percent, respectively) indicate using netting on their fields, greenhouses, and high tunnels for berry crop production (Figure 2.12). On average, the respondents who implement each of these technologies do so to roughly half of their total berry crop acreage, which amounts to 1.25 acres, 0.78 acres, and 0.35 acres, on average respectively (Table 2.3).

Figure 2.12 Percentage of Berry Crop Producers using each Production System



⁹ Eighty-five percent of producers with irrigation systems irrigate all of their berry crop acreage (2.85 acres on average).

¹⁰ Seventy-five percent of producers who use plasticulture implement it on their entire berry crop acreage (2.15 acres on average).

Table 2.3 Production Systems among Berry Crop Producers

	Mean	Median	Minimum	Maximum
Netting in Field (berry crop acreage under)	1.25	0.78	0.25	5.00
(% of berry crop acreage under)	53	50	10	100
High Tunnels (berry crop acreage under)	0.35	0.18	0.06	1.00
(% of berry crop acreage under)	47	38	12	100
Greenhouses (berry crop acreage under)	0.78	1.00	0.08	1.00
(% of berry crop acreage under)	47	20	10	100
Irrigation (berry crop acreage under)	2.47	1.25	0.05	10.00
(% of berry crop acreage under)	92	100	17	100
Plasticulture (berry crop acreage under)	2.34	2.00	0.10	10.00
(% of berry crop acreage under)	88	100	25	100

Based on the type of berry crop produced, specific production technologies are more favored than others. Of the 59 respondents who grow strawberries, 49 percent implement plasticulture, 42 percent of them use matted rows, and 17 percent use other production methods, such as growing plants in raised beds and mulching with straw or wood chips (Figure 2.13). When considering the 46 blackberry producers in the sample, 59 percent use static trellises, 7 percent use shift trellises, and 22 percent implement other production systems, including tying plants to vertical posts and planting upright (self-supporting) varieties (Figure 2.14). Of the 29 respondents who produce summer-bearing raspberries, 52 percent use static trellises and 21 percent implement other production systems, such as tying plants to vertical posts and growing plants in raised beds (Figure 2.14). Finally, of the 28 fall-bearing raspberry growers in the sample, one-half use static trellises and 32 percent implement other production systems, including mowing down the vines each year and using temporary posts for support (Figure 2.14).

Figure 2.13 Percentage of Strawberry Growers using each Production System

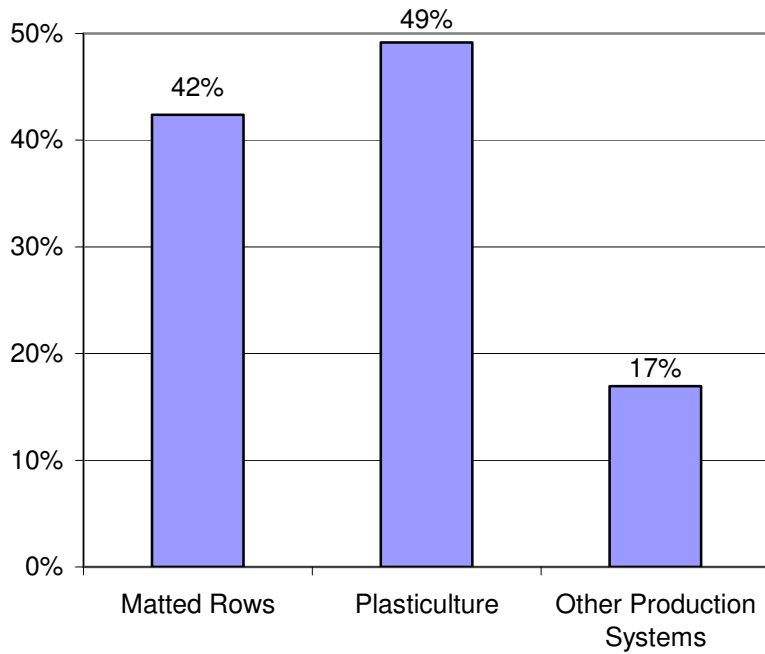
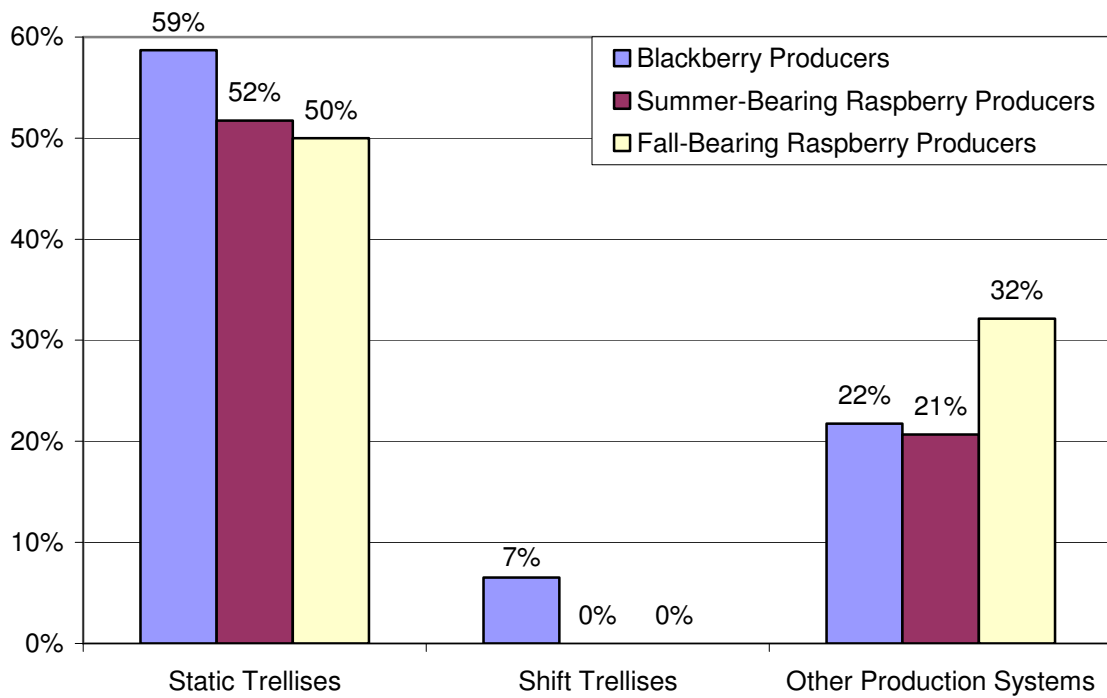


Figure 2.14 Percentage of Bramble Berry Growers using each Production System



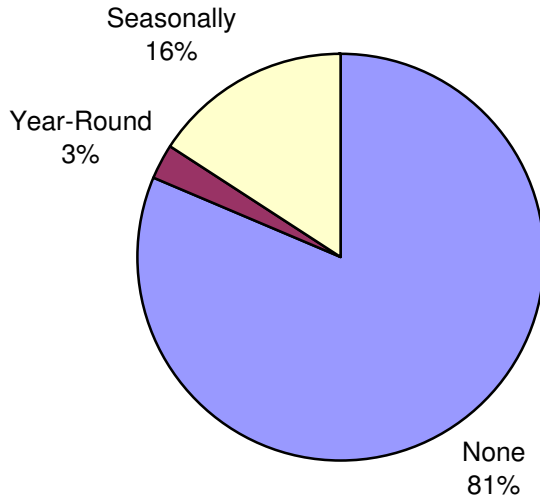
2.3.5 Berry Crop Labor Resources and Usage

Labor is a critical component to all production systems. While one respondent reports hiring as many as 35 permanent laborers annually, 22 percent of commercial berry crop producers hire at least one year-round laborer. Of these, the average berry crop producer employs four year-round paid laborers (Table 2.4). This statistic is slightly higher than the average number of hired year-round laborers (three) for all farms in Virginia (NASS, 2004). In comparison to permanent labor, seasonal labor is more frequently used by berry crop producers, with 59 percent of the respondents reporting they hire at least one seasonal worker. On average, berry crop producers who use seasonal labor hire eight workers, although one respondent reports hiring as many as 45 seasonal laborers (Table 2.4). In contrast, the average farmer in Virginia only employs three seasonal workers, which is less than half of the average number of laborers hired by the average berry crop producer (NASS, 2004). Additionally, migrant labor accounts for 3 percent of permanent labor and 16 percent of the seasonal labor employed by berry crop producers (Figure 2.15), compared with only 2 percent of both permanent and seasonal labor used on all farms in Virginia (NASS, 2004).

Table 2.4 Number of Laborers Employed Annually by Berry Crop Producers

	<i>Census</i>	Survey			
	Mean	Mean	Median	Minimum	Maximum
Permanent Labor	3	4	2	1	35
Seasonal Labor	3	8	4	1	45

Figure 2.15 Migrant Labor Employed by Berry Crop Producers



2.3.6 Berry Crop Marketing Strategies

2.3.6.1 Market Outlets

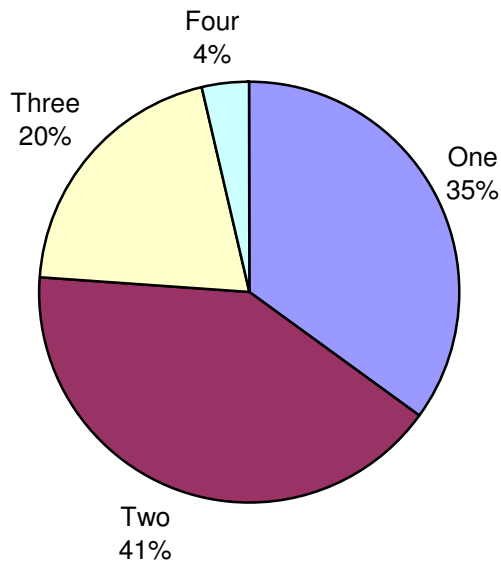
While 35 percent of berry crop producers rely exclusively on one market outlet¹¹ to sell their output, the majority are more diversified: 41 percent use two different outlets to sell their products, 20 percent sell through three different outlets, and 4 percent use four different sales outlets (Figure 2.16)¹².

Direct marketing outlets are important to berry crop producers. In fact, of the 88 percent of berry crop producers who sell output directly to consumers, the median grower earns 80 percent of his or her farming income through these sales.

¹¹ The word outlet is used to denote a specific type of buyer. Thus, it is possible (and common) for a producer to sell through only one outlet, but to multiple buyers.

¹² In this part of the analysis, all sales made directly to consumers are grouped together as a single outlet.

Figure 2.16 Number of Market Outlets used by Berry Crop Producers



The majority (77 percent) of berry crop producers who sell directly to consumers use one or two direct marketing outlets (Figure 2.17)¹³, with farmers’ markets, pick-your-own (U-Pick) operations, and farm stands dominating. Specifically, 64 percent of berry crop producers use farmers’ markets to sell an average of 68 percent of their direct output, 50 percent use U-Pick operations to sell an average of 50 percent of their direct output, and 44 percent use farm stands to sell an average of 46 percent of their direct output (Figure 2.18 and Table 2.5). Berry crop producers use Internet sales, Community Supported Agriculture (CSA) programs¹⁴, and other direct outlets, such as sales to neighbors, friends, and co-workers, less frequently (Figure 2.18) and rely on them to sell less of their total direct output (Table 2.5).

¹³ When considering sales made directly to consumers, the word outlet denotes the specific avenue through which the grower-consumer transaction occurred. Here, farmers’ markets and farm stands, for example, would be considered two separate outlets.

¹⁴ Community Supported Agriculture programs consist of a group of individuals who financially support a farming operation in return for a share of the farm’s output throughout the growing season (DeMuth, 1993).

Figure 2.17 Number of Direct Marketing Outlets used by Berry Crop Producers

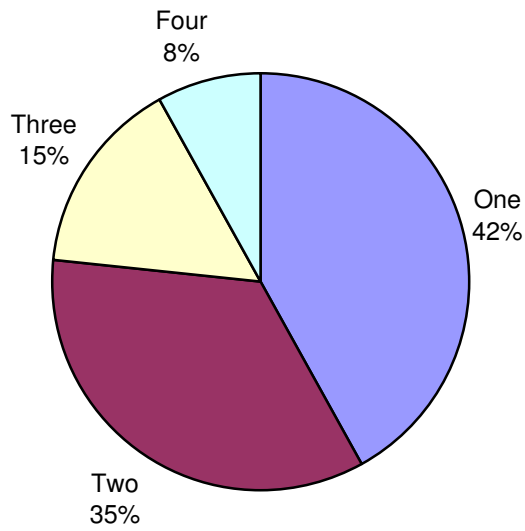


Figure 2.18 Percentage of Respondents who Sell through each Direct Outlet

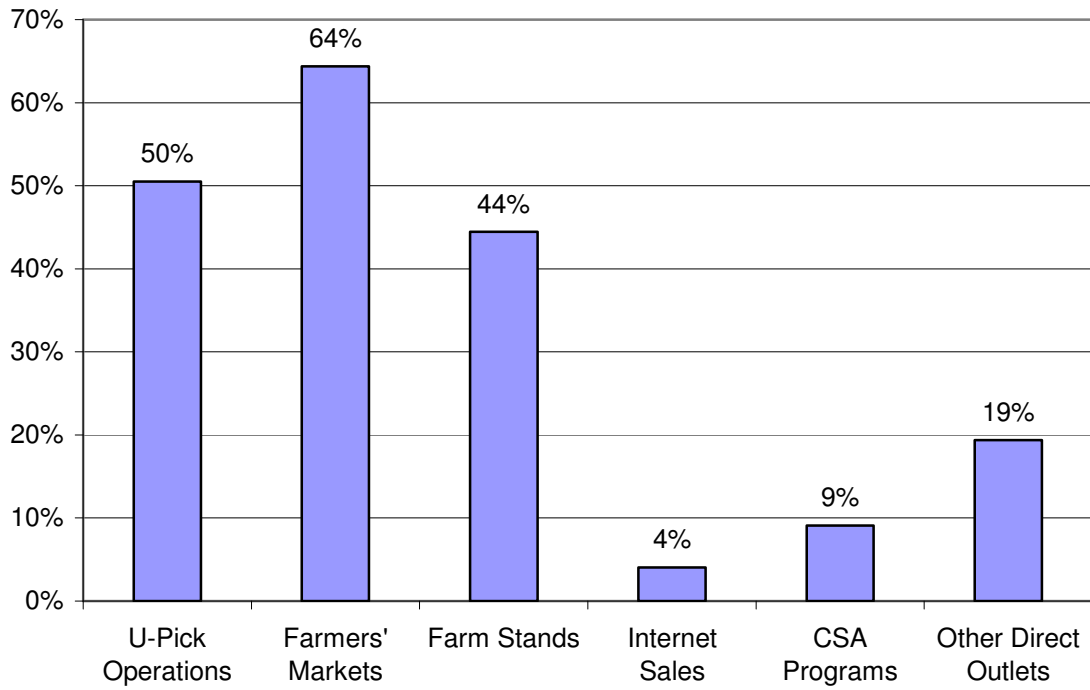


Table 2.5 Percentage of Total Direct Output Sold through each Outlet

	Mean	Median	Minimum	Maximum
U-Pick Operations	50	50	1	100
Farmers' Markets	68	80	2	100
Farm Stands	46	40	1	100
Internet Sales	21	15	5	50
CSA Programs	28	30	1	45
Other Direct Outlets	22	10	2	100

Most berry crop producers (71 percent) also sell their output through at least one indirect marketing outlet. Retail outlets are the predominant indirect outlet used by berry crop producers. Namely, 46 percent of berry crop producers sell an average of 32 percent of their total output directly to retailers (Figure 2.19 and Table 2.6). Less frequently used indirect outlets include food service businesses such as restaurants, shipping point markets, processor outlets, auctions, wholesale markets, and wineries. In particular, 19 percent of berry crop producers sell an average of 17 percent of their total volume to food service businesses, 11 percent move an average of 45 percent of their products through shipping point farmers' markets, 9 percent sell an average of 45 percent of their output through processor outlets, 6 percent move an average 31 percent of their total volume via auctions, and 14 percent complete an average of 61 percent of their total sales through other indirect outlets (Figure 2.19 and Table 2.6).

Figure 2.19 Percentage of Respondents who Sell through each Indirect Outlet

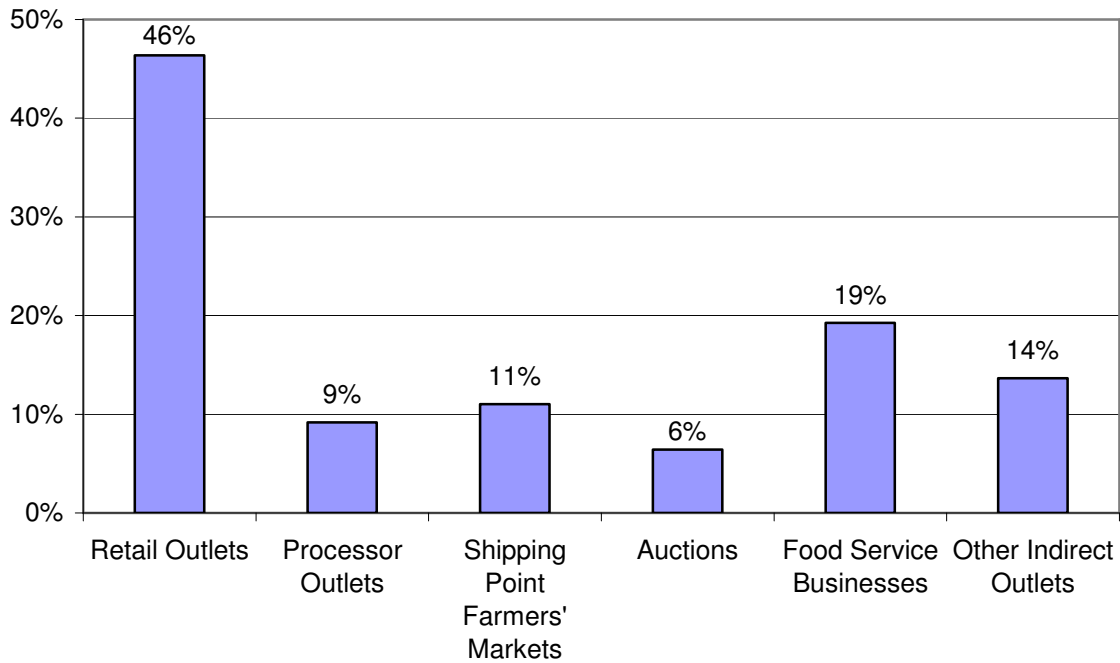


Table 2.6 Percentage of Total Output Sold through each Outlet

	Mean	Median	Minimum	Maximum
Retail Outlets	32	25	1	100
Processor Outlets	45	42	1	93
Shipping Point Farmers' Markets	45	45	5	100
Auctions	31	10	1	95
Food Service Businesses	17	10	1	60
Other Indirect Outlets	61	69	1	100

2.3.6.2 Advertising Methods and Media

In order for growers to inform potential customers of their products, it is important for them to advertise effectively. Most berry crop producers (77 percent) use multiple advertising vehicles (up to nine different methods) throughout the year (Figure 2.20). Word of mouth is the most common of these advertising methods, used by 88 percent of berry crop producers (Figure 2.21). Other common advertising vehicles used by berry crop growers include road signs (used by 47 percent of respondents), newspapers (43 percent), state directories (39 percent), and personal websites and mailing

lists (each used by 23 percent of respondents) (Figure 2.21). Less frequently used advertising methods include telephone directories, such as the Yellow Pages, paid Internet advertisements, and other advertising means, such as local farmers' market announcements, blogs, and radio advertisements (Figure 2.21).

Figure 2.20 Number of Advertising Methods used by Berry Crop Producers

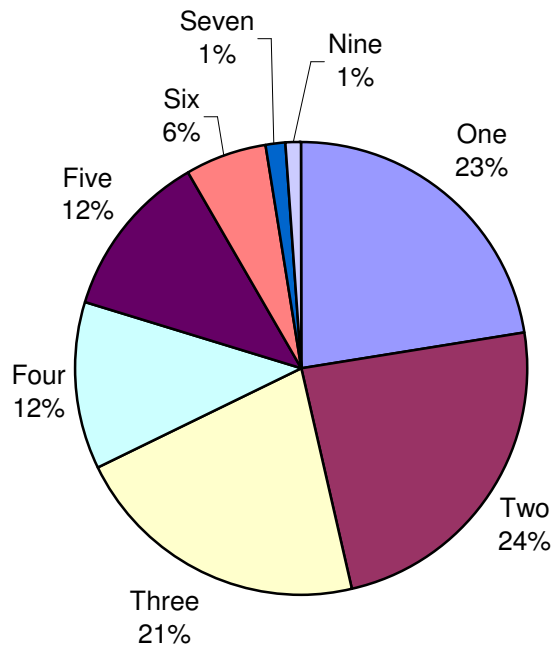
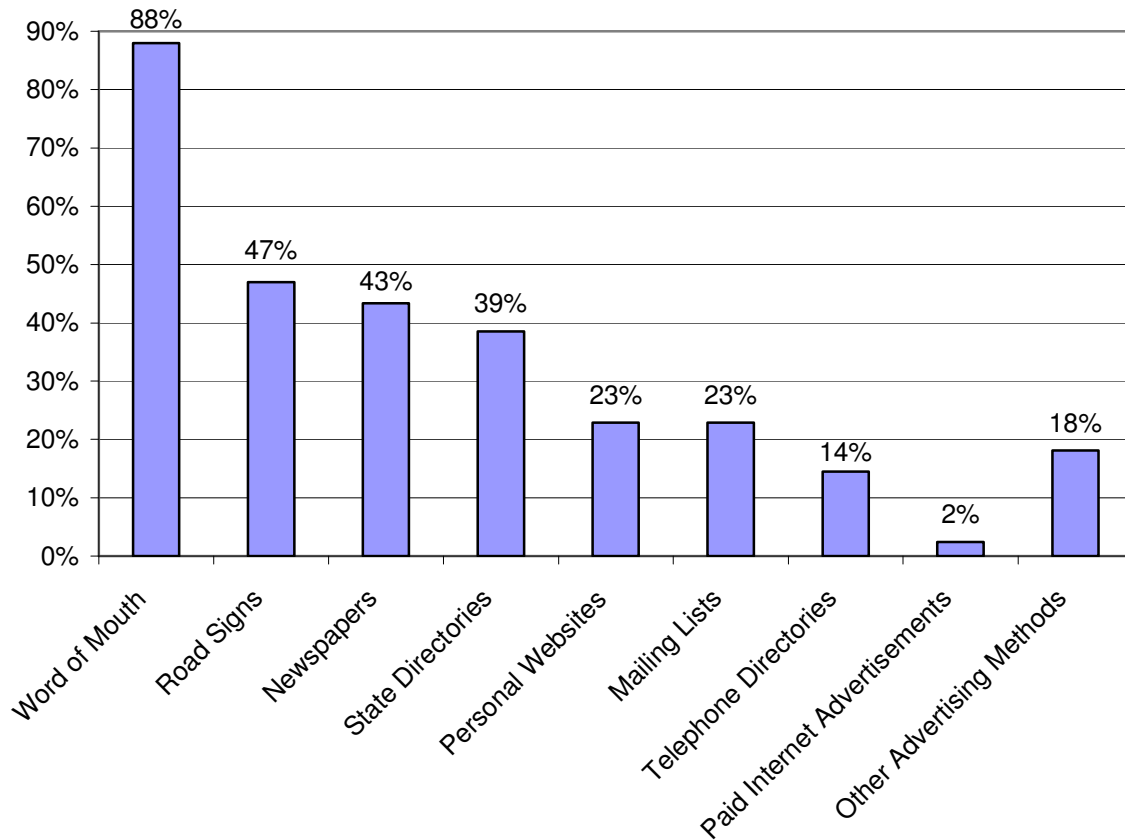
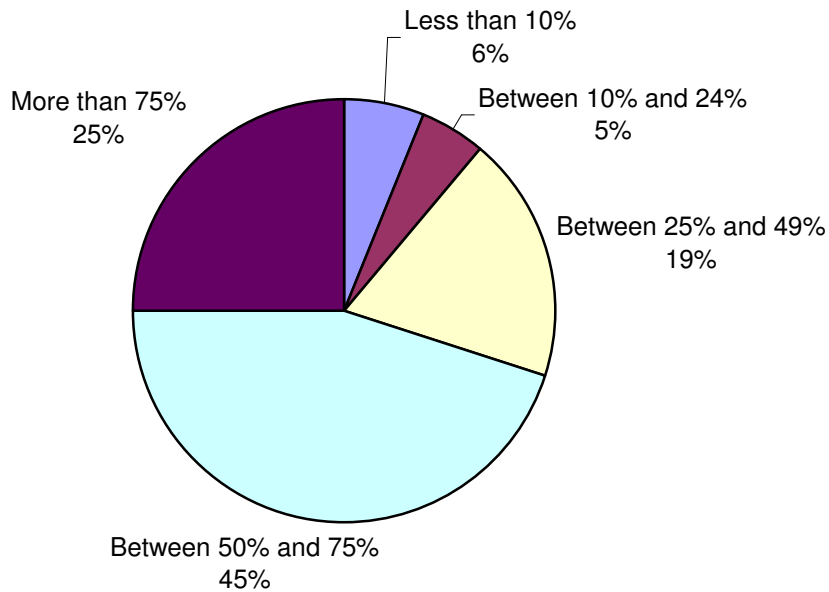


Figure 2.21 Percentage Berry Crop Producers who use each Advertising Method



Along with effective advertising methods, successful direct marketer must also attempt to build and maintain lasting relationships with their customers. Forty-five percent of berry crop producers report that between one-half and three-fourths of their total customer base consists of “regular” customers, and an additional 25 percent consider more than three-fourths of their customers to be “regulars” (Figure 2.22). Along with “regular” customers, infrequent and first-time visitors are always welcomed by direct marketers. During the peak time of the year, the mean and median berry crop producer has a total of 284 customers and 75 customers in one day, respectively.

