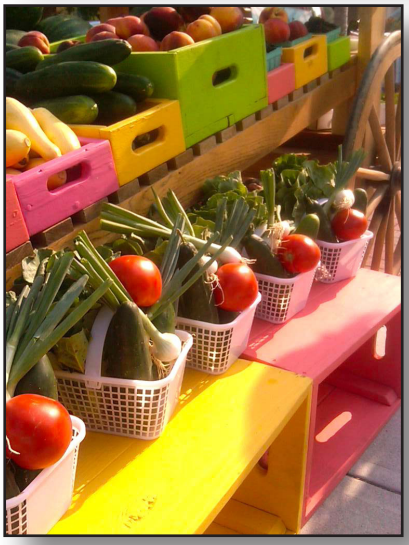
Agriculture in Virginia Beach: Impact on the City Economy






Terance J. Rephann

January 2012

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Center for Public Service
University of Virginia

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INTRODUCTION

Virginia Beach is Virginia's largest city at 437,994 residents and to many visitors who flock to its beaches or visit family members in the military service it appears to be largely urbanized. Its most visible industries are hospitality and tourism supported by natural amenities such as an the longest pleasure beach in the world and numerous hotels, motels, and restaurants, and a defense industry anchored by military installations such as Oceana Naval Air Station, the Training Support Center, and Fort Story. Sometimes overlooked is that a significant portion of the city's 248 square mile land area, 44 square miles in total, consists of farmland and forestland (City of Virginia Beach 2009). This land base supports over 200 farms and farm-related businesses that contribute to the environment, quality of life, and economy of the city and the region.

The purpose of this study is to describe the agricultural sector in Virginia Beach and gauge the contribution that it makes to the city's economy. The agricultural economy has changed significantly in the last half-century in size and other characteristics. In 1969 farmland covered nearly 53,000 acres and employed approximately 1,000 workers, accounting for 1.5% of total city employment. Hogs/sows were the largest source of cash receipts. By 1997, farm acreage was under 30,000 and farms employed 191 people, but crops formed the bulk of sales. Virginia Beach's agriculture has stabilized since that time and directly employed over 200 people in 2009. Crops continue to be, by far, the largest source of revenue and direct sales to consumers of vegetables, fruits, and other commodity products from roadside stands and farmers markets have expanded rapidly. In 2008-2010, Virginia Beach's farms generated an estimated average $23 million in output. $1.3 million of this amount was sold directly to area consumers. The farm sector was also responsible for attracting over 280,000 agritourism visitors from inside and outside the city.

This study takes a comprehensive approach to measuring the economic impact of agriculture. Not only does it gauge the economic impact of agriculture sales, but it looks at farm-related income derived from growing revenue sources such as agritourism and value-added products. In addition, the expenditures of agritourism visitors attributable to farm and equine activities and agriculture-related events and activities such as the Pungo Strawberry festival are counted. The study also considers the contribution of expenditures on agricultural research and education, in particular the economic impact of the Hampton Roads Agricultural Research and Extension Center. These economic impacts are broken out by source so that the reader can evaluate the relative importance of each component. Finally, the study discusses other economic benefits that stem from Virginia Beach agriculture.

The study uses a methodology (input-output analysis) and a software tool (IMPLAN) that have been used often in agricultural impact analysis, including recent economic impact studies of Virginia's agricultural and forest industries (Rephann 2008) and Clarke County, Virginia's agriculture sector (Lamie, Benson, and Pease 2005). The methodology accounts not only for the direct spending attributable to agricultural and farm-related activity such as agritourism but for indirect spending attributable to linkages in the supply chain. As a result of these linkages, the original expenditures cause a "ripple effect" or "multiplier effect" when money is re-spent in the Virginia Beach economy. Input data for the analysis is drawn from a variety of sources, including original survey work of Virginia Beach farmers and horse facilities and the Virginia Beach Office of the Virginia Cooperative Extension Service.

The study is divided into four sections. The first section provides more complete background on the history, size, and composition of Virginia Beach's agriculture sector. The second section provides a definition of the agriculture sector used in the study, describes the economic impact methodology and introduces the IMPLAN software tool used for the analysis. The third section presents the results of the economic analysis. The results are reported in terms of employment, output (or sales), and value-added. Economic impacts are also broken by out component (i.e., commodity production, horse expenditures, agritourism, and education/research)

and are identified as direct (the sales attributable to agriculture, including commodities, agritourism, equine, and research and education), indirect (impacts attributable to purchases of local production inputs), and induced (impacts attributable to additional worker household spending). The fourth section describes other economic benefits of agriculture in Virginia that are not captured by the economic impact analysis.