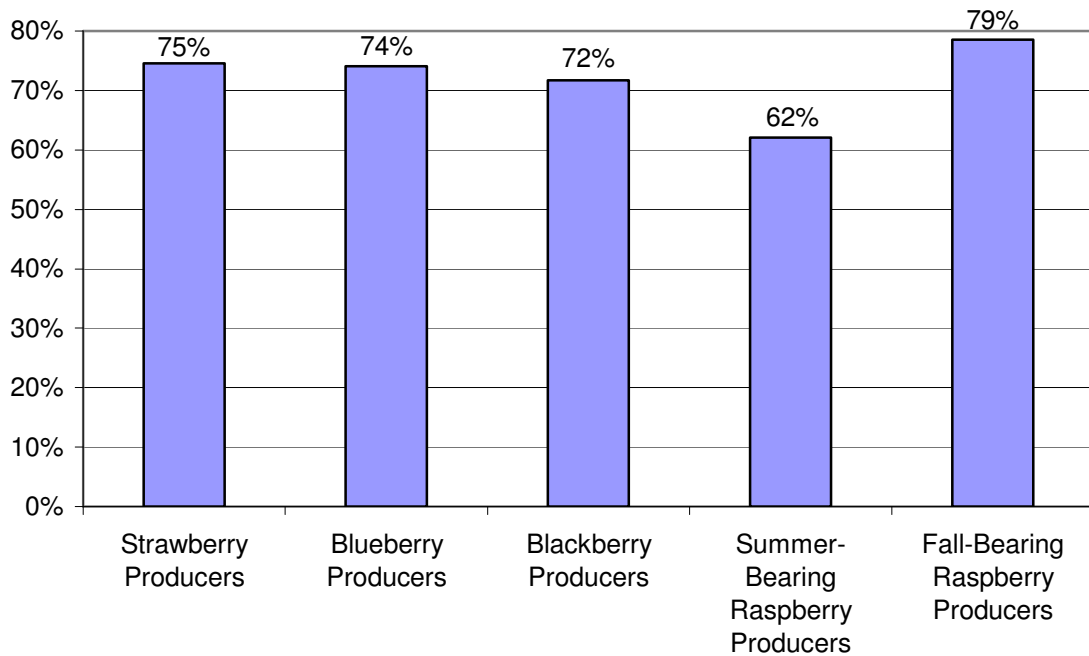
Figure 2.22 Percentage of “Regulars” in Total Customer Base



2.3.7 Constraints to Berry Crop Operations

Berry crop producers encounter multiple limitations in production that hinder their ability to expand their acreage. In particular, 75 percent of strawberry growers, 74 percent of blueberry producers, 72 percent of blackberry growers, 62 percent of summer-bearing raspberry growers, and 79 percent of fall-bearing raspberry producers wish to expand production of their respective products, but cannot do so because of the constraints they face (Figure 2.23).

Figure 2.23 Percentage of Berry Crop Producers who Wish to Expand Acreage



2.3.7.1 Labor Constraints

Labor is the most commonly cited limitation, faced by 47 percent of the strawberry producers, 33 percent of the blueberry growers, 28 percent of the blackberry producers, 38 percent of the summer-bearing raspberry producers, and 39 the percent of fall-bearing raspberry growers in the sample (Figure 2.24). Combined, 47 percent of these producers cite the cost of labor as a prohibiting factor, 27 percent have been unable to find qualified workers, 16 percent have been unable to find enough workers, and 18 percent cite other constraints, such as difficulties complying with labor laws and regulations, an unwillingness among local laborers to work for minimal wages, and an unavailability of housing for the laborers, as limiting factors (Figure 2.25).

Figure 2.24 Percentage of Berry Crop Producers who Face Labor Constraints

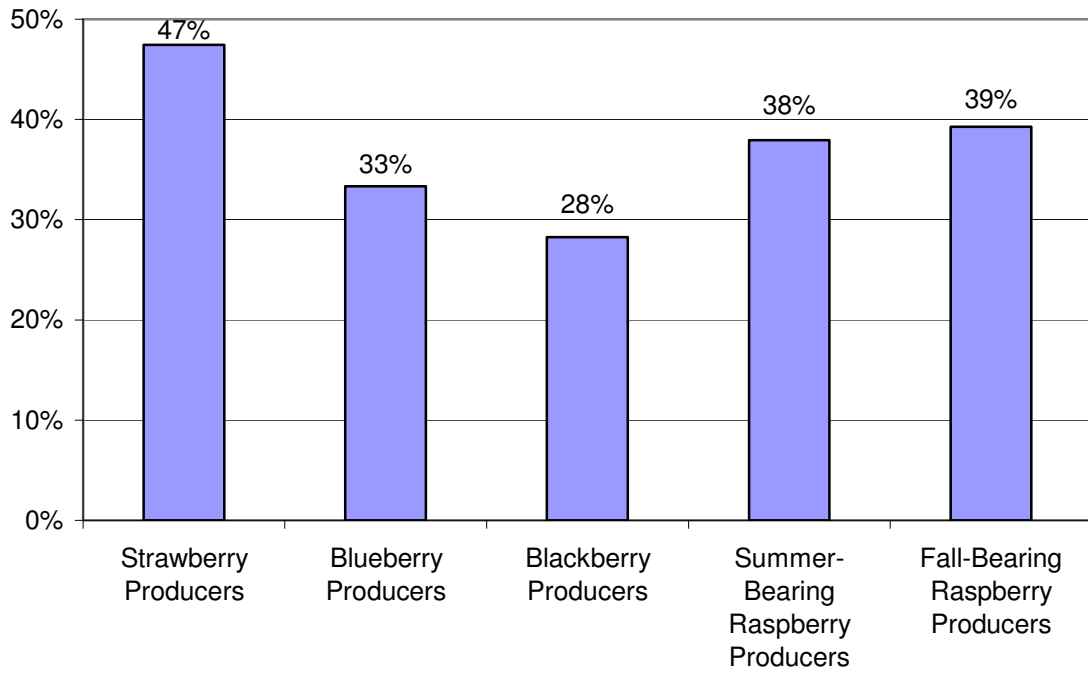
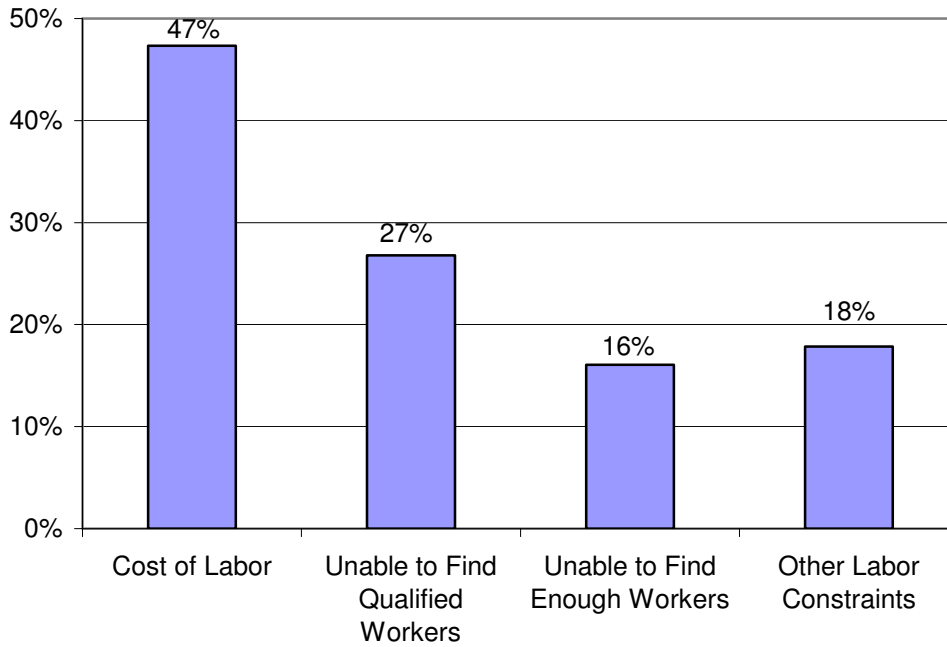


Figure 2.25 Percentage of Berry Crop Producers Facing each Labor Constraint



2.3.7.2 Additional Constraints

Besides labor constraints, some berry crop producers also face financial constraints, production pests and diseases, land limitations, market limitations, and various other constraints that hinder their ability to expand production. When considering strawberry growers, 14 percent are limited by financial constraints, 10 percent by a lack of market access, 7 percent by production pests and diseases, 3 percent by a lack of land access, and 24 percent by other constraints, such as old age, poor health, inefficient equipment, a lack of marketing knowledge, and weather variability (Figure 2.26).

For blueberry growers, 19 percent decide not to expand due to financial constraints, 7 percent due to issues related to land access, 6 percent due to problems with production pests and diseases, 6 percent due to complications with market access, and 22 percent due to other constraints, including a lack of time to properly manage an expanded operation, a lack of knowledge regarding organic production, and an uncertainty in demand for blueberries (Figure 2.26).

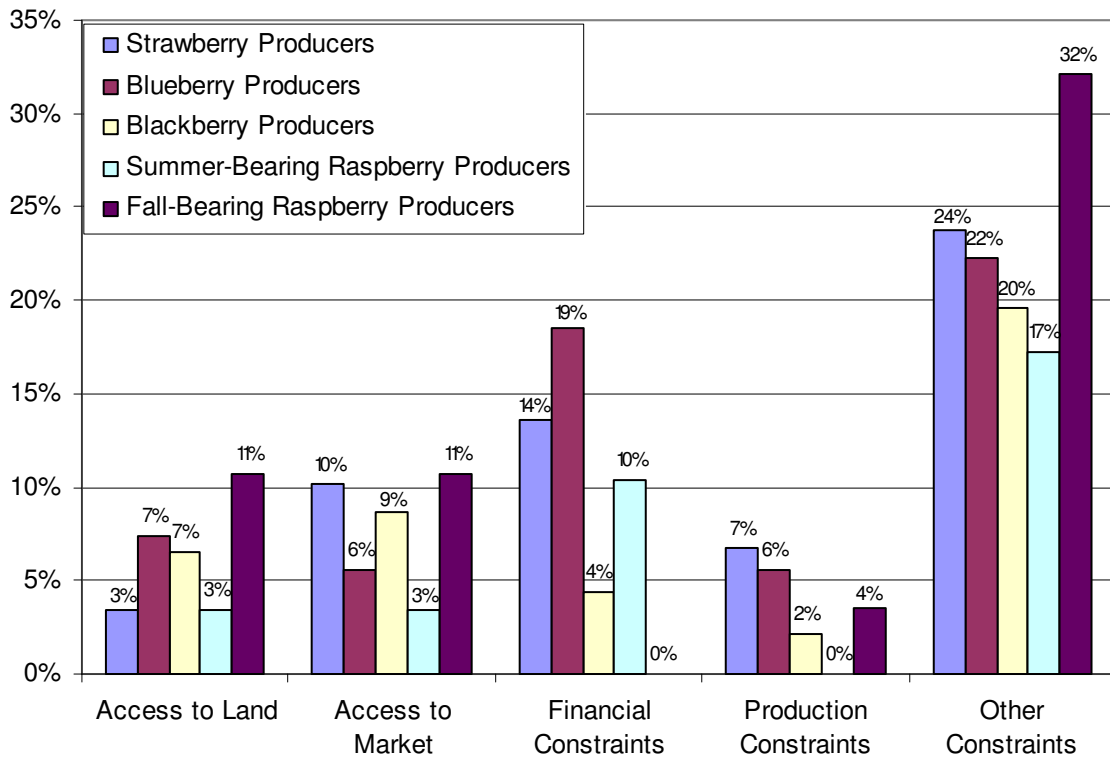
Blackberry producers express their reasons for not expanding production in the following ways: 9 percent are constrained by market access, 7 percent by land access, 4 percent by financial constraints, 2 percent by production pests and diseases, and 20 percent by other constraints, such as a lack of demand for blackberries and a lack of knowledge about organic production (Figure 2.26).

As for summer-bearing raspberry producers, 10 percent choose not to expand because of financial constraints, 3 percent because of land access, 3 percent because of

market access, and 17 percent because of other constraints, including old age and a lack of demand for summer-bearing raspberries (Figure 2.26).

Finally, fall-bearing raspberry growers reveal the factors that are preventing them from expanding production by the following: 11 percent are constrained by access to markets, 11 percent by access to land, 4 percent by production pests and diseases, and 32 percent by other constraints, such as old age, a lack of demand for fall-bearing raspberries, and a lack of time to properly manage an expanded operation (Figure 2.26).

Figure 2.26 Percentage Berry Crop Producers who Face Additional Constraints



2.3.8 Educational Needs among Berry Crop Producers

At the close of the mail-based survey, berry crop producers were given the opportunity to identify any areas related to their berry crop operation in which they could

benefit from further education. This open-ended question was designed to inform future extension programming directed at berry crop growers. Of the responses, four key categories of educational needs among berry crop producers emerged: market outlet diversification, marketing strategies, consumer education, and production and procurement legalities.

As seen in Section 2.3.6.1, berry crop producers commonly sell through farmers' markets, U-Pick operations, farm stands, and retail outlets. However, many less frequently used market outlets may be of interest to berry crop producers in Virginia. Of these market outlets, respondents desire educational programs emphasizing opportunities to sell berries through cooperatives, the Internet, and Community Supported Agriculture programs.

Along with learning about opportunities to sell berries through less commonly used market outlets, respondents also desire formal training in marketing techniques that will influence sales through their choice of outlets. Specifically, respondents cite their need for educational programs highlighting advertising methods, sales promotions, display tactics, and market penetration strategies.

In addition to the marketing strategies mentioned above, multiple producers cited the need to learn about ways to educate the general public about the products they grow. Specific areas of interest within the broader category of consumer education include informing customers of the health benefits associated with berry consumption, and teaching customers about the benefits of consuming locally grown products.

Lastly, respondents desire educational programs regarding production and procurement legalities. Specific topics for extension education programs within this

category include taxation, product liability insurance, food safety regulations, on-farm certifications, and migrant labor issues.

2.4 Discussion and Conclusions

While berry crop producers in Virginia closely mirror state-level statistics of all Virginia farmers along the lines of ethnicity, age and land ownership, they deviate along many other dimensions. Notably, the average berry crop grower has farmed his or her land for fewer years, is more likely to be female, earns more of his or her annual household income from farming, operates a significantly smaller farm, is more likely to obtain organic certification, and employs more labor than the average producer in Virginia. In addition to these characteristics, the average berry crop producer holds a Bachelor's degree; earns an annual income between \$40,000 and \$59,999; has been growing berries for 12 years; grows two different types of berry products on an average of two acres; relies heavily on direct market outlets, especially farmers' markets and U-Pick operations, to sell his or her products; advertises via word of mouth; serves a customer base in which more than one-half are "regulars;" and faces multiple limitations, including labor constraints, which hinder his or her ability to expand.

While each of the statements above is true for the average berry crop grower in Virginia, the structure and organization among berry crop producers in the state varies significantly. For example, although the average berry crop producer operates an 88-acre farm, other berry crop growers produce on as little as one-half of an acre to as much as 1,000 acres. Likewise, large deviations among the respondents exist in demographic variables, including age, education, and income; production variables, including berry

crop mix, organic methods, and labor usage; and marketing variables, including sales outlet mix and the percentage of output sold through direct and indirect outlets.

In order to further examine the structure and organization of berry crop growers in Virginia, clustering techniques will be applied to categorize this diverse set of producers into relatively homogeneous groups in the following chapter. These groupings will provide more insight into the current supply of berries grown in Virginia and set a basis to analyze how different types of producers are positioned to satisfy the demand for locally grown berry crops.

Chapter 3:
Structure and Organization of Berry Crop Producers in Virginia:
A Cluster Analysis

3.1 Introduction

This chapter extends the results of the previous chapter to categorize commercial berry crop producers in Virginia into distinct groups according to their production and marketing characteristics. In Chapter 2, berry crop producers were determined to be fairly diverse along several dimensions, including their demographic profiles, the composition of their farming operations, the methods they use in production, and the marketing strategies they implement to sell their final output. In order to gain further insight into the structure and organization of this diverse set of growers, each producer will be classified into a unique group using cluster analysis techniques. The same producer survey data and sample size (115 growers) described in Section 2.2 will be used to carry out the cluster analysis. The results from this analysis will provide a more complete understanding of the current supply of berry crops produced in Virginia. Implications from the results of the cluster analysis will be briefly discussed in the chapter's close.

3.2 Methods and Data

Cluster analysis is a procedure used to classify data or entities into relatively homogenous groups (Aldenderfer and Blashfield, 1984). It has been widely implemented in numerous disciplines. In the field of agricultural economics for example, Hardiman *et al.* (1990) use cluster analysis to classify farming systems in China; Rosenberg and

Turvey (1991) employ cluster analysis to categorize management practices implemented by swine producers in Ontario; Poole (1998) uses cluster analysis to examine marketing orientations among citrus producers in Spain; and Siegmund-Schultze and Rischkowsky (2001) apply clustering techniques to characterize socioeconomic profiles of sheep producers in West Africa.

For the purpose of this study, berry crop producers will be classified into groups on the basis of their total farm size, berry crop acreage, diversity in berry products produced, berry crop production experience, reliance on direct marketing outlets, and diversity of sales outlets used. Once clusters are formed, descriptive statistics of farm characteristics and demographics for producers in each group will be calculated to uncover similarities and dissimilarities among them. Due to missing values in one or more of the variables used to form clusters, 18 cases were deleted from the original sample. Thus, the analysis proceeds with a total of 97 commercial berry crop growers.

Before groupings can be identified in the data, several preliminary steps need to be completed beforehand. First, the variables used to form the clusters must be standardized, because they are not all measured in the same units (Everitt, 1993). For example, Farm Size, which is a continuous variable measured in acres, ranges from a minimum of one-half acre to a maximum of 1,000 acres, while Berry Crop Production Experience is a continuous variable measured in years that ranges from zero years to 45 years. Since Farm Size has a much larger range than Berry Crop Production Experience, it would carry more weight in determining similarities among producers in the sample if it was not standardized (Romesburg, 1990). The most common way to standardize the variables in a cluster analysis is to calculate a Z-score for all observations of the variables

used to form the groupings (Romesburg, 1990). These unitless values (Z_{ij}) are calculated as follows:

$$Z_{ij} = \frac{X_{ij} - \bar{X}_i}{S_i}$$

where \bar{X}_i is the mean and S_i is the standard deviation of the values ($j = 1, 2, \dots, 96, 97$) of the i th variable.

Once the original data under the grouping variables are converted into standardized values, they can be plotted into six-dimensional space, where the axes represent each of the six standardized grouping variables. Next, Euclidean distance coefficients can be calculated between each pair of objects (each berry crop producer is an “object”) by summing the squared difference between the values of the two objects across all six variables. Squared Euclidean values are calculated to remove the effect of the direction (positive or negative) on the distance coefficient. The magnitude of each of these Euclidean distance coefficients measures how similar or dissimilar each pair of objects is in Euclidean space. Specifically, objects most alike will have low Euclidean distance coefficients and objects most unlike will have high Euclidean distance coefficients (Romesburg, 1990). With a 97×97 matrix of Euclidean distance coefficients, known as a proximity matrix, clusters can be formed using one of several agglomerative linkage methods. See Appendix C for a snapshot of this proximity matrix.

Agglomerative linkage methods begin by assigning each object to a separate cluster. They continue by progressively reducing the number of clusters through a series of successive fusions between objects or groups of objects that are the most similar, until all objects are grouped into a single cluster at the end (Everitt, 1993). Since there are 97

cases in this data set, it will take 96 fusions to carry out an agglomerative clustering method. During each fusion, two objects, two clusters, or an object and a cluster are grouped together according to criteria specified by one of several alternative mathematical algorithms, known as linkage methods. Once linked, the objects or clusters remain together until a single cluster is formed in the final fusion (Everitt, 1993). For the purposes of this project, Ward's method will be used to form groupings in the data. This particular method is widely used as a clustering method in social science research and is designed to minimize the variance within clusters (Aldenderfer and Blashfield, 1984). In particular, Ward's method fuses together the pair of objects or group of objects with the lowest increase in the error sum of squares (ESS) along each stage of the agglomerative schedule (Ward, 1963). ESS for each fused group is calculated as follows:

$$ESS = \sum_{j=1}^n (Z_{ij} - \bar{Z}_i)^2$$

where Z_{ij} is the value of the j th object across the i th variable, \bar{Z}_i is the mean of each group across i th variable for $i = 1, \dots, 6$, and n is the total number of objects in the group. When a group is composed of a single object or of several objects with identical values for all Z_{ij} , the group ESS is equal to zero, which is the most desirable level for forming homogenous clusters (Ward, 1963).

Agglomerative linkage methods, such as Ward's method, are part of a broader technique used to classify data known as hierarchical clustering. In hierarchical classifications, the data are not partitioned into a particular number of clusters at a single step, which is the case in K-Means classifications (Everitt, 1993). This is advantageous in market analyses, because the researcher can determine the suitable number of clusters

to apportion the objects into based on the objectives of the study (Aldenderfer and Blashfield, 1984). Furthermore, a visual depiction of the fusions of objects or clusters that took place at each stage of the agglomerative schedule can be seen in a two-dimensional diagram known as a dendrogram. A complete dendrogram can be “cut” into clusters with a horizontal line that intersects the diagram exactly as many times as the appropriate number of groupings (Romesburg, 1990).

3.3 Results

The total sample of current berry crop producers in Virginia was grouped into three distinct clusters using hierarchical classification under Ward’s linkage method. Appendix D shows a complete dendrogram of the fusions that took place and the groupings that were formed. One-way analysis of variance (ANOVA) confirms that the means of each of the six variables used to form the clusters are statistically different among each group (Table 3.1). The cluster means of several other variables, including Farm Income from Direct Sales, Organic Acreage, Peak Laborers, and Ethnicity, are also statistically different when tested jointly. A complete descriptive analysis of these variables and their significance by cluster is presented in Tables 3.2 through 3.8.