SECTION 1
VIRGINIA BEACH'S AGRICULTURE INDUSTRY

Virginia Beach can trace its agricultural heritage back to the Algonquian American Indian tribes who initially inhabited the region and cultivated maize, squash and beans to meet their dietary needs. English colonists made their first landing at Cape Henry in Virginia Beach on their way to establishing a permanent settlement at Jamestown where they introduced Old World plant and animal specials to the New World, including horses, barley, and wheat (Bailey 1910). During the colonial days and well into the 20th century, the region was still mainly rural and agriculture was the largest industry.

While the region was once all forests and farms, the rural area has been slowly pushed southward and westward with economic growth and the resulting residential, industrial and commercial development. As a result today's agricultural production region lies mainly in the southern section of the city in the Pungo and Blackwater neighborhoods. With the continued erosion of the rural land base, an urban growth boundary was established by the city in order to direct future development to areas of the city with the infrastructure best able to accommodate additional growth, including locations close to existing arterial highways and areas soon to be served by a Hampton Roads light rail system called The Tide. Rural preservation efforts have expanded south of the boundary in order to preserve environmental resources, protect scenic vistas important to sustainable tourism in the region such as Sandbridge, and promote continued agricultural production (City of Virginia Beach 2009).

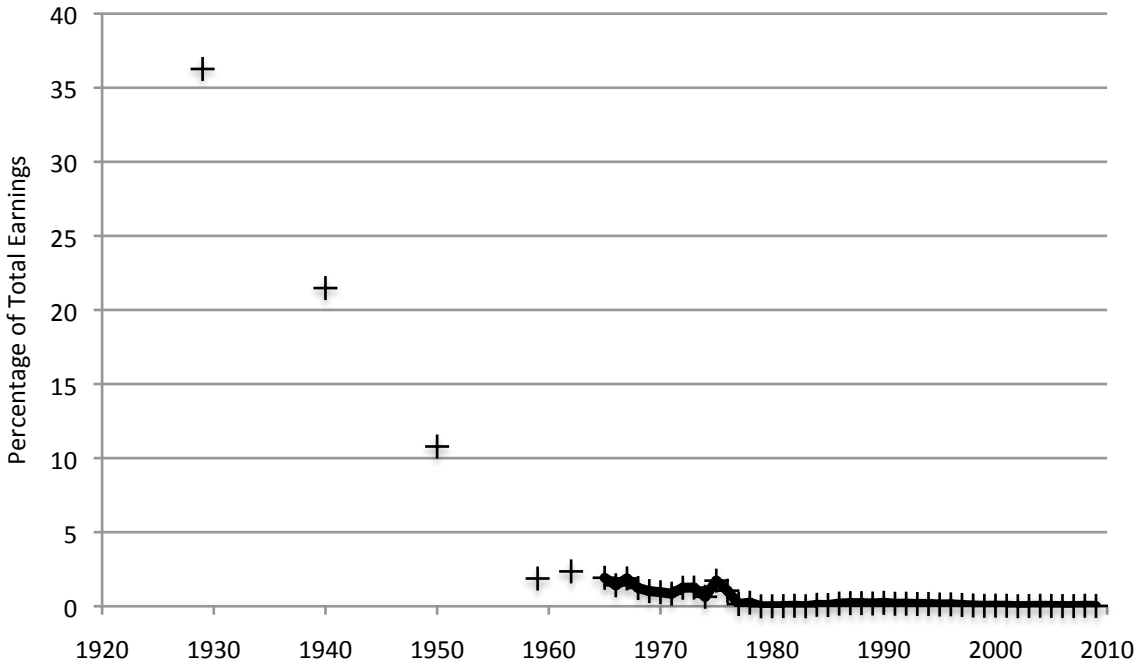
Agriculture has historically played an important part in the city's economy. In 1929, the earliest year that income figures are available, the farm sector made up 36 percent of total Virginia Beach earnings (see **Figure 1.1**). Indeed, the sector could easily lay claim to being the largest industry in the city as late as 1940. The advent of World War II rapidly changed this situation, and the defense industry catapulted to first place, with federal military earnings alone accounting for 45 percent of total city earnings in 1950. As the economy modernized, farmland was rapidly converted to military, industrial, commercial, and residential land uses. **Figure 1.2** shows the changes in farm acreage over the 1978-2007 period. Farmland was nearly halved from 1978 to 2007, decreasing from 51,275 to 26,671 acres[1] based on *Census of Agriculture* data. Employment attrition in the agriculture sector has outpaced the loss in the farmland due in part to productivity improvements. Nearly 1,000 workers were employed directly by the farm sector in 1969 (see **Figure 1.3**). This decreased to fewer than 200 by 1997 before stabilizing above 200 over the next decade.

The characteristics of Virginia Beach's farm sector have changed markedly over the last several decades.[2] **Figure 1.4** shows that agricultural cash receipts are increasingly derived from crops rather than livestock. The city once had several large Concentrated Area Feed Operations (CAFOs). Most have since discontinued operations. In recent years, Virginia Beach's agriculture production value has increased in tandem with rising prices for commodity crops such as corn and soybeans (see **Figure 1.5**). According to Virginia Beach Cooperative Extension estimates, approximately 51 percent of agriculture production value is agronomic crops and 16 percent fruits and vegetables. Livestock accounts for 18 percent and other products make up the residual 15 percent. The relative importance of miscellaneous income attributable to sources such as agritourism, agricultural services, custom work, and rental income has also increased. **Table 1.1** shows Virginia Beach participation in farm-related value-added activities (the *Census of Agriculture* only recently introduced

1 The Virginia Beach Department of Agriculture estimates total current farm acreage as 28,731.

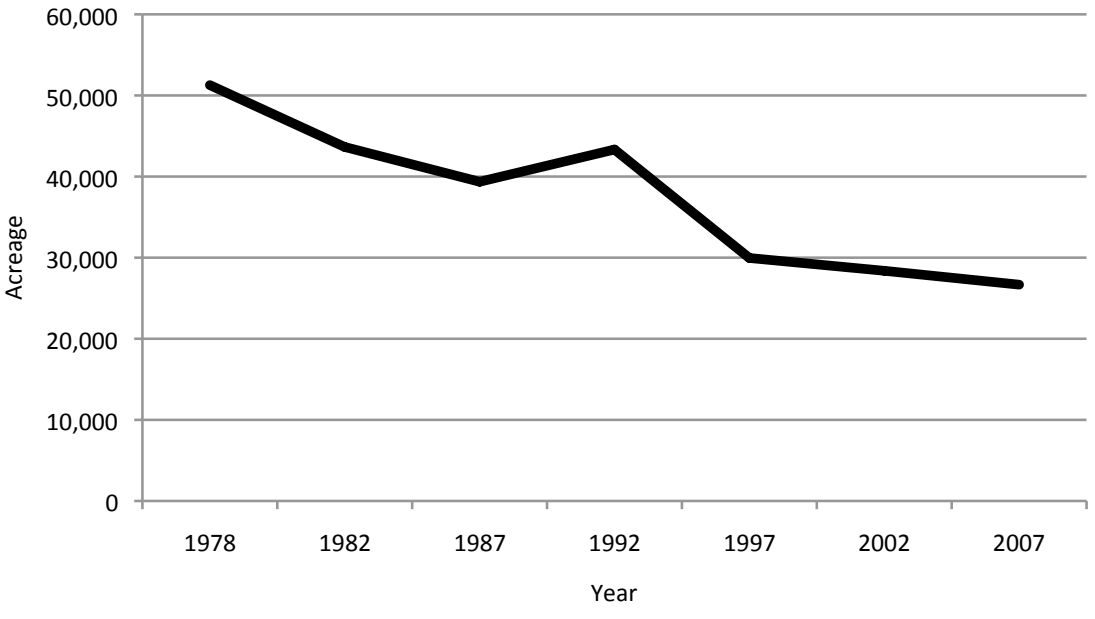
2 The U.S. Department of Agriculture defines a farm as any operation with $1,000 or more of agricultural product sales or receiving $1,000 or more in government payments during the year. Beginning in 2002, the U.S.D.A. expanded the definition to include places with imputed sales of $1,000 or more based on a point system that awards points for crop acreage and head of livestock. For instance, places with five or more horses or 200 or more acres of pasture but not reporting $1,000 or more in agricultural sales are defined as farms.

Figure 1.1 Virginia Beach Farm Earnings as Percentage of Total Earnings, 1929-2009