In general, Cluster #1 consists of large-scale producers who market the majority of their products to indirect outlets, Cluster #2 is comprised of small-scale, less experienced growers who mostly sell their output directly to consumers, and Cluster #3 is made up of medium-sized, more experienced producers who are also heavily reliant on direct outlets to sell their products. The following three sub-sections provide a detailed

description of the structure and organization of berry crop producers in each unique cluster.

Table 3.1 One-Way ANOVA: Variables used to Form Clusters

Share of Respondents in each Cluster		Cluster			Sig.*
		1 39%	2 39%	3 22%	
Farm Size (acres)	Mean	131.48	26.74	68.33	0.007
	Median	20.00	13.50	28.00	
	Std. Dev.	212.65	45.63	91.24	
Berry Crops (acres)	Mean	3.26	0.78	2.37	0.000
	Median	2.00	0.50	1.50	
	Std. Dev.	3.24	0.76	2.06	
Berry Crop Diversity (# of different types of berries produced)	Mean	2.21	2.18	1.29	0.010
	Median	1.50	2.00	1.00	
	Std. Dev.	1.53	1.04	0.56	
Berry Crop Production Experience (years)	Mean	10.34	5.45	24.62	0.000
	Median	6.00	4.00	23.00	
	Std. Dev.	8.60	4.80	5.92	
Direct Outlets (% of total output sold through)	Mean	27.84	92.29	87.29	0.000
	Median	22.50	100.00	96.00	
	Std. Dev.	27.39	9.97	18.52	
Sales Outlets Diversity (# of different sales outlets used)	Mean	2.39	1.50	1.86	0.000
	Median	2.00	1.00	2.00	
	Std. Dev.	0.79	0.56	0.85	

* **Bold** values denote statistical significance of at least the 0.10 level.

Table 3.2 Characteristics of Producers

Share of Respondents in each Cluster	Cluster Mean			Sig.*
	1 39%	2 39%	3 22%	
Ethnicity: White, non-Hispanic	1.00	0.97	0.76	0.001
Age:				
Under 25 Years Old	0.03	0.00	0.00	0.477
Between 25 - 44 Years Old	0.18	0.38	0.10	0.036
Between 45 - 59 Years Old	0.42	0.41	0.25	0.413
Between 60 - 69 Years Old	0.26	0.19	0.50	0.043
Over 69 Years Old	0.11	0.03	0.15	0.239
Gender: Female	0.32	0.30	0.40	0.737
Education:				
No High School Diploma	0.03	0.00	0.05	0.470
High School Diploma	0.11	0.11	0.14	0.908
Some College	0.16	0.14	0.14	0.973
Associate's Degree	0.11	0.03	0.10	0.413
Bachelor's Degree	0.32	0.47	0.33	0.347
Graduate Degree	0.29	0.25	0.24	0.892
Household Size (# of people)	3.34	3.11	2.52	0.175
Household Income:				
Less than \$20,000	0.00	0.00	0.00	N/A
Between \$20,000 - \$39,999	0.23	0.18	0.05	0.262
Between \$40,000 - \$59,999	0.33	0.42	0.42	0.732
Between \$60,000 - \$79,999	0.20	0.12	0.00	0.116
Between \$80,000 - \$99,999	0.07	0.12	0.16	0.597
\$100,000 or More	0.17	0.15	0.37	0.144
% of Household Income from Farming	0.50	0.37	0.51	0.286
% of Farming Income from Berry Crop Sales	0.28	0.20	0.29	0.594
% of Farming Income from Direct Sales	0.38	0.76	0.81	0.000
Own All Land in Production	0.89	0.89	0.95	0.707
Experience:				
Farmed Land Between 0 - 5 Years	0.16	0.35	0.10	0.038
Farmed Land Between 6 - 20 Years	0.39	0.32	0.24	0.477
Farmed Land 21 or More Years	0.26	0.16	0.52	0.012
Farmed Land for Multiple Generations	0.18	0.16	0.14	0.919
Berry Crop Production Experience (years)	10.34	5.45	24.62	0.000

* **Bold** values denote statistical significance of at least the 0.10 level.

Table 3.3 Characteristics of Farm Operations

Share of Respondents in each Cluster	Cluster Mean			Sig.*
	1 39%	2 39%	3 22%	
Farm Size (acres)	131.48	26.74	68.33	0.007
% of Growers who Produce/Raise:				
Fruits, Other than Berry Crops	0.50	0.47	0.43	0.874
Vegetables	0.79	0.68	0.81	0.458
Row Crops	0.21	0.16	0.24	0.734
Livestock or Dairy	0.34	0.21	0.24	0.415
Specialty Crops	0.47	0.45	0.48	0.967
Production Acreage:				
Berry Crops	3.26	0.78	2.37	0.000
Fruits, Other than Berry Crops	19.33	2.96	1.27	0.165
Vegetables	16.34	3.05	17.73	0.152
Row Crops	11.42	0.31	26.68	0.123
Livestock and Dairy	37.43	6.45	1.40	0.079
Specialty Crops	0.30	0.22	0.22	0.836
% of Production Acreage:				
Berry Crops	0.29	0.22	0.23	0.557
Fruits, Other than Berry Crops	0.13	0.26	0.07	0.032
Vegetables	0.28	0.33	0.43	0.309
Row Crops	0.06	0.03	0.17	0.036
Livestock and Dairy	0.20	0.10	0.09	0.252
Specialty Crops	0.05	0.09	0.01	0.169

* **Bold** values denote statistical significance of at least the 0.10 level.

Table 3.4 Berry Crop Production

Share of Respondents in each Cluster	Cluster Mean			Sig.*
	1 39%	2 39%	3 22%	
Number of Different Berry Products	2.21	2.18	1.29	0.010
% of Growers who Produce:				
Strawberries	0.53	0.42	0.57	0.488
Blueberries	0.45	0.53	0.52	0.760
Blackberries	0.58	0.42	0.14	0.004
Summer-Bearing Raspberries	0.24	0.37	0.00	0.006
Fall-Bearing Raspberries	0.32	0.34	0.05	0.035
Other Berries	0.11	0.11	0.00	0.307
Berry Crop Acreage:				
Strawberries	0.74	0.24	1.31	0.012
Blueberries	0.72	0.36	0.67	0.541
Blackberries	0.98	0.16	0.06	0.032
Summer-Bearing Raspberries	0.16	0.08	0.00	0.397
Fall-Bearing Raspberries	0.13	0.08	0.05	0.521
Other Berries	0.18	0.02	0.00	0.581
% of Berry Crop Acreage:				
Strawberries	0.35	0.25	0.52	0.084
Blueberries	0.20	0.31	0.40	0.187
Blackberries	0.27	0.19	0.08	0.094
Summer-Bearing Raspberries	0.04	0.13	0.00	0.007
Fall-Bearing Raspberries	0.14	0.11	0.01	0.163
Other Berries	0.01	0.05	0.00	0.279

* **Bold** values denote statistical significance of at least the 0.10 level.

Table 3.5 Production Methods and Technologies

Share of Respondents in each Cluster	Cluster Mean			Sig.*
	1 39%	2 39%	3 22%	
Organic Production:				
No Organic Production	0.62	0.55	0.29	0.042
Organic Production, but not Certified	0.32	0.34	0.57	0.142
Organic Production, Certified or in Transition	0.05	0.11	0.14	0.520
Organic Acreage	7.43	3.60	15.04	0.058
Irrigation and Crop Protection:				
Use Netting in Field	0.10	0.22	0.33	0.220
Use High Tunnels	0.05	0.12	0.08	0.739
Use Greenhouses	0.05	0.12	0.15	0.583
Use Irrigation	0.87	0.72	0.78	0.377
Use Plasticulture	0.44	0.24	0.44	0.312

* **Bold** values denote statistical significance of at least the 0.10 level.

Table 3.6 Labor Usage and Constraints

Share of Respondents in each Cluster	Cluster Mean			Sig.*
	1	2	3	
	39%	39%	22%	
Peak Number of Laborers used During Season	9.03	2.78	8.15	0.036
Permanent Labor (# of workers hired annually)	2.28	0.22	0.55	0.072
Seasonal Labor (# of workers hired annually)	6.67	2.09	7.10	0.046
% of Total Labor Hired:				
Permanent	0.23	0.10	0.14	0.339
Seasonal	0.81	0.90	0.86	0.578
Labor Constraints:				
Limited by the Cost of Labor	0.55	0.43	0.30	0.180
Unable to Find Qualified Workers	0.29	0.22	0.35	0.544
Unable to Find Enough Workers	0.18	0.11	0.25	0.380
Limited by Other Labor Constraints	0.21	0.14	0.15	0.670

* **Bold** values denote statistical significance of at least the 0.10 level.

Table 3.7 Indirect Marketing Strategies

Share of Respondents in each Cluster	Cluster Mean			Sig.*
	1	2	3	
	39%	39%	22%	
Number of Different Sales Outlets Used	2.39	1.50	1.86	0.000
Sell to at least One Indirect Outlet	0.97	0.47	0.57	0.000
% of Growers who sell to:				
Retail and Wholesale Outlets	0.66	0.34	0.38	0.013
Processor and Food Service Outlets	0.47	0.08	0.33	0.000
Auctions and Shipping Point Markets	0.32	0.05	0.05	0.002
Other Indirect Outlets	0.08	0.03	0.05	0.589
% of Output sold through Indirect Outlets	0.72	0.08	0.13	0.000
% of Total Output sold to:				
Retail and Wholesale Outlets	0.52	0.69	0.41	0.222
Processor and Food Service Outlets	0.24	0.15	0.42	0.134
Auctions and Shipping Point Markets	0.17	0.11	0.08	0.694
Other Indirect Outlets	0.07	0.06	0.08	0.955

* **Bold** values denote statistical significance of at least the 0.10 level.

Table 3.8 Direct Marketing Strategies

Share of Respondents in each Cluster	Cluster Mean			Sig.*
	1 39%	2 39%	3 22%	
Number of Different Direct Outlets Used	1.82	1.53	2.32	0.026
Sell through at least One Direct Outlet	0.76	1.00	1.00	0.000
% of Growers who sell through:				
U-Pick Operations	0.63	0.26	0.70	0.001
Farmers' Markets	0.63	0.71	0.53	0.433
Farm Stands	0.35	0.38	0.63	0.126
Internet Sales	0.03	0.03	0.05	0.905
CSA Programs	0.10	0.09	0.16	0.722
Other Direct Outlets	0.30	0.15	0.26	0.329
% of Output sold through Direct Outlets	0.28	0.92	0.87	0.000
% of Direct Output sold through:				
U-Pick Operations	0.28	0.16	0.39	0.089
Farmers' Markets	0.43	0.53	0.35	0.358
Farm Stands	0.17	0.22	0.20	0.799
Internet Sales	0.00	0.02	0.01	0.655
CSA Programs	0.03	0.03	0.03	0.997
Other Outlets	0.09	0.04	0.02	0.390
Peak Number of Daily Customers during Season	117.00	126.04	870.06	0.037
Number of Different Advertising Methods Used	2.84	2.79	3.93	0.104
Advertise via:				
Word of Mouth	0.84	0.89	0.93	0.711
Newspapers	0.44	0.41	0.64	0.336
Road Signs	0.41	0.33	0.71	0.059
Personal Websites	0.22	0.33	0.21	0.563
Paid Internet Sites	0.06	0.00	0.00	0.276
Mailing Listings	0.19	0.22	0.43	0.210
Telephone Directories	0.13	0.11	0.29	0.297
State Directories	0.31	0.33	0.64	0.086
Other Methods	0.25	0.19	0.07	0.375

* **Bold** values denote statistical significance of at least the 0.10 level.

3.3.1 Cluster #1: Indirect Outlet Dependent & Larger-Scale

Producers in Cluster #1 represent 39 percent of the sample. These producers come from large farming operations and rely heavily on indirect outlets to sell their

products. The average producer in this cluster operates a 131 acre farm, and sells 72 percent of his or her total output to indirect outlets, including retail and wholesale (used by 66 percent of the producers in the cluster), processors and food service businesses (used by 47 percent of the producers in the cluster), and auction and shipping point farmers' markets (used by 32 percent of the producers in the cluster). Ninety-seven percent of producers in this cluster sell to at least one indirect outlet, compared to only 57 percent and 47 percent of producers in Cluster #3 and Cluster #2, respectively (Tables 3.3 and 3.7).

The average producer in this cluster grows 3.3 acres of berry crops, which exceeds the 0.78 acres grown by the average producer in Cluster # 2 and the 2.4 acres grown by the average producer in Cluster #3. All large-scale growers in the sample with eight acres or more of berry crops are classified in this group. Within this acreage, the average producer in Cluster #1 grows a more diverse mix of berry products than the average producers in Cluster #2 and Cluster #3. Blackberries, strawberries, and blueberries are particularly important to this cluster, as 58 percent, 53 percent, and 45 percent of the growers in the cluster produce on an average of nearly one acre each, respectively. With the exception of strawberry acreage in Cluster #3, the average producer in Cluster #1 consistently devotes more land to each individual berry product than the average producers in the other two clusters (Table 3.3 and 3.4).

Along with berry crops, producers in this cluster dedicate a significant amount of their farmland to vegetable production (28 percent on average) and livestock or dairy production (20 percent on average). This amounts to more than five times the number of acres the average producer in Cluster #2 devotes to both vegetables and livestock or dairy

production and more than 26 times as many acres as the average producer in Cluster #3 uses to raise livestock or dairy. Additionally, few of the producers in this cluster implement organic production processes on their farms (Tables 3.3 and 3.5).

Producers in this cluster tend to rely on more hired labor in order to run these larger operations. Namely, the average producer in this group hires 9 laborers during his or her busiest time of the year, while the average producers in Cluster #2 and Cluster #3 only hire a maximum of 3 laborers and 8 laborers, respectively, during their busiest times of the year (Table 3.6).

Demographically, most of the principal operators in this cluster are between 45 and 59 years old, white, and male. Approximately half of the average producer's annual household income comes from farming and 28 percent his or her farming income comes from berry crop sales (Table 3.2). Geographically, producers in the cluster are spread out across the state with a heavy representation in Hanover County (19 percent of the producers in the cluster) and Loudoun County (16 percent of the producers in the cluster) (Appendix E).

3.3.2 Cluster #2: Direct Outlet Dependent & Smaller-Scale

Producers in this group also represent 39 percent of the sample. This cluster is made up of "hobby farmers" who operate small farms and are less experienced. Namely, the average farm size in this cluster is only 26 acres, of which an average of 0.78 acres is devoted to berry crop production. The largest proportion of producers in this cluster have farmed their land five years or less. Furthermore, the average producer in this group only has 5 years of experience growing berry crops, compared with the average producer in

Cluster #1 and Cluster #3 who have 10 and 25 years of experience growing berry crops, respectively (Tables 3.2 and 3.3).

The average producer in this group is more reliant on direct markets to sell his or her products than the average producers in Cluster #1 and Cluster #3. Specifically, the average producer in this cluster sells 92 percent of his or her total output through direct outlets, and earns 76 percent of his or her total farm income from sales made directly to consumers. Total farm income, however, only represents 37 percent of the average producer's annual household income in this cluster. Farmers' markets are the most frequently used direct outlet by producers in this cluster. Namely, 71 percent of the producers in this cluster use farmers' markets to sell all or a portion (55 percent on average) of their products directly to consumers (Tables 3.2 and 3.8).

On average, producers in this cluster devote relatively large sections of their land to grow vegetables (33 percent of total farm acreage), fruits (26 percent of total farm acreage), and berry crops (22 percent of total farm acreage). Blueberries, summer-bearing raspberries, and fall-bearing raspberries are produced by a higher percentage of producers in this cluster than in the other two. Like Cluster #1, the majority of the producers in this cluster (55 percent) do not implement organic production processes on their farming operation (Tables 3.3 – 3.5).

Labor is not employed as frequently by producers in this cluster. In fact, the average producer hires only two seasonal laborers and no permanent workers, compared to the average producer in Cluster #1 who employs seven seasonal and two permanent workers annually and the average producer in Cluster #3 who employs seven seasonal and one permanent worker throughout the year (Table 3.6).

The lack of farming experience of the producers in this cluster may be partially explained by the predominance of younger aged individuals in this group compared to others. Specifically, 38 percent of the producers in this group are between 25 and 44 years old, compared to only 10 percent in Cluster #3 and 18 percent in Cluster #1, and 41 percent are between 45 and 59 years old, compared to only 25 percent in Cluster #3 (Table 3.2). Similar to Cluster #1, producers in this group are evenly spread throughout various regions of the state, with the highest representation coming from Loudoun County (19 percent of the producers in the cluster) (Appendix E).

3.3.3 Cluster #3: Direct Outlet Dependent & Medium-Scale

Producers in this group represent the remaining 22 percent of the sample. This cluster consists of an ethnically diverse group of experienced farmers who rely heavily on direct outlet to sell their products. Compared to Cluster #1 and Cluster #2, the average producer in this cluster operates a medium size farm (68 acres) and produces an intermediate level of berry crops (2.4 acres). Over half of the producers in this group have farmed their land 21 years or more, and on average, producers in this cluster have 25 years of experience growing berry crops, which is more than twice as many years of experience as the average producer in Cluster #1 has and more the five times that of the average producer in Cluster #2 (Tables 3.2 and 3.3).

The average producer in this cluster sells 87 percent of his or her total output through direct outlets, and earns 81 percent of his or her total farming income from direct sales to consumers. Producers in this cluster market their products through a diverse set of direct outlets, dominated by pick-your-own operations (used by 70 percent of the

producers in the cluster), farm stands (used by 63 percent of the producers in the cluster), and farmers' markets (used by 53 percent of the producers in the cluster) (Table 3.6).

While the average producer in this cluster uses a more diverse mix of market outlets than the average producers in the other two clusters, he or she grows a less diverse mix of berries. Strawberries and blueberries are the most common berry crops grown by producers in this cluster. Specifically, 57 percent of the producers in this group grow strawberries on an average of 52 percent of their total berry crop acreage, and 52 percent grow blueberries on an average of 40 percent of their total land devoted to berry crop production (Table 3.4).

In addition to berry crops, 81 percent of the growers in this cluster produce vegetables. On an average, producers in this cluster devote the largest proportion of their total farm acreage (43 percent) to vegetable production, which is more than the other two clusters. Unlike producers in the Cluster #1 and Cluster #2, the majority of the producers in this cluster (71 percent) implement organic production processes on an average of 15 acres of their farming operation, although 57 percent are not officially USDA certified (Tables 3.3 and 3.5).

Demographically, this cluster is more diverse than Cluster #1 and Cluster #2. In particular, 24 percent are of non-white ethnic backgrounds, compared with only 3 percent in Cluster #2 and no producers in Cluster #1. Likewise 40 percent of the growers in this group are female, compared with 30 percent in Cluster #2 and 32 percent in Cluster #1. The wealth of experience of this cluster may be explained by its age distribution, which is comprised of the highest proportion of producers in the two oldest age categories. Specifically, 50 percent of the producers in this group are between 60 and 69 years old,

compared to only 26 percent in Cluster #1 and 19 percent in Cluster #2, and 15 percent are over 69 years old, compared to 11 percent in Cluster #1 and only 3 percent in Cluster #2 (Table 3.2). This cluster also has the highest proportion (37 percent) of producers who earn an annual household income greater than \$100,000, as opposed to only 17 percent and 15 percent of the producers in Cluster #1 and Cluster #2, respectively. Geographically, the majority of the producers in this cluster are located in Northeastern Virginia (Appendix E).

3.4 Discussion and Conclusions

The clusters that emerged in this part of the analysis provide additional insight into the structure and organization of commercial berry crop producers in Virginia that could not be revealed solely through a descriptive analysis of the entire sample. For example, while the descriptive analysis illustrates that the majority of all berry crop producers (88 percent) sell a portion of their output through at least one direct outlet, the cluster analysis separates these growers into three groups: one that is not as reliant on farming income that comes from direct sales (Cluster #1), and two that are heavily reliant on farming incomes that stem from sales made directly to consumers (Cluster #2 and Cluster #3).

Along with marketing strategies, the results from the cluster analysis reveal critical information about the variation in farm composition among berry crop producers. In summary, Cluster #1 consists of mostly larger-scale producers who grow a diverse mix of berry crops, including blackberries, strawberries, and blueberries, Cluster #2 is made up of smaller-scale farmers who are also diverse in their berry crop mix, producing a

significant amount of raspberries to complement their blueberry, strawberry, and blackberry production, and Cluster #3 is comprised of medium-scale growers who are less diverse in their berry crop mix, producing mostly strawberries and blueberries.

When taken together with demographic variables, including age, gender, education level, and farming experience, the results of this analysis are instrumental in designing and conducting extension outreach programs. Namely, county extension agents can target a specific segment of berry crop producers more effectively with the detailed information provided above. For example, an extension program for larger-scale berry crop producers will have to include more information on opportunities to serve indirect outlets and be geared towards a middle-aged audience, while programs for smaller and medium-scale producers will need to be more specific to direct marketing opportunities and directed towards a mixture of younger and older-aged producers.

With a clearer and more detailed picture of the characteristics of berry crop producers in Virginia in place, the proceeding research will focus on the state-level demand for these products among a diverse set of market outlets. In particular, the potential demand for small grown in Virginia and the specific requirements producers must meet so they can profitably sell their products through various market outlets will be analyzed.

Chapter 4:

Demand for Locally Grown Berry Crops among Alternative Market Outlets in Virginia

4.1 Introduction

The previous two chapters analyzed the current supply of berry crops in Virginia. From the results of the cluster analysis it is evident that a specific group of producers (39 percent) rely mostly on indirect marketing channels, including supermarkets, wholesalers, and processors such as wineries, to sell their products, while the remaining berry crop growers (61 percent) depend primarily on direct marketing channels, encompassing pick-your-own operations, farmers' markets, and farm stands. For current berry crop producers and those considering diversification into berry crop production, it is imperative to understand the different market outlets through which they can potentially sell their products. Based on the relative attractiveness of each potential outlet and its respective upfront investment requirements, berry crop producers may be inclined to sell their products solely through direct or indirect outlets or through a combination of the two.

This chapter assesses the potential demand among diverse berry crop outlets in Virginia and examines the requirements berry crop producers must adhere to in order to sell through these channels. The overriding thesis of this chapter is that the market potential of different outlets available to berry crop growers in Virginia will differ by outlet type. Hypotheses to be explored to support this statement relate to: 1) overall consumer demand, 2) volume and market flows, 3) demand for attributes, 4) berry crop products, 5) relationships and sale arrangements, and 6) market entry requirements.

Evidence supporting or disproving these hypotheses and a detailed assessment of the current demand for locally grown berry crops through each type of outlet will be presented in the final sections of the chapter.

4.2 Methods and Data

Results presented in this chapter come from a series of personal interviews with individuals who buy berries for various market outlets in Virginia and local growers who sell berries to a diverse set of market outlets. The objective of these interviews was to learn about the potential demand for locally grown berry crops among these outlets. Specifically, three supermarket buyers, three wholesale buyers, four winery owners, and seven producers were interviewed using a questionnaire that was customized to each type of respondent (Appendix F). Of the three supermarket buyers interviewed, one represents a large national chain, one works for a regional chain with approximately 100 stores, and the other is employed by a local chain with 30 stores. Similarly, the berry crop producers interviewed are of various sizes and use a diverse set of marketing outlets to sell their products. Of the seven producers interviewed, four sell through both direct and indirect outlets, two sell solely through direct outlets, and one sells strictly through indirect outlets. Collectively, the interviewees selected are thought to be a representative sample of the participants in Virginia's berry crop market. Since many buyers from foodservice outlets obtain frozen berries directly from intermediaries, they were determined to be inactive participants in the market for fresh berry crops and were not interviewed for this study.