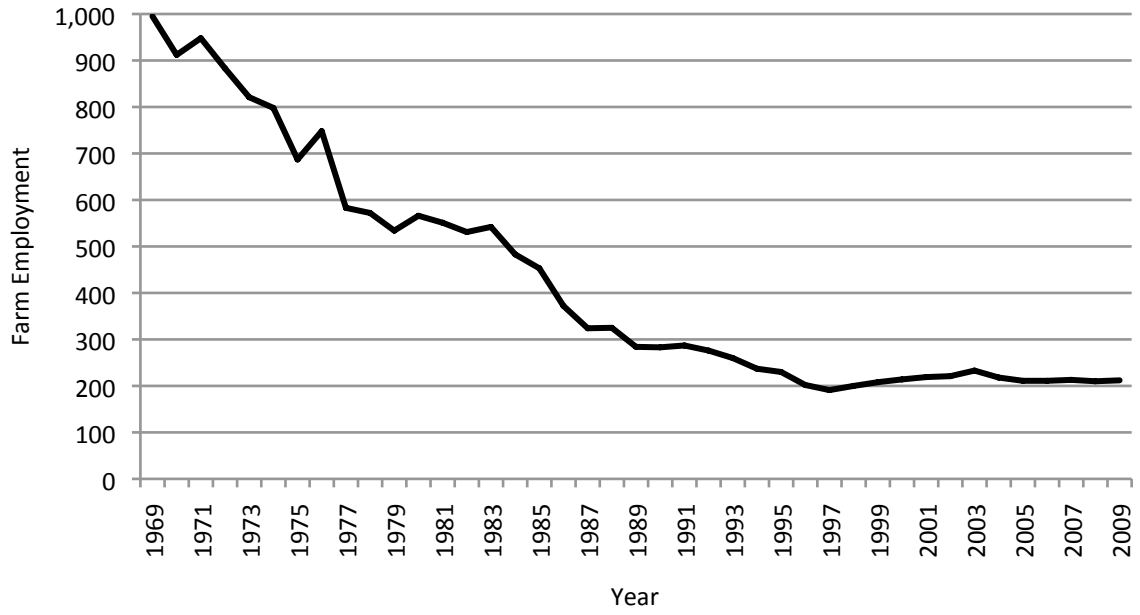
Source: Bureau of Economic Analysis

Figure 1.2 Virginia Beach Farm Acreage, 1978-2007



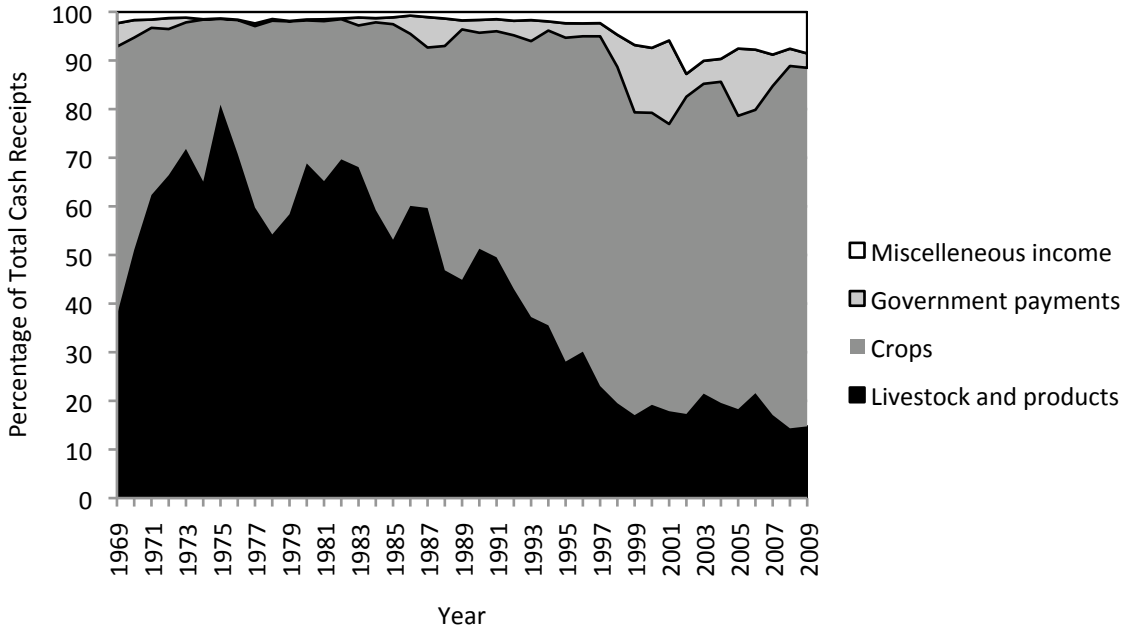
Source: U.S. Department of Agriculture, National Agricultural Statistics Service, various years

Figure 1.3 Virginia Beach Farm Employment, 1969-2009



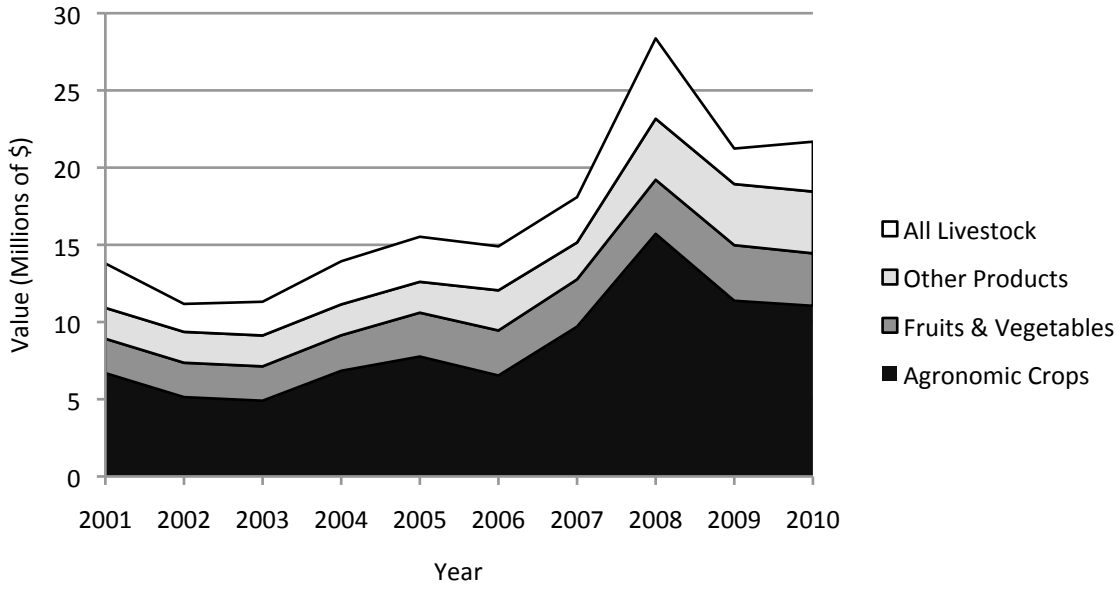
Source: Bureau of Economic Analysis, Regional Economic Information System

Figure 1.4 Virginia Beach Cash Receipts by Source, Percentage of Total, 1969-2009



Source: Bureau of Economic Analysis, Regional Economic Information System

Figure 1.5 Virginia Beach Agriculture Production Value by Commodity Group, 2001-2010



Source: Virginia Beach Office, Virginia Cooperative Extension Service

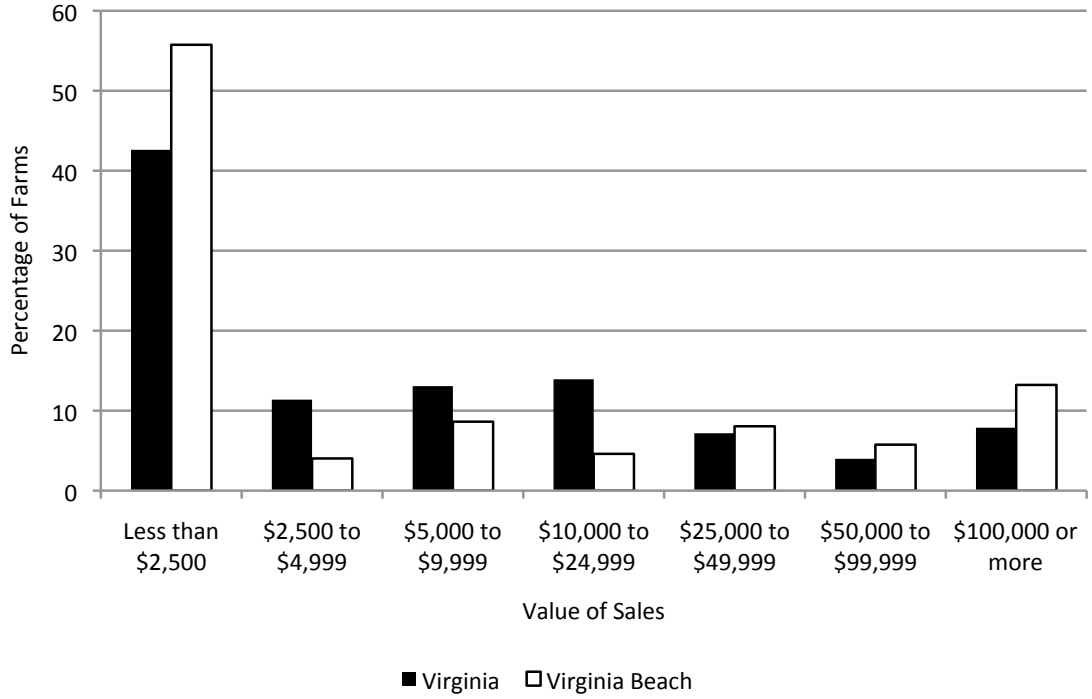
questions about activity in these areas). Direct sales to consumers more than doubled from 1997 to 2007. Virginia Beach farms and farmers are similar in many respects to those in other parts of Virginia. Farms are generally smaller than they were 30 years ago. A majority of farms in both Virginia and Virginia Beach currently have farm sales below $5,000 (see **Figure 1.6**). However, Virginia Beach has proportionally more farms with sales above $25,000. Farm operators are more likely to be employed off-farm part of the time and are aging. The average age of principal operators increased from 56 to 59 between 2002 and 2007. Approximately one-third of Virginia Beach farmers are retirement age (see **Figure 1.7**). Virginia Beach has a different agriculture production profile than the state at large (see **Figure 1.8**). Over two-thirds of Virginia's farms are principally livestock and poultry operations, while over half of Virginia Beach farms are classified as crop producers. Consequently, approximately 80 percent of Virginia Beach farmland is used in cropland production compared to only 40 percent for Virginia (see **Figure 1.9**). Virginia Beach ranks high in the production of certain commodities. It is the largest strawberry producer in the state with crop sales in the range of $750,000 to $1,000,000 per year