The subsequent section outlines a series of qualitative hypotheses that will be tested against the results from the interviews. Each of these hypotheses will be drawn from the general framework of U.S. produce markets as they are depicted in the literature.

4.3 Conceptual Framework and Hypotheses

The U.S. market for fresh fruits and vegetables is dynamic and has experienced a great deal of change in recent years. Of note, the demand for fresh produce has steadily increased, retail outlets have become more consolidated, direct outlets have grown in popularity, consumer preferences for product attributes have changed, and purchasing arrangements between producers and produce buyers have become more complex (Dimitri *et al.*, 2003; Calvin *et al.*, 2001; Kaufman *et al.*, 2000). The following subsections will provide a more in-depth look at each of these elements that have shaped the current fresh produce market. Hypotheses, drawn from this framework, will be developed and tested regarding the potential market for locally grown berry crops in Virginia. In general, it is expected that the market for berry crops produced in Virginia will closely mirror trends in U.S. produce markets.

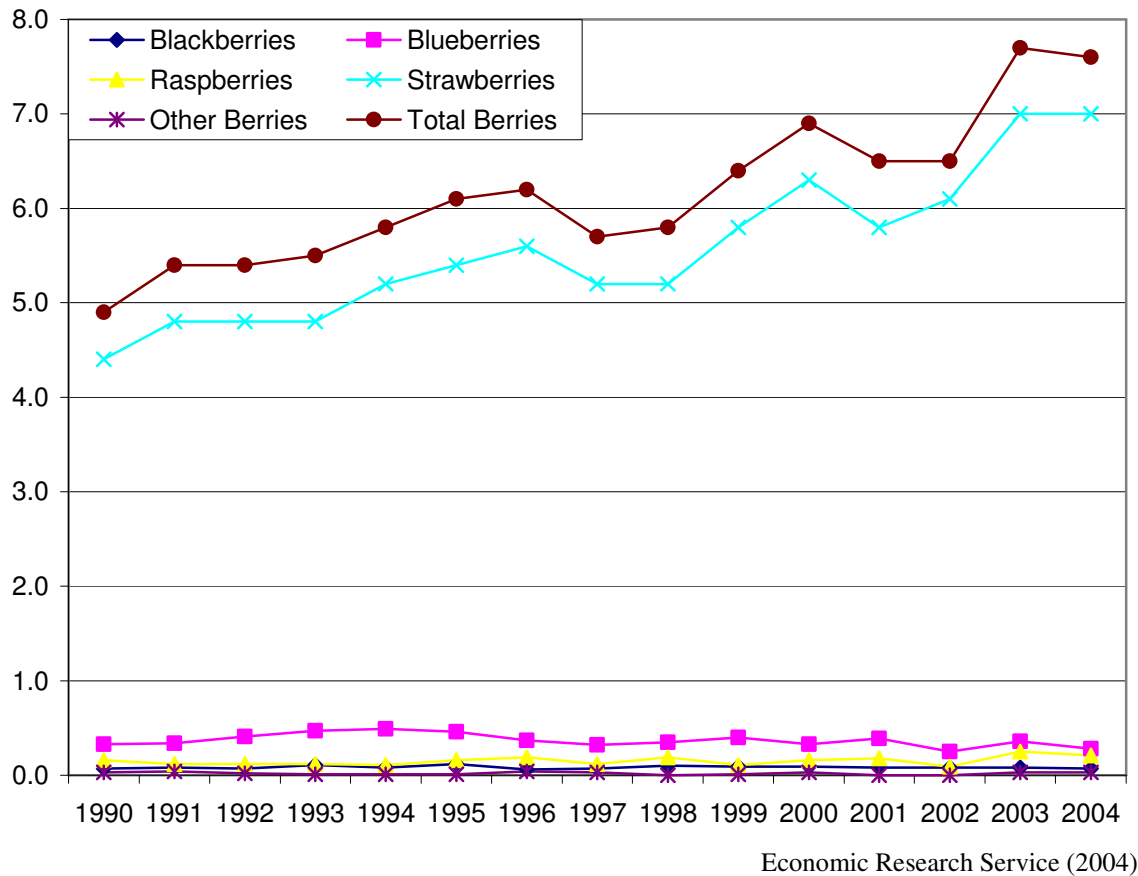
4.3.1 Consumer Demand for Fresh Produce

Americans are consuming more fresh fruits and vegetables. Specifically, per capita consumption of fresh produce increased by 6 percent between 1987 and 1995, and by 8 percent between 1995 and 2000 (Dimitri *et al.*, 2003). Kaufman *et al.* (2000) identify several key factors that have led to this increasing trend. First, U.S. consumers

have become more health conscious in their dietary choices, in response to recommendations from health experts to eat more fruits and vegetables. Secondly, fresh produce has become easier for U.S. consumers to purchase. Namely, U.S. consumers today can access a wider variety of produce items throughout the year via a diverse set of market outlets, including purchases made directly from growers themselves. Lastly, many U.S. consumers are earning higher incomes and are spending more of their disposable money on convenient and higher quality foods such as fresh-cut fruits and vegetables (Kaufman *et al.*, 2000).

While the overall per capita consumption of fresh produce in the U.S. has steadily increased in recent years, the U.S. per capita consumption of berries has grown at an even faster rate. Between 1990 and 2004, per capita berry consumption rose by 55 percent (Figure 4.1). The increasing trend in per capita strawberry consumption, which rose by 59 percent during this same time period, has dominated all other types of berries, which experienced no or little change in consumption between 1990 and 2004 (ERS, 2004).

Figure 4.1 Pounds of Berries Consumed in the U.S. per Capita per Year



Hypothesis 1: Consistent with national trends, demand for berries is growing among consumers in Virginia.

4.3.2 Marketing Chain for Produce and Product Flows

The marketing chain for fresh produce grown in the United States has evolved over the years. Historically, the majority of produce moved from a producer to a wholesaler then on to a retailer, before being sold to the final consumer (Dimitri *et al.*, 2003; Kinsey and Senauer, 1996). Today, more produce is being purchased directly from

growers by retailers and consumers themselves, reducing the volume that passes through intermediary outlets (Calvin *et al.*, 2001).

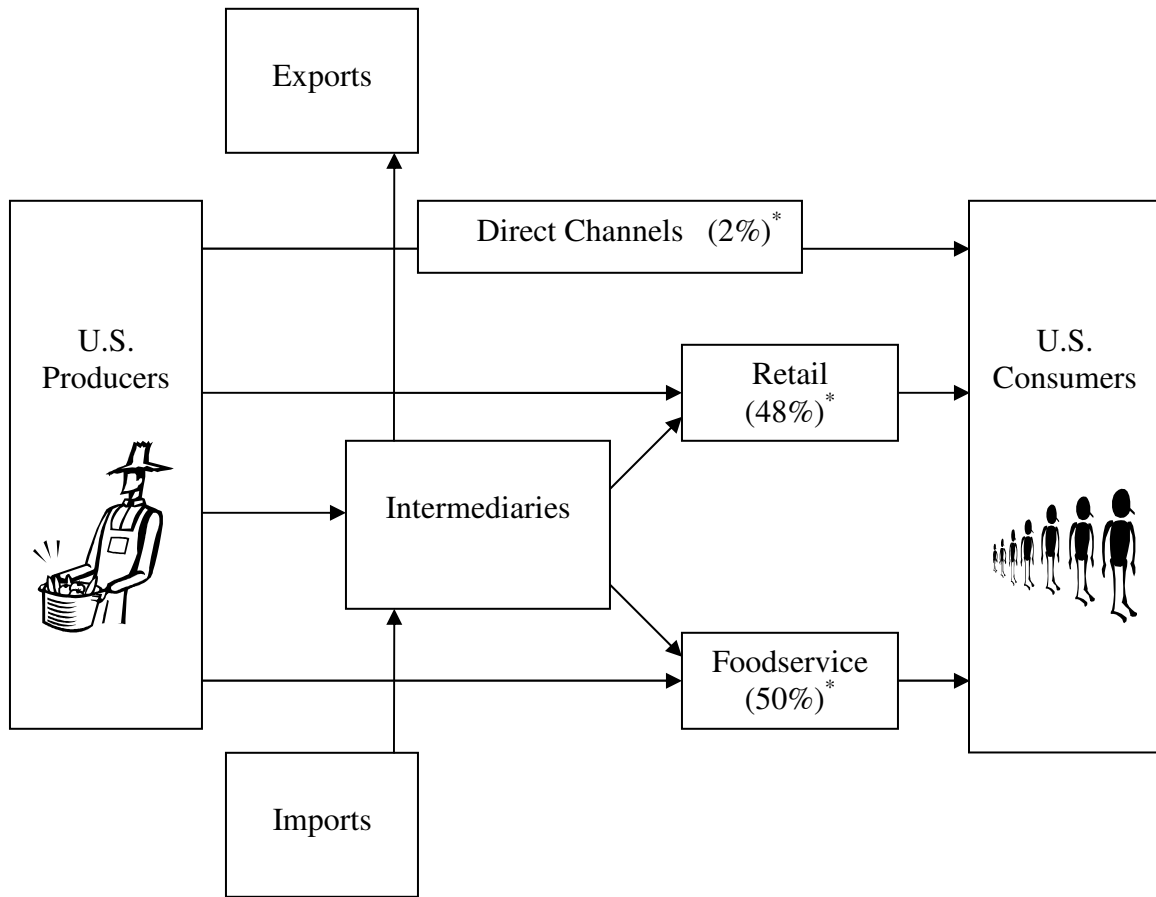
While the majority of consumers purchase fresh produce from supermarket and foodservice outlets, a small portion buy directly from the producers themselves. In 1997, approximately 50 percent of final produce sales in the U.S. were through foodservice outlets, 48 percent came via retail outlets, and the remaining 2 percent occurred through direct market outlets, including pick-your-own operations, farmers' markets, farm stands, and community supported agriculture programs (Dimitri *et al.*, 2003). Although sales through direct channels are difficult to estimate because most transactions are conducted on a cash basis, they are growing and becoming more popular among U.S. consumers (Kaufman *et al.*, 2000).

Figure 4.2 shows a basic flow chart of the current marketing chain for fresh produce. The "Producers" box consists of all U.S. fruit and vegetable growers, ranging from large commercial growers to small-scale farmers. The "Exports" box represents all domestically grown produce that does not reach U.S. consumers because it is sold abroad. Kaufman *et al.* (2000) estimate that approximately \$3.1 billion worth of fruits and vegetables were exported to foreign countries in 1997, which is nearly a three-fold increase relative to the value of fresh produce exported in 1987. While a significant portion of the domestic supply is exported abroad, a larger amount is imported into the system. The "Imports" box depicts all produce sold in the U.S. that was grown abroad. Over a ten year span from 1987 to 1997, the value of produce imported to the U.S. more than doubled to \$4.1 billion (Dimitri *et al.*, 2003). The "Intermediaries" box includes all produce shippers, wholesalers, value-added processors, and brokers who buy and sell

produce on consignment. While the number of wholesale outlets in the market has declined over the last 20 years, those who remain have been able to survive by becoming larger and performing more functions and services required by retail outlets (Kaufman *et al.*, 2000). The “Retail” box accounts for all small independent grocery stores, specialized food stores, including natural and health food stores, large chain supermarkets, such as Kroger, and mass merchandisers, such as Wal-Mart. The retail sector of the food marketing chain is more consolidated now than it has ever been before – from 1996 to 1999, 385 mergers and acquisitions took place among grocery stores in the U.S. (Richards and Patterson, 2003). As a result, fewer larger retailers are responsible for more produce sales than previously¹⁵. The “Foodservice” box represents all full-service restaurants, fast food establishments, and other places where consumption of produce occurs outside of the home. The “Direct Channels” box includes all outlets where consumers can purchase produce directly from the growers themselves. Finally, the “Consumer” box consists of all U.S. consumers of fresh fruits and vegetables. Consumers are the major driving force in the current produce marketing chain. In fact, the entire system has been transformed to quickly respond to consumer demands as effectively as possible (Kinsey and Senauer, 1996).

¹⁵ By the end of 1999, the four largest food retail outlets controlled approximately 27 percent of the market, while the top 20 retailers controlled approximately 52 percent of the nation’s market share (Calvin *et al.*, 2001).

Figure 4.2 Marketing Chain for Fresh Produce in the U.S.



* Percentages represent the amount of fresh produce sales to U.S. consumers through the respective marketing channels in 1997 (Dimitri *et al.*, 2003).

Hypothesis 2: Indirect market outlets represent a more significant (in terms of volume) potential market for berry crops produced in Virginia than direct markets.

4.3.3 Consumer Demand for Produce Attributes

As depicted above, consumers purchase fresh produce from both indirect outlets such as supermarkets and restaurants and from direct outlets such as farmers' markets and pick-your-own operations. When faced with the decision on which market outlet to choose, consumers will select the outlet that maximizes their value. In its simplest form,

value is defined as the ratio of the benefits a consumer receives over the costs he or she incurs in order to achieve these benefits (Blackwell *et al.*, 2001). When a consumer purchases a product, he or she indirectly purchases a bundle of attributes associated with the product (Lancaster, 1966). These attributes, in turn, deliver benefits to the consumer.

In the context of the current produce market structure, different market outlets are in a better position than others to provide specific attributes to consumers. In general, consumers who prefer to buy produce through retail outlets over direct outlets do so for three main reasons: year-round availability, convenience, and variety (Dimitri *et al.*, 2003; Calvin *et al.*, 2001; Kaufman *et al.*, 2000; McLaughlin *et al.*, 1999).

In a survey administered to 100 produce buyers from supermarket chains throughout the U.S., 95 percent indicated that year-round availability of fresh produce is important to consumers in the current market structure (McLaughlin and Perosio, 1994). With the exception of certain products grown in a few states, such as California and Florida, most fresh fruit and vegetable production in the U.S. only occurs seasonally. This makes it difficult for retailers to obtain a year-round supply of domestic produce. As a result, imports have played a greater role in ensuring year-round availability of fresh produce (Dimitri *et al.*, 2003).

Convenience is also important to consumers who shop at retail outlets. Today's typical American is busy and lacks free time to prepare food at home. In response to the need for a reduction in meal preparation time, supermarkets have begun to offer more fresh-cut fruits and vegetables and pre-packaged salads (Kaufman *et al.*, 2000; McLaughlin *et al.*, 1999). Since consumers readily pay more for the convenience found in these ready-to-eat produce items, they have become a major sector of the produce

department in supermarkets (Calvin *et al.*, 2001; Kinsey and Senauer, 1996). Along with reducing the time it takes to prepare a meal at home, consumers who prefer to buy fresh produce at retail outlets cite the accessibility of retail outlets as preferable to those of other outlets such as pick-your-own operations, which are located on producers' farms. Seiders and Tigert (2000) find that consumers who primarily shop at supermarkets are less willing to trade locational convenience for other desirable attributes that may be present in different outlets.

Finally, consumers' preference for produce variety is often more easily satisfied by shopping at retail outlets than any other type of outlet. Over a ten year span, the number of unique produce items carried by the average supermarket in the U.S. nearly doubled from 173 items in 1987 to 335 items in 1997 (Litwak, 1998; Litwak, 1988). Supermarket produce departments have diversified their product offerings over the years for multiple reasons. First, specific ethnic groups, such as Asian-Americans, Hispanics, and African-Americans, which make up a significant portion of the U.S. population, tend to consume a greater variety of produce in their diets than the rest of the population (McLaughlin *et al.*, 1999; Kinsey and Senauer, 1996). Second, specialty produce products have become more popular among U.S. consumers and are commonly replacing traditional items. For example, between 1987 and 1997, the U.S. per capita consumption of romaine lettuce rose, while that of iceberg lettuce fell over the same time span (Kaufman *et al.*, 2000). Additionally, many retail outlets have begun to offer a wide range of organic fresh fruits and vegetables (Guptill and Wilkins, 2002), which further benefits consumers who seek the attribute of variety in their produce selection.

While retail outlets are well positioned to offer a specific set of attributes that are important to some consumers, many other consumers place a higher value on the attributes supplied by direct market outlets. In general, taste and flavor, freshness, market atmosphere, and support of local agriculture are all important attributes to consumers who buy produce through direct outlets (Thilmany *et al.*, 2006; Lehman *et al.*, 1998; Brooker *et al.*, 1993).

Although consumers can visually inspect and physically touch produce for sale in all types of outlets, they cannot determine its taste until they purchase it. However, in a survey of U.S. consumers, Thilmany *et al.* (2006) found that the average consumer rates taste and flavor above all other attributes when deciding the outlet through which to obtain produce. Unlike most retail outlets, many direct outlets are in a position to provide samples for their customers to taste. Along with their desire to obtain flavorful products, consumers who prefer to obtain produce directly from growers do so because freshness is an important attribute to them. In a survey of consumers in California, Wolf (1997) concluded that the majority of the respondents who purchase produce at farmers' markets rather than supermarkets do so because they prefer produce that looks fresh and is of high quality. Similarly, in a survey of consumers in Ohio, Darby *et al.* (2006) determined that freshness was the most important attribute (cited by 89 percent of direct market respondents) influencing consumers to purchase locally grown food.

Along with attributes obtained from consuming the products, consumers who purchase produce through direct outlets also desire attributes related to the experience of obtaining the products. For example, in a survey of residents in Delaware, Ladzinski and Toensmeyer (1983) found 28 percent of consumers choose to buy produce specifically

through pick-your-own operations, because they are set in a pleasing rural atmosphere. Many other direct outlets such as farm stands are also located on or near a farm, offering a similar aesthetic appeal that can be desirable to direct market consumers. Attributes related to experience are also prevalent in many off farm direct outlets such as farmers' markets. Specifically, these types of direct outlets provide a social context that allows consumers to feel a sense of connection with farmers and other shoppers during their shopping experiences (Hinrich, 2000).

Lastly, many consumers who purchase produce through direct outlets do so to obtain locally grown products and to support local farmers. In a survey of consumers in Delaware, Gallons *et al.* (1997) found that 81 percent of consumers purchase produce through direct outlets because they believe the consumption of locally grown products is very important or somewhat important. Additionally, over half of the respondents in this same sample indicated they buy produce directly from growers because they believe helping local farmers is very important or somewhat important (Gallons *et al.*, 1997).

Hypothesis 3: The potential for berry crop producers in Virginia to meet consumers' demand for specific attributes differs by type of market outlet.

4.3.4 Demand for Berry Crop Products

As presented in Section 4.3.1 and Figure 4.1, U.S. per capita consumption of berries as a whole has steadily increased in recent years (ERS, 2004). In 2004, 7 pounds of strawberries were consumed per capita, which accounted for approximately 92 percent of all berry consumption in the U.S. Blueberries were the next most frequently consumed type of berry at 0.28 pounds per capita, representing only 4 percent of total berry

consumption. Not far behind blueberries were raspberries, which were consumed at a rate of 0.16 pounds per capita, accounting for 3 percent of all berry consumption. Blackberries and other berries represented the remaining 1 percent of total berry consumption, and were consumed at a rate of 0.07 pounds per capita and 0.03 pounds per capita, respectively (ERS, 2004).

Compared to other fruits and vegetables, berry crops are highly perishable. As a result, berries need to reach consumers quickly once they are harvested, which can present a challenge to growers and indirect buyers. In the U.S., the majority of berry crop production is concentrated in relatively few geographic locations. For example, strawberries are most prevalently produced in the southern and costal areas of California, where they can be grown for 11 months out of the year (Boriss *et al.*, 2006). When taken together, perishability, geographic concentration of production, and seasonality of production all play an important role in determining the demand for berry crops among different market outlets.

While it is evident that berries are being consumed at a significantly higher rate than before, there is no relevant information available on the volume of each type of berry product that passes through each type of marketing outlet. Several extension publications, however, do indicate that direct market outlets, especially pick-your-own operations, can be ideal for selling berry products to consumers (see for example Bratsch and Pattison, 2006; Ernst and Woods, 2005; Demchak *et al.*, 2000; and Funt *et al.*, 1999).

Hypothesis 4: Potential demand for different types of berry crops grown in Virginia differs depending on the market outlet they are sold through.

4.3.5 Produce Supplier-Buyer Sales Arrangements

Along with consumer preferences, procurement practices have shaped the current structure of produce markets particularly for indirect outlets. Namely, transactions that occur between produce growers and buyers along an indirect marketing channel may be subject to a diverse set of written or verbal provisions. While daily sales between indirect buyers and produce growers are important, and are still used to ensure fresh products are always available for consumers to purchase, the use of formal contracts is becoming more common in the produce industry to ensure an ongoing supply for buyers and a guaranteed market for producers (Calvin *et al.*, 2001).

Contracts, as opposed to daily spot market transactions, are important to both produce growers and indirect buyers because they introduce predictability into an uncertain market and allow the participants to share risk (Hueth *et al.*, 1999). Once a contractual agreement is made between a produce grower and a buyer, the grower can make production decisions based on specific purchase expectations, and the buyer can promote and plan their future supply of produce with greater confidence. Additionally, the agreement protects the grower from fluctuating prices on the spot market, and thus reduces his or her price risk.

Although many contracts between produce growers and buyers are informal unwritten agreements, they are often based on a complex set of terms and conditions. These stipulations, which growers are required to adhere to before they can engage in a sales arrangement with an indirect buyer, will be discussed in the following section.

Hypothesis 5: Relationships between berry crop producers in Virginia and indirect buyers differ by type of market outlet with consequences for the attractiveness and potential longevity of sales arrangements.

4.3.6 Produce Market Entry Requirements

Direct and indirect market outlets differ significantly in their entry requirements. In order to enter into a sales agreement with indirect produce buyers, growers must be able to meet several entry requirements. Besides price and quantity specifications, produce contracts frequently include stipulations regarding quality characteristics, payments of fees such as promotional allowances and slotting fees, and requests for services such as third-party food safety certification, grading, packaging, and labeling (Calvin *et al.*, 2001). Indirect buyers typically cite the increasing cost of conducting business as their justification for requiring produce suppliers to pay certain fees and perform specific services (Dimitri *et al.*, 2003).

Promotional allowances are fees producers pay to buyers to help cover the cost of advertising their products to consumers or other indirect channel members. Like promotional allowances, slotting fees may also be part of a contracted sales arrangement between produce suppliers and retail buyers. Slotting fees are payments issued to retailers by producers or other indirect channel members to guarantee shelf space for their products. In a survey of retail buyers, Calvin *et al.* (2001) found that 62 percent of retailers require their produce suppliers to pay promotional allowances, while 24 percent demand slotting fees from their suppliers.

Along with fees, indirect buyers often ask their suppliers to perform various services as part of the contractual agreements. One commonly specified service requested from growers is third-party food safety certification. Here, buyers require producers to provide proof from an independent entity that their products meet specific food safety standards. In addition to complying with food safety certification, indirect buyers may also have strict regulations for their suppliers regarding the standards they must follow in packaging and labeling their produce. A survey of retail buyers revealed that 80 percent of retailers require their produce suppliers to show proof of third-party food safety certification, 65 percent ask their growers to properly package their produce, and 48 percent specify labeling requirements for their suppliers (Calvin *et al.*, 2001). While required fees and services increase producers' costs, they are also potentially beneficial to producers, because they facilitate product movement through the marketing chain and provide them with a competitive advantage (Calvin *et al.*, 2001).

Hypothesis 6: Entry requirements such as minimum volumes, quality stipulations, fees, and services differ among market outlets with consequences for the potential for berry crop producers in Virginia to serve them.

4.4 Results

4.4.1 Consumer Demand for Berries

There is clear evidence from the interviews conducted with supermarket buyers and direct marketing berry crop producers in Virginia to support the first hypothesis that there is an increasing trend in berry consumption in the state. Interviewees unanimously asserted that demand for berries is strong and has consistently grown over the years,

similar to the nation-wide trend in demand. Buyers from retail outlets also affirmed that the local demand for berries is constant throughout the year, although farmers in Virginia can only supply berries seasonally.