Table 1.1 Value-Added Activities by Virginia Beach Farmers, 1997-2007

Item	1997	2002	2007
Number of farms that sell directly to consumers	27	22	31
Number of farms that marketed products through Community Supported Agriculture (CSA)	NA	NA	5
Value of agricultural products sold directly to consumers	$219,000	$285,000	$725,000
Number of farms that offer agritourism and recreation services	NA	NA	4
Value of agritourism and recreational sales	NA	NA	$147,000
Number of farms producing and selling value-added products	NA	NA	8

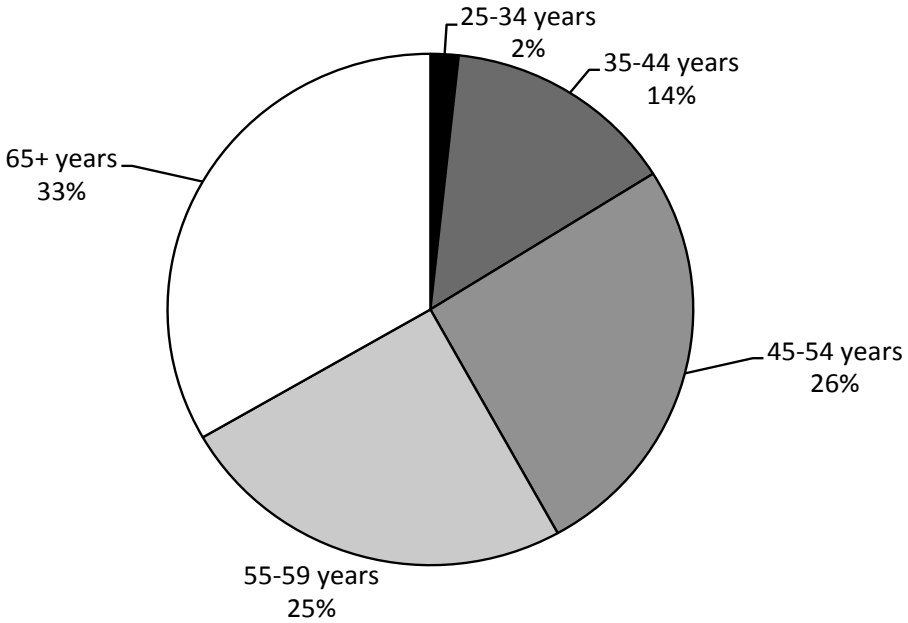
Source: U.S Department of Agriculture, National Agricultural Statistics Service (2009)
NA=Not available

Figure 1.6 Percentage of Farms by Value of Sales, Virginia and Virginia Beach, 2007



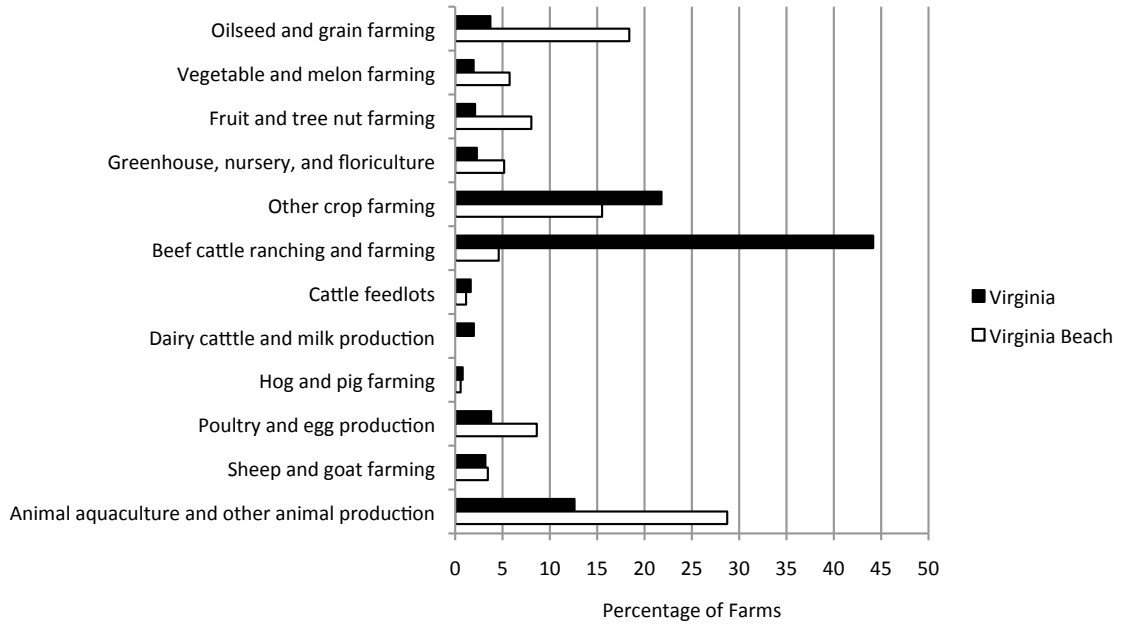
Source: U.S. Department of Agriculture, National Agricultural Statistics Service (2009)

Figure 1.7 Virginia Beach Principal Farm Operator by Age, 2007



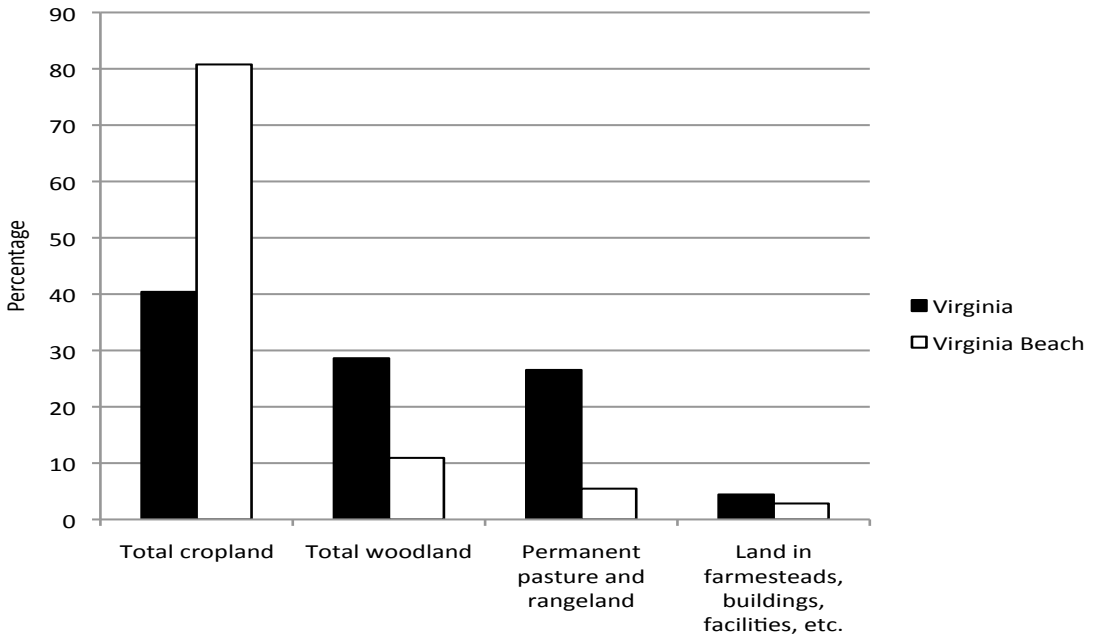
Source: U.S. Department of Agriculture, National Agricultural Statistics Service (2009)

Figure 1.8 Percentage of Farms by North American Industrial Classification System, Virginia and Virginia Beach, 2007



Source: U.S. Department of Agriculture, National Agricultural Statistics Service (2009)

Figure 1.9 Percentage of Farmland by Use, Virginia and Virginia Beach, 2007



Source: U.S. Department of Agriculture, National Agricultural Statistics Service (2009)

(Virginia Beach Department of Agriculture 2011a). It ranks 16th in corn production over the last 13 years (Virginia Beach Department of Agriculture 2011b). Virginia Beach horse operations and households board the 24th highest population of equine (NASS 2008). Farmers markets, roadside stands, U-pick, and other direct-to-consumer sales venues form an important part of the product distribution network and help place Virginia Beach sixth highest among Virginia localities in terms of the product sales directly to consumers

In the last two decades, the community has made significant progress in preserving its remaining natural resource base, which is a necessary condition for maintaining current levels of agricultural activity. The City Comprehensive Plan is supportive of efforts to preserve the rural area for environmental and growth management reasons and recognizes the economic importance of agriculture as part of a diversified economy. The City operates a very successful land preservation program called the Agricultural Reserve Program (ARP) that funds easement acquisition through installment purchase agreements (IPA) which provides yearly tax-free interest payments and a lump sum principal payment at the end of 25 years. The ARP program preserved 8,832 acres over the period 1997 to 2011 and has the goal of preserving a total of 20,000 acres. In addition, the City has made strategic acquisitions of land in the Pungo neighborhood to alter the path of development in that region.

The city has also developed supportive programming to build new agricultural markets. The Virginia Beach Department of Agriculture has facilitated the growth of local food markets by organizing and sponsoring farmers markets. The City now operates two farmers markets (see **Table 1.2**), Why not Wednesdays Farmers Market in City Center and the Virginia Beach Farmers Market. The City also sponsors an agritourism education program called *Live the Life Adventures* that introduces residents and tourists to fresh and value-added local food products. *Taste of the Market* provides food tours to local food venues and offers a mini-course on organic food production and its benefits. Farm to Table includes a guided tour of area farms and farm stands and opportunities to pick-your-own produce.