Of the retail buyers interviewed, berry sales account for between 6 percent and 10 percent of all produce sales in their supermarket chains. For large national chains, this amounts to millions of dollars annually in sales of berries alone. When considering individual berry products, strawberries are the most commonly purchased berry, representing between 70 percent and 85 percent of total berry sales in terms of volume. One buyer who purchases for approximately 100 regionally-based stores indicated that in recent years consumers have purchased up to 20,000 cases of strawberries (equivalent to eight semi-truck loads) during a one week period. Blueberries are the second most frequently purchased berry from retail outlets, accounting for between 10 percent and 18 percent of total berry sales in terms of volume. Two of the three retail buyers suggested that consumer demand for blueberries, relative to all other berry products, has grown the fastest in recent years. Blackberries and raspberries are the least frequently purchased berries, each representing less than 10 percent of total berry sales in terms of volume in supermarkets. Table 4.1 provides a summary of berry sales information by supermarket buyer type.

Sales of berries through local direct marketing outlets have also been on the rise. In 2006, one large-scale grower in the state earned approximately \$300,000 in gross revenue from berry crop sales at farmers' markets in Virginia and approximately \$600,000 in gross revenue from on-site berry crop sales, including a pick-your-own operation. A smaller-scale berry crop grower stated that his blueberries are generally

sold out within two hours at the farmers’ markets where he sells. Additionally, of the six producers interviewed who sell berries directly to consumers, four indicated that they are planning on expanding their berry crop acreage for the upcoming season to better accommodate the increasing trend of berry consumption in the state.

Table 4.1 Berry Sales among Supermarkets in Virginia

	Large National Chain	Medium Regional Chain	Small Local Chain
Total Berry Sales (% of total produce sales)	10	7	6
Strawberry Sales (% of total berry sales)	70	85	80
Blueberry Sales (% of total berry sales)	18	10	10
Raspberry Sales (% of total berry sales)	8	4	5
Blackberry Sales (% of total berry sales)	4	1	5

Sales of other berries, such as gooseberries, account for less than 1 percent of total berry sales in terms of volume in all cases

4.4.2 Marketing Chain for Berries and Product Flows

Evidence from interviewees supports the second hypothesis that a greater volume of locally grown berries flow through indirect outlets as opposed to direct outlets, however, a strong demand still exists through direct outlets. The overall flow of locally grown berry products can be explained by the entry requirements among indirect buyers and the current structure of berry crop producers in the state. While some entry requirements among indirect buyers are introduced below, they will be explained in more detail in Section 4.4.6.

With the exception of wholesale buyers, all indirect buyers interviewed have minimum volume and delivery frequency requirements in place. Additionally, the

majority of indirect buyers require their suppliers to pay fees and perform services, which often come at a high cost. Thus, in order to serve indirect outlets, berry crop growers must be in a position to produce a substantial volume and be able to incur higher production and marketing costs than they would incur if they sold their output through direct outlets. This makes it difficult for small and medium-scale producers to serve indirect outlets. Although many small and medium-sized berry crop producers cannot meet the entry requirements set forth by indirect outlets, many large-scale berry crop producers can. Of the seven producers interviewed, the top three in terms of berry crop production acreage (all produce 10 or more acres annually) sell all or a significant portion of their output to indirect outlets. As a result, it is likely that the volume of locally grown berries flowing through indirect outlets during the growing season is much larger and more significant than that passing through direct outlets.

As seen in the previous two chapters, Virginia is composed of many berry crop producers who are small and heavily dependent on income from sales made through direct outlets. Additionally, of the seven producers interviewed, the bottom three in terms of berry crop production acreage (all produce less than two acres annually) sell all or a significant portion of their output through direct outlets. This in turn provides further evidence that only a small volume of berries flows through direct outlets in Virginia each year.

Although a smaller percentage of locally grown berries flow through direct outlets, these markets are not saturated. As depicted in the previous section, the majority of direct marketers interviewed plan to expand their acreage in order to capture more of the demand for berry products that exists through these outlets. The notion that the demand

for locally grown berries is strong through direct outlets can further be supported by the profitability of producers who use direct outlets to sell their output. Of the four berry crop producers interviewed who sell their products through both direct and indirect outlets, three indicated that they receive a greater percentage of their overall profits from berry crop production via direct sales. Therefore, these unsaturated outlets present a significant demand that can be met by local berry crop producers, despite the fact that only a relatively small volume of locally grown berries passes through them each year.

4.4.3 Consumer Demand for Berry Product Attributes

The third hypothesis that the potential for berry crop producers in Virginia to meet consumers' demand for specific attributes differs by market outlet type is supported with the information gathered from the interviews with retail buyers and local producers. Specifically, the majority of the direct marketers indicated that obtaining fresh products, interacting with others present at the outlet, and experiencing a rural setting are important attributes to the customer base they serve. On the other hand, all three retail buyers who represent grocery chains of various sizes confirmed that the customers who shop at their stores desire year-round availability, convenience, and variety.

In addition to the attributes mentioned above, many consumers prefer to purchase berries that are locally grown. While two retail buyers indicated they are committed to obtaining produce from local producers, because there is a growing interest in locally grown products among the customers they serve, all six direct market producers cited locally grown products as an important attribute for their consumers. In fact, one small-scale berry crop producer referred to his entire customer base as "locavores," which he

defined as people who avidly support local agricultural production through their food purchases. Multiple direct marketers also indicated that their consumers generally associate locally grown berries with several other attributes, including quality, flavor, freshness, and a way to support local farmers.

The desire for a unique shopping experience is also generally more important to those who purchase berries through direct outlets. More than half of the interviewed producers mentioned their direct market customers desire the remote setting and the social aspect of purchasing products through direct outlets. Each of the four producers who sell a share of their berry crops through a pick-your-own operation indicated that large groups of people, including parents with the children, community organizations, and student groups, frequently visit their farms to purchase berries and enjoy fellowship with one another in a rural environment.

Customers who visit pick-your-own operations and other direct market outlets also value meeting the actual farmers who grow the food they consume. Unlike indirect outlets, where the producers usually remain anonymous to the final consumers, direct outlets allow consumers to interact and feel a sense of connection with the producers. One producer said direct markets are optimal to sell berries through, because growers have the opportunity to explain the methods they used in production and the characteristics of their products to the customers. Not only is this interaction valuable to consumers, it is also instrumental for growers because it gives them an opportunity to build lasting relationships with their customer, which can lead to positive word of mouth advertising and future sales.

Two direct market producers also mentioned that many consumers buy berries through their direct outlets because they demand flexibility in the volume they purchase, which can be classified as a search attribute. While consumers can only purchase berries in standard-sized cases at supermarkets, they have the ability to obtain various quantities, from small pints that are ready-to-be-consumed to bulk containers that can be used to be processed into jams and jellies, through direct outlets.

Although direct outlets are in a better position to serve customers who demand flexibility in the quantity of berries they purchase, retail outlets are better positioned to provide a variety of berry products that can be conveniently obtained throughout the year. Unlike local producers, large-scale growers located in California, Florida, and countries abroad can supply berries to Virginia throughout the year. While non-local berry crops can be obtained at a significantly high cost, all three supermarket buyers indicated that they are willing to purchase available berries from all possible sources to satisfy their customers' desire for year-round availability and convenience.

Along with their ability to produce year-round, major suppliers have the means to invest in research and development, which has not only led to efficiency gains in production, but has also improved their ability to produce more uniform products. One buyer representing a large national chain explained the need for customers to be able to purchase berries from multiple stores within the grocery chain with an identical taste and quality. Since the majority of the interviewed local berry crop growers who sell to indirect outlets operate large-scale berry farms, they are in a better position than direct marketers to meet the demand for products that are consistent in quality, grade, taste, and flavor.

4.4.4 Demand for Berry Crop Products

Demand for specific berry products differed significantly depending on the type of market outlet, lending support for the fourth hypothesis. In general, retail buyers are willing to purchase all types of locally grown berry crops during the growing season, wholesale buyers prefer to buy blueberries, and wineries desire to purchase only the specific berry crops they need to bottle their current mix of wine products.

Although strawberries are by far the most frequently purchased berry product among consumers who shop at retail outlets, retail buyers showed varying degrees of interest in purchasing local berries of all types from growers during the season. Along with meeting their consumers' demand for locally grown products, a local supply of berries is desirable among retail buyers, because it reduces the high cost of transportation they have to pay for an out-of-state supply. In order to meet the rapidly growing demand for blueberries, two supermarket buyers indicated they are interested in buying as many locally grown blueberries as possible. One buyer from a large national chain also suggested that he is willing to purchase a local supply of other berry products, including golden raspberries and gooseberries to fulfill niche demand. While the majority of consumers do not purchase these products, retail outlets are still interested in providing them seasonally to meet their customers' need for variety and novel products. Outside of purchasing conventional berry products, a small but significant percentage of consumers seek organic berries from retail outlets. Two retail buyers indicated their interest in obtaining certified organic berries of all types from growers in the state.

As mentioned previously, berries are highly perishable and they need to move quickly to consumers once harvested. For intermediary buyers, such as wholesalers who

must accumulate volume before they can resell it to their clients, this limits the feasibility of purchasing specific berry crops locally. Relative to all other berries, blueberries are the least perishable because they have the thickest skin, and thus, the best holding capacity. As a result, blueberries are the most ideal berry product to be sold through wholesale outlets. In fact, two wholesale buyers indicated they would buy any quantity of blueberries from local producers as long as the suppliers honor their volume commitments and the output meets the agreed upon quality expectations.

Lastly, buyers from processing outlets, wineries in particular, are interested in purchasing the specific berries they use as inputs. Of the four winery owners interviewed, two bottle a variety of wines made with an array of berries, and the other two each produce a single specialty wine, one made with blackberries and the other with raspberries. While all of these winery owners grow a portion of the berries they use to make these fruit wines, they are all dependent on other berry crop growers to obtain the volume of berries they need to bottle wine throughout the year.

Local winery owners who only have the ability to produce a portion of their inputs on the land they own have an additional reason to purchase the remainder of their berry crop inputs from local growers in Virginia. In order to qualify for a farm winery license, which is relatively inexpensive compared to a standard winery license, producers are not allowed to purchase more than 25 percent of the total products they use to make wine from outside of the Commonwealth of Virginia (LIS, 2000). Three out of the four of the winery owners interviewed purchase their berry crop inputs from local growers as a means to qualify for a farm winery license.

4.4.5 Berry Crop Supplier-Buyer Sales Arrangements

The results from the interviews with buyers from indirect outlets disprove the fifth hypothesis that relationships between local growers and indirect buyers differ by outlet type. As opposed to formal written agreements that are standard among major berry crop suppliers and indirect buyers, the majority of transactions that take place between berry crop producers in Virginia and retail, wholesale, or processor buyers are made through verbal contracts based on trust. The stipulations of these sales arrangements, which will be discussed in more detail in the subsequent section, vary by the type of indirect outlet and among outlets within each category.

Regardless of the indirect outlet type, the majority of buyers indicated the importance of building long-term relationships with local suppliers in order to ensure a steady supply of berry crop products for several years into the future. Daily communication between the producer and buyer during the growing season is an integral part of all of these purchasing arrangements.

Direct sales arrangements with local berry crop producers during the growing season are beneficial to retail chains of all sizes, because they can be made at significantly lower costs due to shorter transit distances, and they allow highly perishable products to reach the shelves of their stores faster. For these reasons, buyers from local and regionally-based retail chains suggested that they would be willing to pay above-average prices to obtain locally grown berries when they are available. Sales arrangements between retail buyers and local growers generally include stipulations along the lines of minimum volumes, quality expectations, the payment of specific fees, and the performance of specific services. All three retail buyer interviewed insisted that

they desire to build lasting relationships with local producers who have adequate resources to fulfill these requirements.

Purchasing arrangements between local berry crop growers and wholesale buyers are similar to those made between producers and retail buyers, except they generally do not involve a minimum volume stipulation. This is advantageous for small-scale growers whose berry crop acreage is insufficient to serve retail outlets. Like retail buyers, all three wholesale buyers stressed the importance of building ongoing relationships with local berry crop growers who can uphold the stipulations set forth in the sales agreement.

While local berry crop growers and winery owners tend to have similar relationships to those between growers and retail or wholesale buyers, the purchasing arrangements between these parties are generally less stringent. Namely, the majority of winery owners will purchase secondary berries (fruit that is slightly misshaped, but still of high quality) in their fresh or frozen state. By purchasing frozen berries, winery owners can bottle wine year-round. One winery buyer expressed his desire to obtain a sample batch of berries from the local supplier to experiment with making wine with the berries before he commits to a large volume purchase. Additionally, the majority of the processor buyers also indicated that as long as they can obtain a local supply of high quality berry crops, they will be flexible in organizing the sales agreements.

4.4.6 Berry Crop Market Entry Requirements

The sixth hypothesis that entry requirements differ by type of market outlet is supported based on the information obtained from the interviewees. As indicated in the previous section, the purchasing arrangements between local producers and retail and

wholesale buyers generally involve more stringent stipulations, while agreements made between local growers and processor buyers are typically less strict. Overall, purchasing arrangements between local berry crop growers and indirect buyers contain a unique set of terms and conditions, depending on the individual parties involved.

In general, retail buyers require local small producers to adhere to minimum volume and frequency of delivery stipulations in order to maintain a consistent supply of uniform products throughout the chain. For a small chain with 30 stores, for example, this would amount to a total of 200 cases of berries per week made through at least two separate deliveries to a centralized distribution center. This number would grow incrementally as the number of stores in the retail chain increases. Similar to retail buyers, processors typically demand a minimum volume from their berry crop suppliers. For wineries, this volume varies depending on the size of the winery and the number of bottles it produces of wines made with berries. Unlike retail and processor buyers, wholesale buyers generally do not require producers to meet any minimum volume requirements.

Quality specifications are standard among all indirect buyers. Even winery owners who are willing to purchase frozen and secondary berries demand high quality inputs in order to produce flavorful wines. If quality specifications are not upheld, buyers will typically refuse the load at the producer's expense¹⁶. Retail and wholesale buyers generally follow grading standards specified by the United States Department of Agriculture (USDA). One large retail chain uses its own set of standards, which exceed USDA's top (#1) standards.

¹⁶ In generally, most buyers indicated they are willing to work with suppliers if they cannot meet the agreed upon stipulations due to a one-time unforeseeable reason, but multiple breaches of sales arrangements are often grounds to terminate the supplier-buyer relationship.

Delivery of berry products is generally the responsibility of the producer. In some instances, particularly among wholesale and processor outlets, buyers are willing to pick up products from the growers for an additional fee. While some producers may be required to deliver their product directly to the stores of smaller retailers, larger retail chains generally procure their products through a centralized distribution center. Retail chains that have centralized distribution centers have stricter rules regarding delivery, due to the high volume of traffic they tend to have throughout their operating hours. For example, two retail buyers require berry crop suppliers to deliver their products in a temperature¹⁷ and humidity controlled truck that is warehouse dock-compatible.

Besides an optional delivery fee, processor buyers, in particular winery owners, do not require berry crop growers to pay any additional fees in their sales arrangements. One wholesale buyer who sells products on consignment requires her buyers to pay an additional per-unit fee for sorting and packaging. Like most sales arrangements between produce growers and retail buyers in the U.S., the majority of retail buyers require local berry crop producers to pay an additional fee to help cover promotion and advertising expenses. No indirect buyers request slotting fees from their local berry crop suppliers.

The degree to which services are required by indirect buyers varies drastically. Of all the interviewees, a large national retail buyer requires the highest level of services. Specifically, in order for local berry crop producers to sell to this chain, they must subscribe to a specific on-line buying system, hold a minimum of \$3 million worth of product liability insurance¹⁸, package and label their products according to criteria

¹⁷ Berries should remain between 33 degrees Fahrenheit and 36 degrees Fahrenheit throughout the duration of the delivery.

¹⁸ According to an interviewee, a \$3 million product liability insurance policy costs roughly \$150 per month.

specified by the grocery chain, provide proof of third-party food safety certification, and invest in appropriate post-harvest technology, such as pre-cooling storage, which is used to remove the field heat from harvested berries. The local and regionally-based retail chain buyers are not as strict in their service requirements for berry crop growers. While these buyers require proper packaging, labeling, and post-harvest technology, they require less along the lines of product liability insurance and food safety certifications, and neither buyer requires its growers to subscribe to an on-line buying system. Like the local and regionally-based retail chain buyers, the majority of wholesale buyers require berry crop growers to hold a product liability insurance policy, typically worth \$1 million. In order to minimize the risk of a food safety incident, two wholesale buyers hold their growers responsible for maintaining traceability records and Good Agricultural Practices¹⁹. In general, winery owners do not require any services other than specifying how they would like berry crop growers to package their output.

4.5 Discussion and Conclusions

Local consumers drive both direct and indirect purchases of berry crops in Virginia. Similar to the nation-wide demand for berries, consumers in Virginia are also purchasing more berries. While the majority of local consumers purchase berries at supermarkets, a significant percentage of berry sales occur through direct market outlets during the growing season. Local consumers purchase berries directly from the growers because they desire interacting with others in the marketplace, experiencing a rural ambiance, and obtaining freshly harvested products in various quantities.

¹⁹ Good Agricultural Practices are a standard set of principles that address environmental, economic, and social sustainability for on-farm processes that result in safe and quality food products (FAO, 2003).

Given these attributes, pick-your-own operations, farmers' markets, and farm stands are all attractive market outlets for local berry crop producers to sell their products through. In fact, both small and large-scale producers have been able to profitably sell berries through each of these outlets. Furthermore, the requirements to sell berries directly to consumers are less stringent than those that are in place to sell to various indirect outlets. In general, the demand for locally grown berries sold through direct outlets is strong among consumers in Virginia.

While consumers can only purchase locally grown berries through direct outlets during the growing season, they can obtain them throughout the entire year from retail outlets. Along with year-round availability, consumers prefer purchasing berries from retail outlets, because they can conveniently obtain a diverse selection of products, including traditional, organic, and novelty berries such as golden raspberries. As a result of this steady demand for berries among consumers in Virginia, several types of indirect buyers are also in the market for locally grown berry crops. Namely, indirect buyers prefer to buy locally produced berries during the growing season because they can be obtained in less time and at a lower cost than fruit transported in from other regions.

Retail outlets have relatively strict requirements in place for local berry crop producers to adhere to. These terms and conditions usually require growers to produce a minimum volume, follow packaging and labeling standards, purchase product liability insurance, obtain a third-party food safety certification, pay a promotional allowance, and implement specified technology to be used after harvest and during delivery. For large-scale berry crop producers in Virginia who have the resources to satisfy these requirements, retail outlets provide an attractive opportunity. Similar to other indirect

outlets, the majority of sales arrangements between local berry crop producers and retail buyers are verbal and recur on a continual basis throughout the growing season. In the long run, retail buyers as well as most other indirect buyers are seeking ongoing relationships with local growers to ensure a constant supply of berry crops during future growing seasons.

Many wholesale buyers are also interested in purchasing locally grown berry crops. Wholesale outlets generally require producers to meet a specific set of terms and conditions before they will purchase their products. Local berry crop producers who sell to wholesale outlets are typically required to meet quality stipulations, purchase product liability insurance, and implement traceability measures and good agricultural practices, in order to ensure the safety of their output. Minimum volume stipulations are rarely required by wholesale buyers, making them an attractive option for berry crop producers of all sizes. Arrangements between local berry crop growers and wholesale buyers are mostly made verbally on a continual basis throughout the growing season.

Local wineries represent one particular processing outlet that is interested in purchasing locally grown berry crops. Buyers from wineries in Virginia who use berries as an input in their wine production are inclined to purchase locally grown berries to be in compliance with the Alcoholic Beverage Control Act, which states that farm winery license holders must use inputs grown in Virginia for at least of 75 percent of their total production. Compared to other indirect outlets, wineries have the fewest requirements in place for producers to follow. Unlike other outlets, wineries are willing to purchase frozen and secondary fruits. Sales agreements between winery owners and local berry crop growers are typically informal and conducted on an “as needed” basis. Table 4.2

provides a general summary of each type of outlet regarding product flows, attributes desired, products demanded, sales arrangements, and entry requirements.

Table 4.2 Summary of Results by Outlet Type

	Direct Outlets	Retail Outlets	Wholesale Outlets	Processor Outlets
Product Flows to Consumers	Low Volume	High Volume		
Attributes Desired by Consumers	Freshness Taste/Flavor Locally Grown Rural Experience Social Interaction Support Farmers Flexible Volume	Year-Round Convenience Variety Uniformity		
Products Demanded	All	Strawberries Blueberries Other Berries	Blueberries	All (outlet specific)
Sales Arrangements		Ongoing Verbal Contracts	Ongoing Verbal Contracts	Ongoing Verbal Contracts
Entry Requirements		Minimum Volume Quality Delivery Promotional Fee Insurance Package/Label Food Safety	Quality Delivery Insurance Food Safety	Minimum Volume Quality Delivery

Chapter 5:

The Market for Berry Crops in Virginia: A SWOT Analysis

5.1 Introduction

This chapter synthesizes the results from the previous three chapters to examine specific opportunities for farmers in Virginia to diversify into berry crop production. In order to do this, a SWOT analysis will be conducted. This type of analysis investigates the strengths and weaknesses a market faces in its internal environment and the opportunities and threats that exist in the external environment. The information presented in this analysis will be particularly beneficial to farmers in Virginia who are in need of viable alternatives to land-intensive commodity production.

The overall objective of this chapter is to identify the most favorable berry products to produce and the most promising market outlets to sell them through. Potential entry strategies for local farmers transitioning into berry crop production will also be identified and discussed.

5.2 Methods and Data

Analysis of strengths, weaknesses, opportunities, and threats, also known as SWOT analysis, is one of the most commonly used tools for evaluating a single business or an entire market (Piercy and Giles, 1989). This type of analysis is designed to examine and understand two interrelated components of a market and its participants. The first component is the internal environment, which consists of everything that can be controlled by the participants in the market. Within the internal environment, areas of strengths to exploit and weaknesses to overcome are identified (Westwood, 2006). The

second component of a SWOT analysis is the external environment, which consists of everything that affects the market, but cannot be controlled by its participants. Here, areas of opportunities to grasp and threats to defend against are identified (Westwood, 2006). When put together, these two components provide a detailed portrayal of a market and its participants, which creates a solid foundation for evaluation and decision making.

Akca *et al.* (2006), who use SWOT analysis to examine the fishery sector in Turkey, define the technique as a systematic approach to explore both the current constraints and the future possibilities of a market. Other examples of SWOT analysis applications in the agricultural economics discipline include Ricks and Woods (1995) who investigate the market for apples in Michigan; Faesel and Hill (1995) who evaluate the fruit industry in Poland; and Mollenhorst and de Boer (2004) who assess egg production in the Netherlands.

For the purpose of this thesis, a SWOT analysis will be used to evaluate the market for berry crops in Virginia and its participants. The external analysis will center on the current and potential market for berry crops in the state, and the internal analysis will focus on the strengths and weaknesses of growers located in various regions in Virginia. Most of the information used for the SWOT analysis will come directly from the results of Chapter 2 and Chapter 3, which examine the current supply of berry crops in Virginia, and Chapter 4, which investigates the current demand for locally grown berry crops. Expert opinions from current berry crop producers and cooperative extension specialists will also be presented in this part of the analysis. Once the SWOT analysis is complete, a series of strategic recommendations and potential action strategies will be identified for different types of producers who are considering establishing a berry crop

enterprise. The strategic initiatives and actions strategies will ultimately draw together the supply-side results and the demand-side results to assess the potential for farmers in Virginia to successfully participate in berry crop markets.

5.3 Results

5.3.1 External Analysis

5.3.1.1 Opportunities

Like consumers across the nation, Virginians are increasing their consumption of berries. Strong demand for locally grown berries exists among many consumers who purchase products directly from producers and some who shop at retail outlets. Consumers who purchase berries through direct outlets value numerous attributes, including taste, freshness, the experience of being in a rural setting, the ability to contribute to the livelihoods of local farmers, the social aspects of the market, and the ability to obtain products in various volumes. Different attributes, including convenience, consistency in quality, and variety in products and production methods, are important to consumers who purchase berries through retail outlets.

As a result, opportunities exist for berry crop producers in Virginia who can provide attributes sought in either direct or indirect outlets. Direct outlets are particularly attractive for small and medium-scale producers near population centers. One direct market producer who sells berries through a pick-your-own operation²⁰ estimated a population of approximately 10,000 people is necessary to profitably run this type of

²⁰ U-Pick operations are also attractive to producers because they require less labor to manage, since consumers harvest their own products. For example, as little as 20 hours of labor per acre are required to maintain a U-Pick blueberry operation, compared to 320 hours per acre for an operation that sells blueberries through an alternative outlet (KCES, 2006b)

enterprise. Along with being close to a population center, successful direct market berry crop producers are often personable and enjoy interacting with the public. Evidence from current berry crop producers in the state suggests that direct market berry crop outlets in Virginia are not saturated and that consumers are interested in purchasing all types of locally grown berries through these outlets. Additionally, direct market producers generally receive a higher price for their output than those who sell to indirect buyers. Thus, a myriad of opportunities exist for berry crop growers to successfully serve direct outlets.

Other opportunities exist for local berry crop growers to serve indirect outlets. In order to ensure a continual supply of the berry products they will need in the future, buyers from retail, wholesale, and processor outlets are interested in developing long term professional relationships with local berry crop growers. Compared to different types of indirect buyers, retail buyers generally pay their suppliers the highest price for their output, followed by wholesale and processor buyers, respectively.

Retail outlets are interested in purchasing large volumes of berry crops from local growers to distribute among multiple stores within the same chain. This is attractive to large-scale producers, because they can move large quantities of their output in relatively few transactions to centralized distribution centers that deliver to the stores within their chains. Buyers from retail outlets are particularly interested in purchasing locally grown strawberries, blueberries, and other novelty berries such as golden raspberries.

Unlike retail outlets, wholesale outlets do not require producers to supply a minimum volume, making them an attractive option for small and medium-scale berry

crop producers to serve. Buyers from wholesale outlets are interested in purchasing locally grown blueberries in particular.

Lastly, opportunities exist for local berry crop producers to serve processing outlets. Local wineries, in particular, are an attractive option for medium and large-scale berry crop producers because they typically have the least stringent entry requirements for their suppliers to follow, relative to other indirect outlets. They are also a good outlet for secondary berries, which do not meet other outlets' quality requirements, and frozen berries. By freezing surplus berries, producers can create a time advantage in marketing and selling their products, which are highly perishable in their fresh-state. Buyers from processing outlets expressed interest in purchasing all types of locally grown berries, specific to the inputs each outlet uses for its production.

5.3.1.2 Threats

While opportunities exist for growers of all sizes in Virginia to successfully sell berries through different market outlets, specific threats are also present, prohibiting some producers from serving certain market outlets. For example, small-scale producers often lack the resources needed to meet retail outlets' stringent entry requirements such as minimum volume stipulations, fees, and services. On the other hand, large-scale producers may not be suited to serve direct markets, because to be profitable they need to be able to move large volumes of output in relatively few transactions.

The perishability of berries is another threat that limits product flows through both direct and indirect outlets. Since berries are highly perishable, they need to be moved

quickly to consumers once harvested²¹. Wholesale buyers who work to accumulate and resell large volumes of berries are generally only willing to purchase blueberries from local growers, because they are the least perishable berry crop, unless they can purchase enough volume of other more perishable berries, such as raspberries and blackberries, from multiple growers on a consistent basis. Perishability is also an issue for direct market berry crop producers who move their products through numerous individual transactions, because they have to predict the total volume they will be able to sell before each harvest. While perishability can be completely avoided by selling berries through pick-your-own operations, a significant amount of ripe berries generally remain unharvested and go to waste, since customers provide the majority of the labor.

There is a high level of risk involved in berry crop production in Virginia. In particular, the variable weather in Virginia can threaten berry crop production. While specific varieties of all types of berry crops can be grown in Virginia, extremely hot temperatures can scald berries and extremely cold temperatures can freeze them. Diversification in the mix of berries produced can help reduce this risk of losing all or a significant portion of a berry crop due to weather variability. In fact, the majority of berry crop producers in Virginia (51 percent) grow more than one type of berry.

Competition from major berry producers located out-of-state and abroad provides a threat to local berry crop growers who are positioned to sell their products to indirect outlets. Unlike local producers, many major berry producers can grow berries year-round. In contrast, Virginia's strawberry season generally lasts for about three to five weeks beginning in late-April, the blueberry season stretches from mid-June to the first

²¹ Timing is also important in harvesting berries. Berries harvested even a few days before or a few days after they ripen will be of lesser quality.

frost, and the bramble berry season runs from early-June to late-September, depending on the varieties planted and the production technologies used. Additionally, due to economies of size, major berry producers are more efficient in production and can sell their output at a comparatively lower cost than local growers. Unlike indirect outlets, little competition exists within direct market berry crop outlets in the state, and the demand for berries sold directly to consumers remains unsaturated in its current state.

5.3.2 Internal Analysis

5.3.2.1 Strengths

While berry crops have not traditionally been produced in Virginia, the agricultural sector in the state is strong. In 2002, there were 47,606 farms located in the state, covering a total of approximately 8.6 million acres (NASS, 2004). Together, these farms generated approximately \$2.4 billion in cash receipts from all agricultural products sold during the same year (NASS, 2004). This solid foundation in production agriculture is valuable for producers in Virginia who are considering transition into berry crop production.

Besides their own backgrounds in agriculture, transitioning producers in Virginia have access to a wealth of additional knowledge about berry crop production methods and marketing strategies through local cooperative extension personnel. Specifically, more than half of the berry crop producers interviewed stated that they regularly seek advice about producing and marketing berry crops from their local extension agents.

Upfront financial capital is critical for producers interested in transitioning into berry crop production. Former tobacco quota owners and producers in Virginia (mostly

all of whom are located in counties within Southwest and Southside Virginia) have access to financial capital, in the form of annual Tobacco Buyout payments. These settlement payments, which total \$667 million over ten years for producers in the state (Tiller *et al.*, 2005), can help alleviate some of the high investment costs associated with transitioning into berry crop production.

Since berry crops are not land-intensive, many producers who are considering diversification into berry crop production from conventional commodity production will not have to invest in land. This is advantageous for producers because urban pressure in certain regions of the state, such as Northern Virginia and along the coast, has caused land to become less affordable and less available. Besides land, many transitioning producers may have already made investments in some of the necessary equipment needed to produce berries, such as irrigation pumps and sprayers, which can significantly lower startup costs.

Once producers are able to become established and pay off any startup debts, berry crop production can be highly profitable²². For example, although berry plants are expensive to purchase initially, they can produce marketable fruit for multiple seasons²³ if properly managed. These long run cash flows are advantageous for producers who are interested in expanding or reinvesting in berry crop production.

²² Profitability varies significantly from operation to operation, depending on several factors including region, berry crop mix, and sales outlet mix. For example, sample budgets published by Penn State Cooperative Extension suggest a one acre operation that produces 6,000 pounds of highbush blueberries will receive an average profit of \$4,100 (Demchak *et al.*, 2001), a one acre operation that produces 3,500 pounds of bramble berries will receive an average profit of \$4,900 (Demchak *et al.*, 2005), and a one acre operation that produces 8,000 pounds of strawberries will receive an average profit of \$5,800 (Demchak *et al.*, 2000).

²³ In general, blueberry plants can remain productive up to 40 years (KCES, 2006b), bramble berry plants can remain productive up to 12 years (KCES, 2006a; KCES, 2006c), and matted-row strawberry plants can remain productive up to 3 years (KCES, 2006d).

5.3.2.2 Weaknesses

A lack of experience in berry crop production is a primary weakness among most producers in Virginia. There are relatively few growers involved in berry crop production in Virginia, and most of these are fairly new to the market. Evidence from the cluster analysis reveals that only 22 percent of berry crop growers in the state can be characterized as being highly experienced in producing berry crops.

Along with a lack of experience in producing berry crops, growers in many regions of the state lack access to major population centers in the state. In general, the populations of most counties within the Southwest and Southside districts of Virginia are relatively low compared to other counties in the state, especially those near Washington D.C. and along the coast. Additionally, individuals from Southwest and Southside Virginia generally have less disposable income to spend on high-quality foods than those who reside in larger population centers. These weaknesses hinder producers who are interested in direct marketing opportunities that depend on large population bases with high income levels.

Production investments²⁴ and their respective debt payback periods present another weakness for berry crop producers in Virginia. While the types and levels of investments needed to startup a new berry crop venture vary depending on the size of the operation and the mix of berries that are produced, most commercial operations in Virginia will need to install fencing and irrigation systems. Larger operations may also

²⁴ Sample budgets published by Penn State Cooperative Extension suggest that it costs \$4,388 to prepare and plant one acre of highbush blueberries (Demchak *et al.*, 2001), \$5,424 to prepare and plant one acre of bramble berries (Demchak *et al.*, 2005), and \$1,960 to prepare and plant one acre of strawberries (Demchak *et al.*, 2000). Once berry crops are established, annual total costs are \$6,246 for one acre of highbush blueberries (Demchak *et al.*, 2001), \$9,602 for one acre of bramble berries (Demchak *et al.*, 2005), and \$6357 for one acre of strawberries (Demchak *et al.*, 2000).

decide to invest in production equipment, plasticulture for annual strawberry production, a storage cooler for harvested berries, and hired labor. Due to the fact that berry plants do not bear a sufficient amount of output for sales at a commercial level during the first season, the investment payback period to establish a new berry crop operation often extends across multiple seasons²⁵. While investments are costly for transitioning producers, and can take several years to pay off, they are necessary to successfully produce berry crops in this region.

Labor constraints also hinder many berry crop growers in Virginia. In the current berry crop market, 47 percent of producers are unable to expand their operation due to labor limitations. Specifically, the high cost of labor, the inability to hire enough qualified laborers, and the complexity of labor laws and regulations all present challenges to berry crop producers in Virginia.

5.3.3 Strategic Initiatives and Action Strategies

The results from the cluster analysis in Chapter 3 reveal three general types of berry crop producers that exist in the state: those who are large-scale and depend on indirect outlets to sell their products (Cluster #1), those who are small-scale and depend on direct outlets to sell their output (Cluster #2), and those who are medium-sized and depend on direct outlets to sell their products (Cluster #3). Assuming growers who decide to diversify into berry crop production in Virginia will belong to one of these three groups, the following strategic initiatives and action strategies are recommended based on

²⁵ In general, blueberry plants take three to four years to become fully established for commercial production (KCES, 2006b), bramble berry plants take two to three years to become fully established for commercial production (KCES, 2006a; KCES, 2006c), and matted-row strawberry plants take one year to become fully established for commercial production (KCES, 2006d).

the results from this study and insight from multiple current berry crop producers and area extension experts.

5.3.3.1 Cluster #1 Producers

Growers interested in large-scale berry crop production, similar to producers in Cluster #1, are best positioned to serve retail, wholesale, and processor outlets. With the exception of wholesale outlets, retail and processor outlets generally impose minimum volume requirements on their suppliers, which require several acres of intensive production to meet. Along with their ability to surpass minimum volume requirements, large-scale producers are usually better situated than small and medium-scale producers to pay fees and perform services requested by many indirect buyers, because they can spread these fixed costs of production over more units of output.

The recommended product mix for large-scale growers varies depending on the specific outlets each individual grower decides to serve. For those interested in serving wholesale outlets, blueberries are the most attractive berry crop to produce, due to the high rate of perishability among all other berries. Locally grown blueberries are also in high demand among many retail buyers, making them an attractive option for those interested in serving supermarket chains. Finally, retail buyers expressed interest in purchasing a local supply of strawberries and exotic novelty berries such as gooseberries and golden raspberries. The specific berries processors are interested in purchasing as inputs vary from buyer to buyer.

For growers interested in selling berries to indirect outlets, it is advisable to develop relationships with potential buyers at least one season before the crop is ready to

be harvested. In order to signal to buyers that they are professional and serious about growing and selling berry crops, producers should familiarize themselves with the market outlets' entry requirements, and be prepared to meet them before they seek commitments from buyers. For processing outlets, this might be as simple as implementing specific production methods and lining up an adequate form of transportation for delivery. On the other hand, producers interested in engaging in sales agreements with retail and wholesale buyers should be prepared to purchase a product liability insurance policy, obtain third-party food safety certification, have adequate transportation, and be willing to provide additional outlet-specific fees and services for potential buyers.

Along with meeting the entry requirements among indirect buyers, local growers transitioning into large-scale berry crop production will need to make several initial investments. Specifically, it is pertinent for large-scale berry crop producers to invest in a post-harvest cooling facility (used to remove field heat and store harvested berries), an irrigation system (used to provide a consistent supply of water to plants and protect them against frost during the growing season), fencing materials (used to keep unwanted animals such as deer away from berry plants), production equipment (used to plant and maintain berry plants), and plasticulture (used to enhance production and lengthen the growing season for strawberries). Of the current producers in Cluster #1, 87 percent and 44 percent apply irrigation and plasticulture, respectively, to their berry crop operation. Along with these investments, large-scale producers will need to employ an adequate number of laborers for harvesting their berry crops. Labor is often the biggest expense among large-scale berry crop producers serving indirect outlets. In fact, the cost of labor prohibits 55 percent of producers in Cluster #1 from expanding their operation. On

average, producers in Cluster #1 hire nine laborers during the peak part of the season to harvest and maintain their berry crops.

While the initial investment and labor costs necessary to produce berry crops on a large scale are relatively high, they can be paid off quickly with a few successful seasons. In order to help this group of producers become profitable in the long run, extension efforts will need to be geared towards large-scale production methods and indirect marketing strategies. In particular, outreach sessions related to berry crop production should include information on techniques using plasticulture, and labor management strategies and issues. On the other hand, berry crop marketing outreach sessions should include information related to meeting entry requirements among retailers, wholesalers, and processors, and developing ongoing professional relationships with indirect buyers.

5.3.3.2 Cluster #2 Producers

Growers like those in Cluster #2 who are interested in small-scale berry crop production are best positioned to sell their output directly to consumers and through wholesale outlets that work with other small-scale producers to accumulate volume. Unlike purchasing arrangements with retail and processor outlets, there are no stipulations on volume for products sold through wholesale and direct outlets. As a result, growers of all sizes, even those with less than one acre of berries in production, can profitably sell their products through wholesale and direct outlets.

As mentioned previously, blueberries are the most attractive berry crop to produce for wholesale outlets because they have a better holding capacity than other berries. If enough growers are able to collectively produce an adequate volume of other types of

berries on a consistent basis, however, they could realistically move these products through wholesale outlets as well. Compared to sales arrangements made between producers and indirect buyers, which are generally characterized by fewer large volume transactions, sales made directly to consumers occur more frequently and are of significantly smaller volumes. Since perishability is less of an issue for direct market transactions, all locally grown berry crops can move through these outlets. Additionally, evidence from direct market berry crop growers suggests direct market consumers have a strong demand for all types of berries. Since most direct market berry crop producers are relatively small and can only serve a limited geographic region, there is room for more small-scale berry crop producers in the market.

For growers interested in selling berry crops through direct outlets, it is advisable to start off small and slowly enter the market. Two small-scale producers recommend an initial planting of one acre for berry crop producers interested in selling their output directly to consumers. Small and manageable operations are ideal for new growers to become familiar with berry crop production and marketing. Once the initial learning curve has been achieved, producers can expand their acreage if desirable. This strategy is particularly amenable to part-time farmers who want to develop a berry crop enterprise as a means to earn their principle source of income after retirement. For example, if an individual is inclined to sell blueberries and bramble berries at nearby farmers' markets as a retirement activity, he or she can plant the blueberries four years in advance and the bramble berries two years in advance so they will be ready for commercial production upon retirement. Compared to other groups, producers in Cluster #2 on average earn the

lowest percentage of their annual household income from farming activities (37 percent), making full-time berry crop farming an attractive retirement activity.

Effective advertising is critical for producers using direct markets. The average producer in Cluster #2 uses three different advertising vehicles to inform consumers of his or her berry crop operation and product offerings. Word of mouth is the most frequently used advertising method by small-scale berry crop producers. Thus, it is important for small-scale direct marketers to develop long term relationships with their customers in order to generate positive word of mouth advertising.

Extension outreach programming related to developing lasting relationships with customers would be beneficial for producers who are new to direct marketing. Additionally, outreach efforts focusing on aligning small-scale growers who produce similar products with one another would be valuable for those who are interested in a small-scale production of berry crops. In particular, the formation of a cooperative-like group of several small growers could be an effective means for growers to reduce risk, share resources, and access indirect market outlets that have minimum volume requirements.

5.3.3.3 Cluster #3 Producers

Growers interested in medium-scale berry crop production, similar to those in Cluster #3, are best positioned to sell their output to wholesale, processor, and direct outlets. While processor outlets generally have minimum volume stipulations in place for their supplier to adhere to, they do not require deliveries as frequently as retail outlets, and they will generally accept frozen products. Thus, it is feasible for medium-scale

growers to accumulate volume in a freezer throughout the season and sell it to processor outlets in a few large deliveries throughout the year. Like small-scale producers, medium-sized growers can sufficiently serve wholesale buyers and direct market consumers, especially through pick-your-own operations. Specifically, 70 percent of berry crop growers in Cluster #3 sell an average of 39 percent of their total direct output through pick-your-own operations. While small operations can successfully sell output directly to consumers through farmers' markets and farm stands, pick-your-own operations generally require more than one acre to support a reasonable customer base, and thus are ideal for berry crop producers that are medium in size.

Evidence from interviews with direct market producers suggests that there is a high demand for all types of berry crops through pick-your-own operations. Likewise processor outlets are interested in purchasing all types of berries as inputs for their production processes. While wholesale buyers expressed their interest in purchasing blueberries in particular, all berries could be sold through wholesale outlets if enough volume could be accumulated on a consistent basis to avoid perishability issues.

The action strategies recommended to medium-scale producers are identical to those of large-scale producers interested in serving indirect outlets and to those of small-scale producers interested in serving direct outlets. Specifically, it is advisable for medium-scale berry crop producers who want to sell to wholesale or processor outlets to position themselves to meet any outlet-specific entry requirements before approaching buyers to arrange a sales agreement. For medium-sized producers interested in selling berries directly to consumers, it is recommended that they slowly enter the market and develop long term relationships with their customers before they decide to expand. For

example, a producer selling berries through farm stands may want to begin with only one acre, and then expand according to demand among its particular customer base.

Medium-scale growers will need to make some upfront investments for production, although not as many as large-scale producers. While investing in production equipment and plasticulture for annual strawberry production is only justifiable for large-sized berry crop growers due to its high cost, medium-sized berry crop producers should at a minimum install irrigation and fencing. Of the producers in Cluster #3, 78 percent irrigate their berry crop operation. Labor for harvesting is also critical for medium-scale berry crop enterprises, other than pick-your-own operations. During the peak part of the season, the average producer in Cluster #3 employs eight additional workers to harvest and maintain his or her berry crop acreage.

Since the average medium-scale producer uses almost as many laborers as the average large-scale producer, extension outreach programs on labor management strategies and issues would also be beneficial for medium-scale berry crop producers. Other programs tailored for medium-scale direct market producers might highlight strategies for establishing and running a pick-your-own berry operation, and tactics for developing ongoing relationships with direct market customers.

5.4 Discussion and Conclusions

As seen in the above SWOT analysis, several opportunities exist for farmers in Virginia to successfully participate in berry crop production. The transition, however, is not one that can be made instantaneously. Due to the fact that berry plants take between one and four years (depending on the type and variety) to become established for

commercial production, diversification into berry crop production will be a multiyear project. Once established, it will likely take several more years before a new berry crop enterprise can pay off its high startup investment costs and become profitable.

Since berry crop producers in Virginia are diverse along demographic dimensions, farm characteristics, production methods, and marketing tactics, there is not a universal strategy or a single formula that is suitable for every grower to follow.

Rather, each producer will have to analyze his or her unique situation, determine where he or she fits into the market, and carefully select the best mix of berry crops to produce and the most attractive mix of marketing outlets to sell them through. In general, opportunities are available for large-scale producers to sell all types of berries, including exotic novelty berries, to retail chains, for producers of all sizes to sell blueberries to wholesalers, and for medium and large-scale producers to sell secondary berries in their frozen-state to local wineries. Along with indirect outlets, opportunities exist for small and medium-scale producers to sell locally grown berries of all types through direct outlets. Since labor is often the biggest expense and constraint for berry crop operations, pick-your-own berry operations are one particularly attractive direct outlet for medium-scale producers located near sizable populations, because they require a minimal amount of labor to run.

Besides labor, producers interested in capitalizing on these opportunities will need to make major investments in cooling facilities, irrigation systems, fencing, production equipment and plasticulture (recommended for large-scale strawberry growers only), and the berry plants themselves. While initial investment costs are high, many producers in Southwest and Southside Virginia are in a position to offset part of these expenses with

their settlement payments from the Tobacco Buyout. In the long run, once all debts are paid off, berry crop operations have the potential to become highly profitable.

In order to successfully enter the market, it is important for large and medium-scale producers interested in serving indirect outlets to be prepared to meet the outlet-specific entry requirements and to arrange sales agreements in advance. For small-scale berry crop producers, it is advisable to start out small and be prepared to expand production. In order to ensure future transactions, berry crop producers should attempt to establish ongoing relationships with indirect buyers or the direct customer base they serve.

Chapter 6:

Conclusion

Berry crop producers in Virginia are diverse along several dimensions, including age, education level, income level, farm size, product mix, production methods, labor usage, and market outlet choice. In general, there are three basic types of berry crop producers in the state: large-scale growers who mostly depend on indirect outlets to sell their output, small-volume producers who rely heavily on direct outlets to move their products, and medium-sized growers who depend mainly on sales made directly to consumers. In its current state, only a small portion of the berries that are consumed in Virginia's market are supplied by local growers.

Although a limited supply of locally grown berries flows to consumers in Virginia, demand for these products is strong and increasing. Specifically, consumers who purchase berries through direct outlets desire obtaining fresh products, experiencing a rural setting, interacting with others in the marketplace, supporting local farmers, and selecting flexible quantities. In contrast, consumers who purchase berries at retail outlets prefer convenience, product variety, product consistency, and year-round availability. Along with direct and retail outlets, locally grown berries commonly flow through intermediary outlets, including wholesale outlets and wineries. Buyers from all indirect outlets are interested in forming ongoing relationships with local berry crop suppliers to respond to this growing demand.

With a high demand for locally grown berry crop products among a diverse set of outlets and a low supply currently being produced in Virginia, a shortage of berries exists in the market. As a result, farmers of all sizes in Virginia are in a position to diversify

into berry crop production and begin to fill this gap. Namely, opportunities exist for large-scale producers to provide blueberries, strawberries, and other novelty berries to retail distribution centers, for all producers to sell blueberries to wholesale outlets, for large and medium-sized producers to move all types of berry crops through processor outlets, and for medium and small-volume producers to sell all types of berry crops directly to consumers. Pick-your-own operations, which require little to no hired labor for harvesting, are a particularly attractive direct market outlet for medium-sized producers located near sizeable populations.

Before producers in Virginia enter the berry crop market, they will have to position themselves to meet the entry requirements specific to the outlet(s) they desire to serve, and make significant investments in labor and production technologies. Due to the time lag between planting and harvesting marketable berries, the high levels of risk associated with berry crop production, and the general learning curve producers face in production and marketing, initial investment can take several seasons to pay off. However, once a berry crop producer becomes well established in the market, the potential to become and remain profitable is high.

Collectively, the results from this analysis can be used to inform extension outreach efforts for current and future berry crop growers. While the majority of the implications of this research are qualitative, they provide a solid starting point for growers in Virginia who are seeking alternative agricultural opportunities. Further economic research on the market for berry crops in Virginia may attempt to quantify some of the general conclusions formed in this study. For example, it would be interesting to determine how many more producers can enter the market before it

becomes saturated. Broader research objectives, such as assessing the potential economic impact in the state of Virginia from developing the market for berry crops, can also be addressed in future studies.

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Appendix A: Berry Crop Producer Survey

1. What county is your farming operation located in? _____

2. How many acres do you currently farm? _____

3. How many of the acres reported in question 2 are devoted to the production of fruits? _____

4. What types of fruit do you produce? (Please leave blank if not applicable.)

5. How many of the acres reported in question 2 are devoted to the production of vegetables? _____

6. What types of vegetables do you produce? (Please leave blank if not applicable.)

7. How many of the acres reported in question 2 are devoted to the production of row crops? (e.g. corn, soybeans, wheat, etc.) _____

8. What types of row crops do you produce? (Please leave blank if not applicable.)

9. How many of the acres reported in question 2 are devoted to livestock or dairy? _____

10. What types of livestock or dairy do you produce? (Please leave blank if not applicable.)

11. Please indicate the acreage you have under the following uses

_____ Herbs	_____ Forage
_____ Nursery/Bedding	_____ Christmas trees
_____ Cut flowers	

12. How many of the acres reported in question 2 are devoted to agricultural activities other than those listed above? _____

13. Please specify these other agricultural activities. (Please leave blank if not applicable.)

14. Do you use organic production methods (i.e. production and post-harvest activities free of synthetic chemicals including fertilizers, pesticides, antibiotics, and hormones)? (Please check all that apply.)

<input type="checkbox"/> Yes, certified organic	<input type="checkbox"/> Yes, but not certified
<input type="checkbox"/> Yes, transitional organic	<input type="checkbox"/> No, no organic production (in route to certification)

15. If yes, how many acres do you produce using organic methods? _____

16. What crops or livestock do you produce using organic methods? (Please leave blank if not applicable.)

17. What percentage of your household income comes from your farming operation? _____ %

18. What percentage of your sales are (total should equal 100%)

Direct to retailers	_____ %	To auction	_____ %
Direct to processors	_____ %	To food service businesses	_____ %
Sales direct to consumers	_____ %	To other market outlets not listed	_____ %
To shipping point farmers markets	_____ %		

19. If you reported "other market outlets" in the previous question, please specify.

20. If you sell through an auction, please specify the name and location of the auction

Name	_____	Location	_____
Name	_____	Location	_____

21. If you sell to food service, what sorts of establishments are your clients? (Please check all that apply.)

<input type="checkbox"/> Restaurants	<input type="checkbox"/> Hospitals
<input type="checkbox"/> Public schools	<input type="checkbox"/> Caterers
<input type="checkbox"/> Private schools	<input type="checkbox"/> Other (please specify)

22. Do you sell any products that are not produced on your farm? Yes No

23. If you answered yes to the previous question, what products do you sell that you don't produce on your farm?

24. If you do sell products produced outside your farm, where do you acquire these products? (Please check all that apply.)

<input type="checkbox"/> Local producers	<input type="checkbox"/> Non-local producers/processors
<input type="checkbox"/> Local processors	<input type="checkbox"/> Other (please specify)

25. If you do sell products originating outside your farm, what percentage of your farm revenue comes from the sale of these products? _____ %

SMALL FRUIT PRODUCTION

26. Do you produce small fruits (berries) including strawberries, blueberries, raspberries, and/or blackberries? Yes No

If you answered yes to this question, please answer the questions on this page. If you answered no to this question please skip to page 11 (question 72).

27. What year did you begin commercial production of small fruit? _____

28. What percentage of your farming income comes from small fruit _____ %

29. How many acres of small fruit do you have in production? _____

30. On how many of these acres do you employ

- Netting for the field
- High tunnels
- Greenhouses

- Irrigation
- Plasticulture

STRAWBERRIES

31. Do you produce strawberries? Yes No

If you answered yes to this question, please answer the questions on this page. If you answered no to this question please skip to page 7 (question 38).

32. How many acres of strawberries did you have in production for the 2005 season? _____

33. How many acres of strawberries do you expect to have in 2006? _____

34. What production systems do you use for strawberries? (Please check all that apply)

- Matted row
- Plasticulture
- Other (please specify)

35. What are your three most important strawberry cultivars; how many acres have you planted of each; and what is your average yield per acre for each (please indicate yield units, e.g. lbs/acre)?

	Most important	Second most important	Third most important
Cultivar name	_____	_____	_____
Acreage	_____	_____	_____
Yield	_____	_____	_____

36. What cultural, disease, and insect problems do you experience with strawberries?

37. What factors limit expansion of your strawberry acreage? (Please check all that apply.)

- | | |
|---|---|
| <input type="checkbox"/> Don't wish to expand acreage | <input type="checkbox"/> Financial constraints |
| <input type="checkbox"/> Access to land | <input type="checkbox"/> Production constraints (e.g. pests, disease) |
| <input type="checkbox"/> Access to market | <input type="checkbox"/> No limits to expansion |
| <input type="checkbox"/> Labor constraints | <input type="checkbox"/> Other (please specify) |
-
-

BLUEBERRIES

38. Do you produce blueberries? Yes No

If you answered yes to this question, please answer the questions on this page. If you answered no to this question, skip to page 8 (question 45).

39. How many acres of blueberries did you have in production for the 2005 season? _____

40. Approximately how many plants do you have per acre? _____

41. How many acres blueberries do you expect to have in 2006? _____

42. What cultural, disease, and insect problems do you experience with blueberries?

43. What are your three most important blueberry cultivars; how many acres have you planted of each; and what is your average yield per acre for each (please indicate yield units, e.g. lbs/acre)?

	Most important	Second most important	Third most important
Cultivar name	_____	_____	_____
Acreage	_____	_____	_____
Yield	_____	_____	_____

44. What factors limit expansion of your blueberry acreage? (Please check all that apply.)

- | | |
|---|---|
| <input type="checkbox"/> Don't wish to expand acreage | <input type="checkbox"/> Financial constraints |
| <input type="checkbox"/> Access to land | <input type="checkbox"/> Production constraints (e.g. pests, disease) |
| <input type="checkbox"/> Access to market | <input type="checkbox"/> No limits to expansion |
| <input type="checkbox"/> Labor constraints | <input type="checkbox"/> Other (please specify) |
-
-

BLACKBERRIES

45. Do you produce blackberries? Yes No

If you answered yes to this question, please answer the questions on this page. If you answered no to this question, skip to page 9 (question 53).

46. How many acres of blackberries did you have in production for the 2005 season? _____

47. Approximately how many plants do you have per acre? _____

48. How many acres of blackberries do you expect to have in 2006? _____

49. What cultural, disease, and insect problems do you experience with blackberries?

50. What production systems do you use for blackberries? (Please check all that apply)

Shift trellis Static trellis Other (please specify)

51. What factors limit expansion of your blackberry acreage? (Please check all that apply.)

<input type="checkbox"/> Don't wish to expand acreage	<input type="checkbox"/> Financial constraints
<input type="checkbox"/> Access to land	<input type="checkbox"/> Production constraints (e.g. pests, disease)
<input type="checkbox"/> Access to market	<input type="checkbox"/> No limits to expansion
<input type="checkbox"/> Labor constraints	<input type="checkbox"/> Other (please specify)

52. What are your three most important blackberry cultivars; how many acres have you planted of each; and what is your average yield per acre for each (please indicate yield units, eg. lbs/acre)?

	Most important	Second most important	Third most important
Cultivar name	_____	_____	_____
Acreage	_____	_____	_____
Yield	_____	_____	_____

SUMMER BEARING RASPBERRIES

53. Do you produce summer-bearing raspberries? Yes No

If you answered yes to this question, please answer the questions on this page. If you answered no to this question, skip to page 10 (question 61).

54. How many acres of summer-bearing raspberries did you have in production for the 2005 season? _____

55. Approximately how many plants do you have per acre? _____

56. How many acres of summer-bearing raspberries do you expect to have in 2006? _____

57. What cultural, disease, and insect problems do you experience with summer-bearing raspberries?

58. What production systems do you use for summer-bearing raspberries? (Please check all that apply)

- Shift trellis Static trellis Other (please specify)

59. What factors limit expansion of your summer-bearing raspberry acreage? (Please check all that apply.)

- | | |
|---|---|
| <input type="checkbox"/> Don't wish to expand acreage | <input type="checkbox"/> Financial constraints |
| <input type="checkbox"/> Access to land | <input type="checkbox"/> Production constraints (e.g. pests, disease) |
| <input type="checkbox"/> Access to market | <input type="checkbox"/> No limits to expansion |
| <input type="checkbox"/> Labor constraints | <input type="checkbox"/> Other (please specify) |

60. What are your three most important summer-bearing raspberries cultivars; how many acres have you planted of each; and what is your average yield per acre for each (please indicate yield units, e.g. lbs/acre)?

	Most important	Second most important	Third most important
Cultivar name	_____	_____	_____
Acreage	_____	_____	_____
Yield	_____	_____	_____

FALL BEARING RASPBERRIES

61. Do you produce fall-bearing raspberries? Yes No

If you answered yes to this question, please answer the questions on this page. If you answered no to this question, skip to question 69 at the bottom of the page.

62. How many acres of fall-bearing raspberries did you have in production for the 2005 season? _____

63. Approximately how many plants do you have per acre? _____

64. How many acres of fall-bearing raspberries do you expect to have in 2006? _____

65. What cultural, disease, and insect problems do you experience with fall-bearing raspberries?

66. What production systems do you use for fall-bearing raspberries? (Please check all that apply)

- Shift trellis Static trellis Other (please specify)
-

67. What factors limit expansion of your fall-bearing raspberry acreage? (Please check all that apply.)

- | | |
|---|---|
| <input type="checkbox"/> Don't wish to expand acreage | <input type="checkbox"/> Financial constraints |
| <input type="checkbox"/> Access to land | <input type="checkbox"/> Production constraints (e.g. pests, disease) |
| <input type="checkbox"/> Access to market | <input type="checkbox"/> No limits to expansion |
| <input type="checkbox"/> Labor constraints | <input type="checkbox"/> Other (please specify) |
-

68. What are your three most important fall-bearing raspberries cultivars; how many acres have you planted of each; and what is your average yield per acre for each (please indicate yield units, e.g. lbs/acre)?

	Most important	Second most important	Third most important
Cultivar name	_____	_____	_____
Acreage	_____	_____	_____
Yield	_____	_____	_____

69. Do you produce other berry crops besides strawberries, blueberries, raspberries, or blackberries? Yes No

70. If yes, which berry crops? _____

71. If yes, what is the total acreage of production devoted to these other berry crops? _____

DIRECT MARKETERS

72. Do you sell direct to consumers? Yes No

If you answered yes to this question, please answer the questions on this page. If you answered no to this question, skip to page 14 (question 90).

73. What is the percentage of your direct marketing sales through the following outlets? (Total should equal 100%)

- | | |
|-----------------------|----------------------------|
| _____ U-pick | _____ Internet sales |
| _____ Farmers' market | _____ CSA |
| _____ Farm stand | _____ Other please specify |
-

74. What percentage of your farming income comes from sales direct to consumers? _____

75. What products do you direct market to consumers? (Please check all that apply.)

- Fruits/vegetables
- Meat, poultry, eggs
- Dairy
- Jams/jellies
- Other (please specify)

- Salsa, relish, pickled items
- Distilled or fermented beverages
- Honey products
- Juice

76. Within these categories, what specific products do you sell?

77. How do you decide what price you'll charge for your produce?

78. How many customers do you have in a busy day? _____

79. What is the percentage of your customers would you consider to be "regulars"?

- | | |
|--|--|
| <input type="checkbox"/> Less than 10% | <input type="checkbox"/> Between 50% and 75% |
| <input type="checkbox"/> Between 10% and 25% | <input type="checkbox"/> More than 75% |
| <input type="checkbox"/> Between 25% and 50% | |

80. How do you advertise? (Please check all that apply.)

- | | |
|--|--|
| <input type="checkbox"/> Word of mouth | <input type="checkbox"/> Mailing list |
| <input type="checkbox"/> Local newspaper | <input type="checkbox"/> Yellow pages/telephone directory |
| <input type="checkbox"/> Road signs | <input type="checkbox"/> State directory (e.g. Va. U-pick directory or Va. farmers' markets) |
| <input type="checkbox"/> Own internet site | <input type="checkbox"/> Other (please specify) |
| <input type="checkbox"/> Paid internet advertising | |

81. Do you feel there is a need for a commercially certified, multi-use food processing facility (such as for canning) in your area?

- Yes No Unsure
- Comments _____

82. If you checked yes or unsure in question 82, how many times a year do you estimate you would use such a facility?

- | | |
|--------------------------------------|--|
| <input type="checkbox"/> 1 time | <input type="checkbox"/> 6 – 7 times |
| <input type="checkbox"/> 2 – 3 time | <input type="checkbox"/> 8 – 10 times |
| <input type="checkbox"/> 4 – 5 times | <input type="checkbox"/> Over 10 times |

83. If you feel there is a need for a canning facility, how far would you be willing to drive to reach it?

- | | |
|---------------------------------------|--|
| <input type="checkbox"/> Up to ½ hour | <input type="checkbox"/> Up to 2 hours |
| <input type="checkbox"/> Up to 1 hour | <input type="checkbox"/> More than 2 hours |

84. If you checked yes or unsure in question 82 and if there were such a processing facility, would you be most interested in processing: (Please check all that apply.)

- | | |
|--|---|
| <input type="checkbox"/> Sauces | <input type="checkbox"/> Honey products |
| <input type="checkbox"/> Salsas | <input type="checkbox"/> Cheese |
| <input type="checkbox"/> Pickles/relishes/vinegars | <input type="checkbox"/> Other (please specify) |
| <input type="checkbox"/> Jams/jellies | |
-
-
-

85. What specific educational programs would you be interested in to enhance your direct marketing?

U-Pick

86. Do you have a U-pick operation? Yes No

If you answered yes to this question, please answer the questions on this page. If you answered no to this question, skip to page 14 (question 90).

87. Apart from the produce you sell, what service, products, and attractions do you offer your customers? (Please check all that apply.)

- | | |
|--|--|
| <input type="checkbox"/> Food safety certification | <input type="checkbox"/> Picnic tables/other seating |
| <input type="checkbox"/> Hand washing stations | <input type="checkbox"/> Recipe ideas |
| <input type="checkbox"/> Toilets | <input type="checkbox"/> Other (please specify) |
-
-
-

88. What services, products, and/or attractions (e.g. festivals, hay rides, corn mazes) do you provide free to your customers?

89. What services, products, and/or attractions do you offer to your customers for a fee?

LABOR

90. How many permanent, (year-round) laborers, not including unpaid family members, do you employ? _____

91. How many seasonal laborers, not including unpaid family members, do you employ? _____

92. What is the peak number of laborers you have at any given time throughout the year? _____

93. Do you employ migrant labor?

Yes, year-round No
 Yes, seasonally

94. What constraints do you encounter in finding labor for your farming operation? (Please check all that apply.)

Budget constraints Unable to find enough workers
 Unable to find qualified workers Other (please specify)

DEMOGRAPHIC INFORMATION

To complete this survey we would like to collect some information about the farming household. While completion of these questions is optional, your responses will help us make the fullest use of the survey data collected.

95. Are you a primary decision maker in the farming operation? Yes No

96. What is the highest level of formal education you've received?

No high school diploma or equivalent Associate's degree
 High school diploma or equivalent Bachelor's degree
 Some college Master's or PhD

97. Please indicate your annual household income.

Less than \$20,000 \$60,000 - \$79,999
 \$20,000 - \$39,999 \$80,000 - \$100,000
 \$40,000 - \$59,999 More than \$100,000

98. Which best describes your farmland tenure?

Owner
 Rent/lease

Own and rent
 Other (please specify)

99. Please indicate the number of years you have farmed your land.

0 – 5
 6 - 20

21 or more
 Multi-generational (i.e. inherited)

100. Please indicate your age.

Under 25
 25 – 44
 45 – 59

60 – 69
 70 or older

101. How many individuals live in your household?

One
 Two
 Three

Four
 Five
 Six or more

102. Please indicate your ethnicity

White, non-Hispanic
 African American
 Asian American

Native American
 Hispanic
 Other

103. Gender Male Female

Survey completion

104. This completes the survey. We would be interested any further comments or issues you might have that were not addressed in the survey.

105. Would you like to receive notice of the survey results? Yes No

In appreciation of your participation, we will be awarding a \$100 cash certificate (maximum of six awarded) for every 100 completed surveys.

106. Would you like to be entered into the drawing for a \$100 cash certificate? Yes No

If you answered yes to either question 105 or 106, please complete the contact information below.

Contact information

Name

Address

City

Zip code

Fax

Email

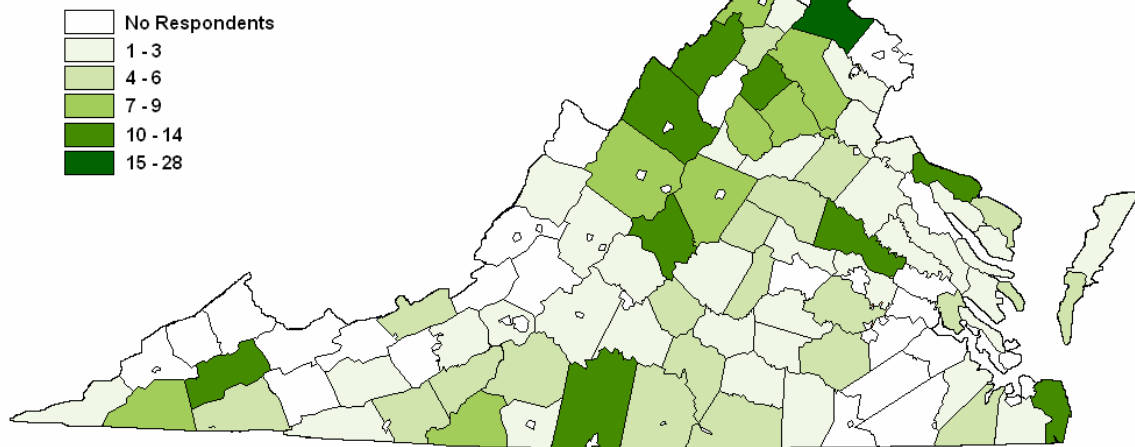
Thank you! We greatly appreciate your time in responding to the survey questions

Appendix B: Berry Crop Producers by County

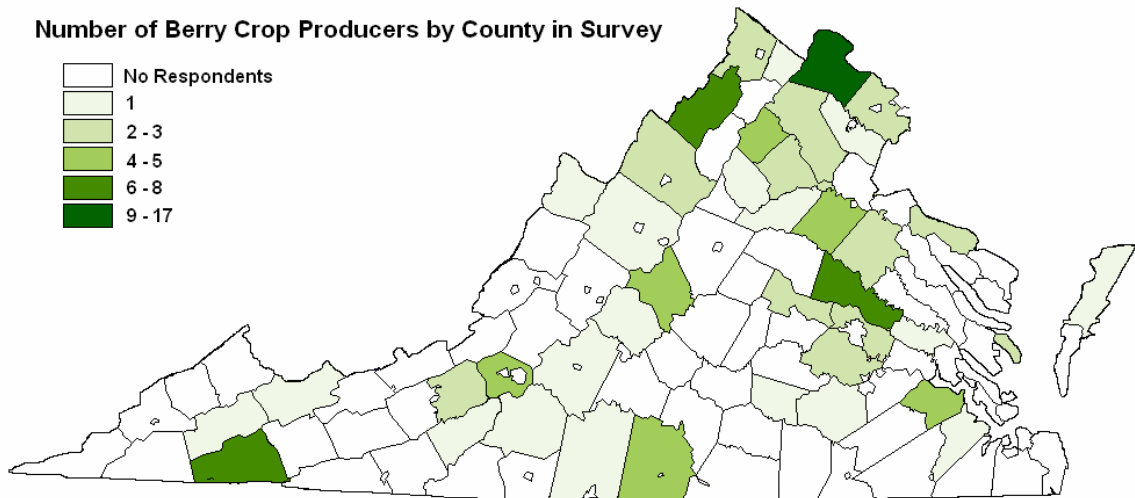
	<i>Census</i>	Survey		<i>Census</i>	Survey
Accomack County	3	1	Loudoun County	28	17
Albemarle County	9	0	Louisa County	5	0
Amelia County	1	0	Lunenburg County	3	0
Amherst County	3	1	Madison County	8	1
Appomattox County	4	0	Mathews County	5	2
Augusta County	7	1	Mecklenburg County	4	0
Bath County	1	0	Middlesex County	3	0
Bedford County	2	1	Montgomery County	2	3
Brunswick County	2	0	Nelson County	12	4
Buckingham County	1	0	New Kent County	0	1
Campbell County	1	0	Northampton County	4	0
Caroline County	3	3	Northumberland County	5	0
Carroll County	5	0	Nottoway County	3	1
Charlotte County	4	0	Orange County	3	1
Chesterfield County	4	2	Patrick County	7	0
Clarke County	3	1	Pittsylvania County	11	1
Culpeper County	7	3	Prince Edward County	3	0
Cumberland County	4	0	Prince William County	3	1
Dinwiddie County	4	1	Rappahannock County	10	4
Fairfax County	0	2	Richmond County	1	0
Fauquier County	8	2	Roanoke County	1	4
Floyd County	4	1	Rockbridge County	3	0
Fluvanna County	5	0	Rockingham County	11	2
Franklin County	5	1	Russell County	12	1
Frederick County	9	3	Scott County	7	0
Giles County	4	0	Shenandoah County	14	7
Gloucester County	2	0	Spotsylvania County	4	4
Goochland County	3	3	Stafford County	3	0
Grayson County	3	0	Surry County	0	5
Greene County	2	0	Tazewell County	0	1
Halifax County	5	4	Warren County	4	0
Hanover County	10	8	Washington County	6	6
Henrico County	3	2	Westmoreland County	10	3
Henry County	2	0	Wythe County	3	0
Highland County	0	1	York County	3	0
Isle of Wight County	2	1	Chesapeake City	2	0
James City County	5	0	Suffolk City	6	0
King and Queen County	1	0	Virginia Beach City	13	0
King George County	2	0	Missing Values	0	4
King William County	2	0			
Lancaster County	1	0	State Total	369	115
Lee County	1	0			

The *Census* was conducted in 2002 and the survey was administered in 2006.

Number of Berry Crop Producers by County in Census



Number of Berry Crop Producers by County in Survey

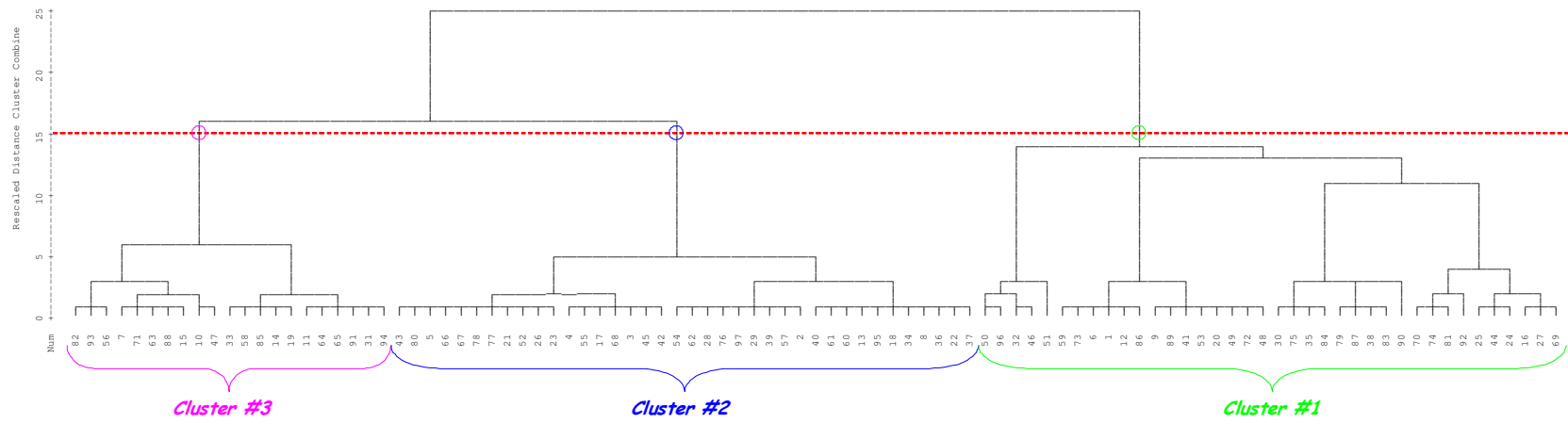


The intervals of these choropleth maps are categorized by natural breaks

Appendix C: Snapshot of Proximity Matrix

Num	Squared Euclidean Distance														
	1	2	3	4	5	6	7	...	91	92	93	94	95	96	97
1	0.0	16.9	8.7	6.1	5.0	0.9	16.3	...	7.1	26.4	27.8	3.7	12.0	13.7	12.6
2	16.9	0.0	2.4	3.0	9.2	12.3	4.8	...	13.6	11.6	17.9	15.8	3.0	21.5	1.0
3	8.7	2.4	0.0	1.0	5.3	5.7	3.7	...	5.2	12.0	15.9	7.0	3.1	14.7	2.2
4	6.1	3.0	1.0	0.0	3.4	3.3	6.9	...	7.3	13.5	19.5	7.3	3.1	15.0	2.1
5	5.0	9.2	5.3	3.4	0.0	4.5	9.8	...	7.7	24.2	20.6	8.5	3.8	17.3	4.9
6	0.9	12.3	5.7	3.3	4.5	0.0	14.7	...	6.7	21.7	27.4	4.0	9.9	14.4	9.6
7	16.3	4.8	3.7	6.9	9.8	14.7	0.0	...	7.3	14.2	7.6	10.7	3.1	17.0	4.6
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	0.0	⋮	⋮	⋮	⋮	⋮	⋮	⋮
91	7.1	13.6	5.2	7.3	7.7	6.7	7.3	...	0.0	18.1	12.7	1.7	8.7	11.4	12.1
92	26.4	11.6	12.0	13.5	24.2	21.7	14.2	...	18.1	0.0	13.9	20.2	15.3	10.1	16.2
93	27.8	17.9	15.9	19.5	20.6	27.4	7.6	...	12.7	13.9	0.0	16.9	11.0	15.3	18.6
94	3.7	15.8	7.0	7.3	8.5	4.0	10.7	...	1.7	20.2	16.9	0.0	10.7	11.8	13.9
95	12.0	3.0	3.1	3.1	3.8	9.9	3.1	...	8.7	15.3	11.0	10.7	0.0	18.0	1.6
96	13.7	21.5	14.7	15.0	17.3	14.4	17.0	...	11.4	10.1	15.3	11.8	18.0	0.0	20.9
97	12.6	1.0	2.2	2.1	4.9	9.6	4.6	...	12.1	16.2	18.6	13.9	1.6	20.9	0.0

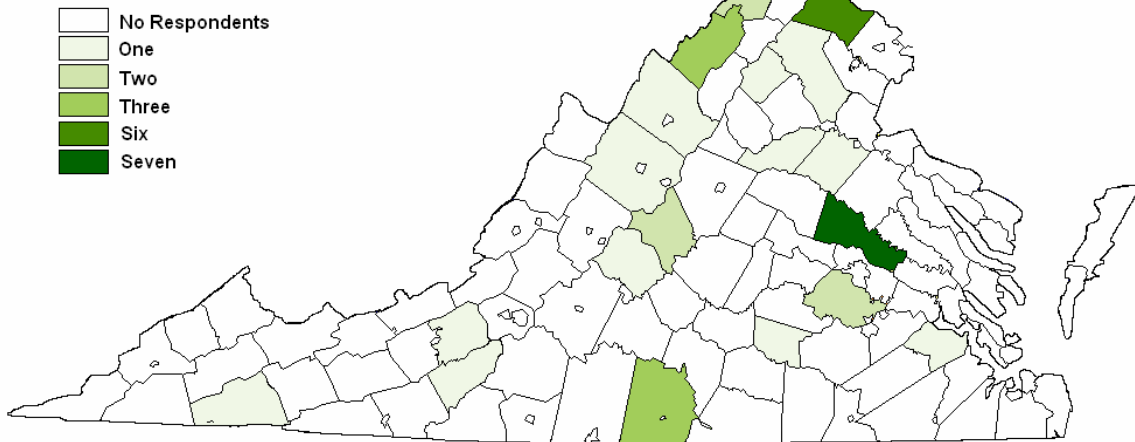
Appendix D: Cluster Analysis Dendrogram



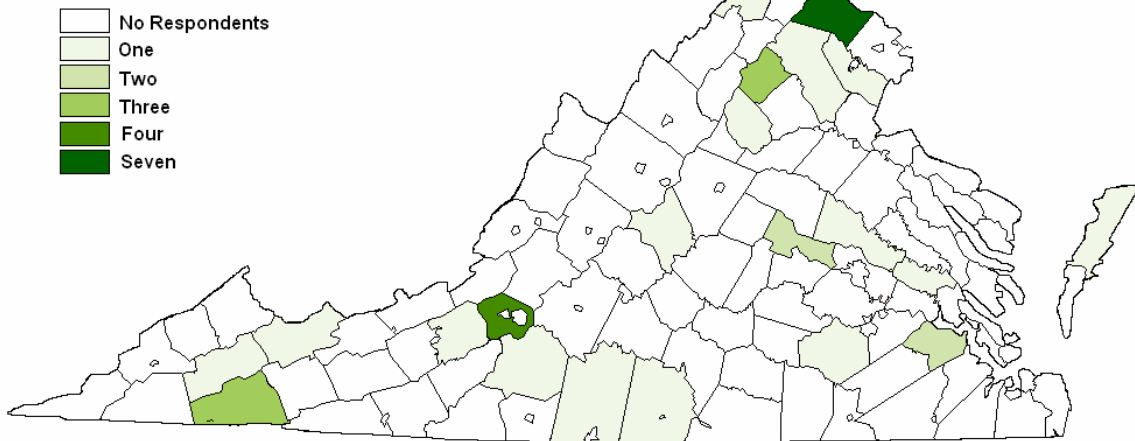
Appendix E: Berry Crop Producers by County in each Cluster

	Cluster		
	1	2	3
Accomack County	0%	3%	0%
Amherst County	3%	0%	0%
Augusta County	3%	0%	0%
Bedford County	0%	0%	5%
Chesterfield County	5%	0%	0%
Clarke County	0%	0%	5%
Culpeper County	0%	0%	14%
Dinwiddie County	0%	3%	0%
Fairfax County	0%	0%	10%
Fauquier County	3%	3%	0%
Floyd County	3%	0%	0%
Franklin County	0%	3%	0%
Frederick County	5%	3%	0%
Goochland County	0%	6%	0%
Halifax County	8%	3%	0%
Hanover County	19%	3%	0%
Henrico County	0%	0%	10%
Loudoun County	16%	19%	10%
Madison County	0%	3%	0%
Mathews County	0%	0%	10%
Montgomery County	3%	3%	5%
Nelson County	5%	3%	0%
New Kent County	0%	3%	0%
Nottoway County	3%	0%	0%
Orange County	3%	0%	0%
Pittsylvania County	0%	3%	0%
Prince William County	0%	3%	0%
Rappahannock County	3%	8%	0%
Roanoke County	0%	11%	0%
Rockingham County	3%	0%	0%
Russell County	0%	3%	0%
Shenandoah County	8%	0%	10%
Spotsylvania County	3%	0%	10%
Surry County	3%	6%	5%
Tazewell County	0%	3%	0%
Washington County	3%	8%	0%
Westmoreland County	0%	0%	10%

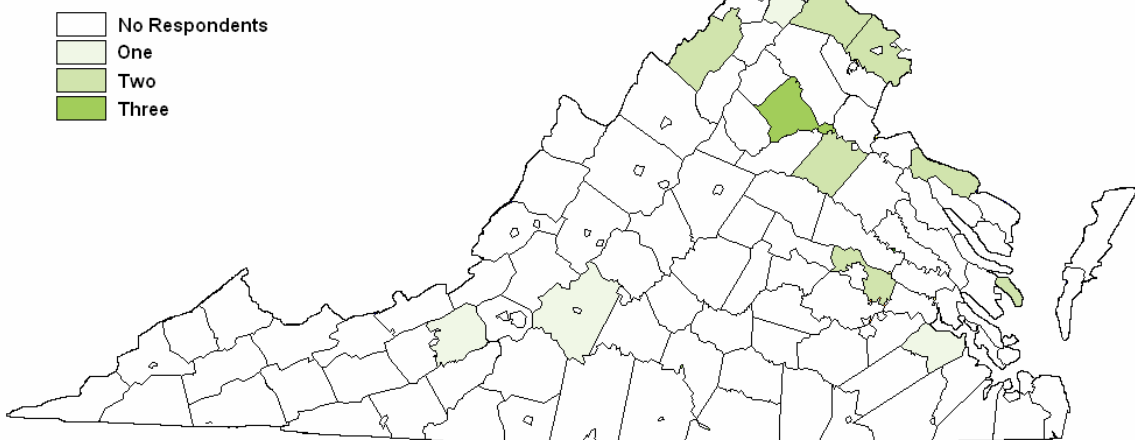
Number of Berry Crop Producers by County in Cluster #1



Number of Berry Crop Producers by County in Cluster #2



Number of Berry Crop Producers by County in Cluster #3



Appendix F: Questionnaires used to Guide Interviews

Supermarket Small Fruit Buyer Survey

Date: _____

Name: _____

Company: _____

Job Title: _____

Address: _____

Phone: _____

Email: _____

- Provide overview of project
- Discuss objective of the interview: To learn about the potential for supermarkets to purchase locally grown small fruit

Type of company:

- Chain supermarket
- Independent supermarket

If your company exists as a chain:

- How many stores are there in the chain?
- Where are the rest of your stores located?
- How many stores are you responsible for?

Which category most closely matches the general scope of your company's product line?

- General merchandise and food
- Food only
- Perishables only
- Fruits and vegetables only
- Small fruit only
- One specific small fruit

What percentage of your company's total sales are food products?

What percentage of your company's food sales are perishables?

What percentage of your company's perishable sales are fruits and vegetables?

What percentage of your company's fruit and vegetable sales are small fruits?

How many employees does your company have?

What specific small fruits does your company sell, approximately what volume of each small fruit does your company sell annually, and what percent of your company's total small fruit sales does each small fruit account for?

	Yes	Volume	% of Small Fruit Sales
Strawberries			
Raspberries			
Blueberries			
Blackberries			
Other (specify)			
Total			100%

Does your company carry small fruit year around? If no, list the months when your company does not carry small fruit.

If no, would your company carry small fruit year around if it could?

Does your company sell any organic small fruits? If yes, please specify.

Does your company use the "Virginia Grown" label to promote locally grown produce or small fruit sales? If yes, please specify. If not, why not?

Does your company do anything else to emphasize locally grown produce or small fruit?

What recent trends have you noticed in each of the following?

- Types of small fruit sought by consumers
- Volumes of small fruit purchases
- Seasonality of small fruit purchases
- Attributes of small fruit purchases (such as organic or locally grown)

Have any of the following constraints prevented your company from selling small fruit in recent years?

- Availability of products
- Prices of products
- Quality of products
- Food safety concerns
- Origin of products

How many suppliers does your company buy small fruits from altogether?

Describe your company's purchasing patterns of small fruit.

- Purchase consistently from one or a specific set of suppliers
- Shift among suppliers throughout the year

What percentage of your company's total volume of small fruit come from the following types of suppliers?

Type of Supplier	Number of Suppliers	Percentage of total volume
Small fruit growers		
Wholesale markets		
Produce brokers		
Produce shippers		
Other (specify)		
Total		100%

What percentage of your company's small fruit purchases are through the following types of agreements or relationships?

	Regular Suppliers	Occasional Suppliers
Verbal Contracts		
Written Contracts		
On Consignment		
Cash Sales		
Other (specify)		
Total	100%	100%

What percentage of your company's small fruit purchases are from each of the following geographic sources? (Where do they originate?) Does this vary by season? How many suppliers fit into each category?

	In Season		Out of Season	
	%	#	%	#
Virginia				
Regional (specify state)				
California				
Florida				
United States other (specify state)				
Canada				
Central America (specify country)				
South America (specify country)				
Imported from other country (specify)				
Total	100%		100%	

Is your company's procurement process centralized or decentralized?

Where do your company's suppliers deliver their products?

- Directly to store
- A centralized distribution center
- Other (specify)

Which of the following services are the responsibilities of your company or your company's suppliers? If either, is this a service your company provides for an additional fee (or a discount from the supplier's payment)?

Service	Responsibility of company	Responsibility of supplier	Either	Additional Fee (Y/N)
Delivery to Supermarket				
Grading				
Packaging				
Washing				
Labeling				

Does your company require any of the following services from your small fruit suppliers? If yes, specify the requirement.

- Food safety certification
- Product liability insurance
- Production and post-harvest technology
- Country of origin labeling (COOL)
- Universal product code (UPC)
- Traceability
- Promotional or educational materials
- Other (specify)

Does your company require its small fruit suppliers pay any slotting fees or participate in any special promotions? If yes, please specify the frequency and cost of each.

Does your company sell small fruit grown in Virginia? If yes, where in Virginia and from whom does it come from?

Is your company interested in purchasing more small fruit from Virginia producers?

If someone approaches your company to ask about selling you small fruit, what do you consider about the supplier in deciding whether or not to try them out?

In your experience, what are the strengths and weaknesses of suppliers of small fruits from Virginia?

Would your company increase the share of procurement from Virginia producers if more were available?

What opportunities do you see for producers in Southwest and Southside Virginia to supply small fruit to your firm or any other firm?

What threats do you see for producers in Southwest and Southside Virginia to supply small fruit to your firm or any other firm?

Wholesale Small Fruit Buyer Survey

Date: _____

Name: _____

Company: _____

Job Title: _____

Address: _____

Phone: _____

Email: _____

- Provide overview of project
- Discuss objective of the interview: To learn about the potential for wholesalers to purchase locally grown small fruit

Which category most closely matches the general scope of your company’s product line?

- General merchandise and food
- Food only
- Perishables only
- Fruits and vegetables only
- Small fruit only
- One specific small fruit

What percentage of your company’s total sales are food products?

What percentage of your company’s food sales are perishables?

What percentage of your company’s perishable sales are fruits and vegetables?

What percentage of your company’s fruit and vegetable sales are small fruits?

What percentage of your company’s total volume of small fruit is sold to the following?

How many employees does your company have?

Type of buyer	Number of buyers	Region	Percentage of total volume
Chain supermarket			
Independent supermarket			
Wholesaler			
Shipper			
Processor			
Chain restaurant			
Independent restaurant			
Food service other			
Other (specify)			
Total			100%

Do buyers of small fruit require any of the following services from your company? If yes, specify the requirement.

- Food safety certification
- Product liability insurance
- Production and post-harvest technology
- Labeling
- Packaging
- Universal product code (UPC)
- Traceability
- Delivery
- Other

Does your company have to pay slotting or any other fees? If so, what percentage of these fees does your company pass to its suppliers?

How does your company communicate with its buyers?

- Phone
- Email
- Personal meetings
- Other (specify)

What specific small fruits does your company sell?

	Yes	No
Strawberries		
Raspberries		
Blueberries		
Blackberries		
Other (specify)		

What volume does your company sell of each of the following small fruits mentioned above?

- Strawberries
- Raspberries
- Blueberries
- Blackberries
- Other

Does your company carry small fruit year around? If no, list the months when your company does not carry small fruit.

Would your company carry small fruit year around if it could?

Does your company sell any organic small fruits? If yes, please specify.

Does your company sell small fruit grown in Virginia? If yes, where in Virginia does it come from?

Are any of your company's small fruit products marked with VDACS's "Virginia Grown" label? If yes, please specify types of small fruit and suppliers. If not, why not?

What recent trends have you noticed in each of the following?

- Types small fruit purchases
- Volumes of small fruit purchases
- Seasonality of small fruit purchases
- Attributes of small fruit purchases

Have any of the following constraints prevented your company from selling small fruit in recent years?

- Availability of products
- Prices of products
- Quality of products
- Food safety scares
- Origin of product

What percentage of your company's total volume of small fruit come from the following types of suppliers? How many suppliers does your company buy small fruits from altogether?

Type of Supplier	Number of Suppliers	Percentage of total volume
Small fruit growers		
Wholesale markets		
Produce brokers		
Produce shippers		
Other (specify)		
Total		100%

Describe your company's purchasing patterns of small fruit.

- Purchase consistently from one or a specific set of suppliers
- Shift among suppliers throughout the year

Does your company have a minimum volume requirement for small fruit purchases?

Approximately how long (in years) has your company worked with the supplier whom you have the most experience?

Is your company on the look out for new suppliers of small fruit?

Does your company require any of the following services from your small fruit suppliers? If yes, specify the requirement.

- Food safety certification
- Product liability insurance
- Production and post-harvest technology
- Labeling
- Country of origin labeling (COOL)
- Packaging
- Universal product code (UPC)
- Traceability
- Promotional or educational materials
- Other

If someone approaches your company to ask about selling you small fruit, what do you consider about the supplier in deciding whether or not to try them out?

Does your company ask its potential suppliers for a product sample before purchasing small fruit from them?

What percentage of your company's small fruit purchases are through the following?

Contractual agreements	
On consignment	
Cash sales	
Other (specify)	
Total	100%

Does your company require its suppliers to pay slotting fees to carry small fruits? If yes, approximately how much is a typical fee?

What percentage of your company's small fruit purchases are from each of the following geographic sources? (Where do they originate?) Does this vary by season? How many suppliers fit into each category?

	In Season		Out of Season	
	%	#	%	#
Virginia				
Regional (specify state)				
California				
Florida				
United States other (specify state)				
Canada				
Central America (specify country)				
South America (specify country)				
Imported from other country (specify)				
Total	100%		100%	

How do local (Virginia or regional within Virginia) suppliers fit into your small fruit procurement strategy?

Which of the following services are the responsibilities of your company or your company's suppliers? If either, is this a service your company provides for an additional fee (or a discount from the supplier's payment)?

Service	Responsibility of company	Responsibility of supplier	Either	Additional Fee (Y/N)
Harvest				
Delivery to Wholesale				
Grading				
Packaging				
Washing				
Labeling				

In your experience, what are the strengths and weaknesses of suppliers of small fruits from Virginia?

Would your company increase the share of procurement from Virginia producers if more were available?

What opportunities do you see for producers in Southwest and Southside Virginia to supply small fruit to your firm or any other firm?

What threats do you see for producers in Southwest and Southside Virginia to supply small fruit to your firm or any other firm?

Winery Small Fruit Buyer Survey

Date: _____

Name: _____

Winery: _____

Job Title: _____

Address: _____

Phone: _____

Email: _____

- Provide overview of project
- Discuss objective of the interview: To learn about the potential for wineries to purchase locally grown small fruit

Compared to other wineries in Virginia, do you consider your winery to be?

- Large
- Medium
- Small

What volume of wine does your winery produce annually?

How many different products (wines) does your winery produce?

Apart from wine, what other products does your winery sell?

Does your winery operate year around or seasonally?

Does your winery use small fruit (berries) to make any of its products?

If yes, what percentage of your winery’s total sales do the wines made with small fruits account for?

If yes, what specific small fruits does your winery use, what volume of each of these small fruits does your winery currently use annually, what percentage of this volume does your winery grow or buy, and how many different products are made with each of these small fruits?

	Yes	Volume	% Grow	% Buy	Number of Products
Strawberries					
Blueberries					
Raspberries					
Blackberries					
Other (specify)					

Is your winery interested in increasing or decreasing the amount of small fruit that it grows or buys? If so, why?

	Grow	Buy	Justification
Strawberries			
Blueberries			
Raspberries			
Blackberries			
Other (specify)			

↑ = Increase, ↓ = Decrease, -- = Remain at current level

If your winery buys small fruit, who are your suppliers and where are they located?

	Number of Suppliers	Type of Suppliers	Geographic Locations
Strawberries			
Blueberries			
Raspberries			
Blackberries			
Other (specify)			

G = Small Fruit Grower, W = Wholesaler, O = Other (specify)

What form are the small fruits in when your winery purchases them from your suppliers?

	Fresh	Frozen	Juice	Concentrate	Other (specify)
Strawberries					
Blueberries					
Raspberries					
Blackberries					
Other (specify)					

How long have you worked these suppliers, and what sort of relationships do you have with them?

How did your winery find out about its current small fruit suppliers, and is your winery on the look out for new small fruit suppliers?

Does your winery desire any services from its small fruit suppliers, such as picking, sorting, packaging, freezing, or delivery?

If someone approaches you to ask about selling small fruit to your winery, what do you consider about the supplier in deciding whether or not to try them out?

Would your winery be interested in buying more locally grown small fruits if they were available in the future? If yes, what specific small fruit would your winery buy?

What constraints limit your winery's purchases of locally grown small fruit?

- Availability of small fruit
- Prices of small fruit
- Quality of small fruit
- Low consumer demand for wines made with small fruit
- Minimal interest in making wines with small fruit
- Other (specify)

Are there any regulatory issues that affect your winery's willingness or ability to source small fruit from other producers?

- Virginia Department of Alcohol Beverage Control (ABC)
- Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF)
- Alcohol and Tobacco Tax and Trade Bureau (TTB)
- Other (specify)

What opportunities do you see for producers in Virginia to supply small fruit to your winery or any other wineries in the state?

Do you have any other comments?

Small Fruit Producer Survey

Date: _____

Name: _____

Farm: _____

Job Title: _____

Address: _____

Phone: _____

Email: _____

- Provide overview of project
- Discuss objective of the interview: To learn about your experiences selling small fruit to different types of buyers

What small fruits do you produce, how many acres of each small fruit do you currently have in production (2007 season), and are you planning on increasing or decreasing your acreage for each small fruit next season (2008)?

	Yes	Number of Acres	Future Plans
Strawberries			
Blueberries			
Raspberries			
Blackberries			
Other (specify)			

↑ = Increase, ↓ = Decrease, -- = Remain at current level

How many years have you been growing small fruit?

What percentage of your small fruit do you sell to each of the following outlets?

	Strawberries	Raspberries	Blueberries	Blackberries	Other (specify)
Chain Supermarkets					
Independent Supermarkets					
Wholesalers					
Shipping Point Farmers' Markets					
Auctions					
Processors					
Wineries					
Food Service Businesses					
Direct to Consumers					
Other Outlets (specify)					
Total	100%	100%	100%	100%	100%

What percentage of your indirect sales are through the following?

Verbal Contract Agreements	
Written Contract Agreements	
On Consignment	
Cash Sales	
Other (specify)	
Total	100%

When and how often do you arrange sales with your buyers?

How long have you worked with your current buyers? Describe your relationships with each of them.

What investments have you had to make in order to sell to the different market outlets mentioned above?

- Product liability insurance
- Production technology
- Post-harvest technology
- Grading equipment
- Washing equipment
- Labeling equipment or supplies
- Packaging equipment or supplies
- Delivery assets
- Human capital
- Other (specify)

Describe your experiences selling to each the different market outlets mentioned above.
(repeat question for each type of outlet)

- Benefits of selling to this type of outlet
- Difficulties with selling to this type of outlet
- What advice, about the following, would you give to producers who are interested in selling small fruit to this outlet:
 - Challenges they will face
 - Investments they will need to make
 - Management practices they will need to follow
 - Any other issues that might affect their success