A number of private ventures have also formed around local food markets. Three other privately sponsored markets are held in the city, including Fresh on Fridays Farmers Market at the Jewish Community Center, Old Beach Farmers Market, and Red Mill Green Market. Over a dozen farms operate roadside stands, several farms offer U-pick opportunities, and five farms offer community supported agriculture (CSA) memberships. A local food hub was recently established by Coastal Farms, a coop program that aggregates food from dozens of Hampton Roads farms and delivers to selected locations around the region (Denckla Cobb 2011).

Private agritourism has flourished as well. The Pungo Strawberry Festival is held in the heart of the Pungo strawberry cultivation area and features a variety of entertainment, arts and craft booths, and agricultural exhibition and sales activities. The Festival was started in 1983 and has continued every year since, with proceeds going to local charitable organizations. It is held for two days on

Table 1.2 Virginia Beach Farmers Markets

Market	Location	Year Started	Size (# of Vendors)
Fresh on Fridays Farmers Market at the JCC	5000 Corporate Woods Drive	2010	7
Old Beach Farmers Market	620 19th Street @ Cypress Avenue	2009	10-12
Red Mill Green Market	2181 Upton Drive, Red Mill Commons Shopping Center	2010	10-15
Virginia Beach Farmers Market	3640 Dam Neck Road	1976	17
Why not Wednesdays Farmers Market	Commerce Street, Adjacent to The Sandler Center Outdoor Plaza	2010	10

Memorial Day weekend and has grown from around 50,000 visitors in 1983 to an estimated 170,000 visitors in 2010. A private company called Coastal Food Tours that expanded into the Hampton Roads region in 2010 operates food tours of Virginia Beach farmers markets and farms. The Virginia Beach area is also a major venue for Virginia's horse industry and features a range of equine activities, including trailriding, horse shows, polo, and therapeutic riding. The area is served by at least five regional equine organizations including: Virginia Beach Horse Show Association, the Atlantic Saddle Club, the East Coast Horse Show Association, the Southeast Virginia Dressage Association, the Tidewater Horse Council, and the Southeastern Association of Trailriders.

SECTION 2
METHODOLOGY AND DATA

This study examines the economic impact of Virginia Beach agriculture using input-output analysis, a research tool that allows one to quantify the impact of an economic activity or expenditure in a region. For this study, Virginia Beach farm production and agriculture-related spending made on local goods and services are counted as direct injections into the Virginia Beach economy. Linkages with other industries in the city mean that this initial injection has further stimulative effects that result from the purchases of goods and services and payments to employees. The stimulus causes a "multiplier effect" that results when money is re-spent in the local economy. This study attempts to capture several important facets of the agriculture sector in Virginia Beach, including farm commodity sales, value-added product sales, agritourism visitation to area farms and festivals, the equine industry, and agricultural education and research. These varied sources of stimulus are converted into spending that occurs within Virginia Beach.

Like most studies of this type, this one is called an economic impact study. From a technical standpoint the phrase "economic contribution" or "economic footprint" would better describe results of the analysis (Watson et al. 2007). No distinction is made between sales to and expenditures made by local residents and sales to and expenditures made by non-residents. An "economic contribution" analysis traces the gross economic activity that results from a given expenditure. It does not consider whether the expenditure used to generate the economic activity might have been used elsewhere in the economy to generate economic activity and gauge the comparative effect of that alternative activity.

Input-Output Analysis

An input-output model can represent the total impact of spending as consisting of three parts, a "direct effect," "an indirect effect," and an "induced effect." The "direct effect" consists of the injection of economic activity or expenditure into the region. For example, farm sales would count as direct expenditures. This direct expenditure then causes a "ripple effect" on the regional economy when money is re-spent. For example, local businesses provide supplies and services to farms such as agricultural services, seed, fertilizer, and equipment. These businesses spend a portion of their sales revenues on their supplies and services from other local firms who, in turn, purchase a portion of their supplies and services from other local firms. This cascading sequence of spending continues until the subsequent rounds of spending dissipate due to leakages in the form of taxes, savings, and spending outside the city. The cumulative effect of these cascading rounds of inter-industry purchases is referred to as the "indirect effect." The final component of the total is that portion attributable to the spending of households. That is to say, farms and businesses pay households for their labor services. These households then purchase goods and services from local firms who in turn purchase a portion of their labor and material inputs from other local and state firms, and so forth. Again leakages occur at each round due to taxes, savings, and purchases of goods and services outside of the region. The "induced effect," is the sum of all impacts associated with household purchases.

The impact analysis for this study used IMPLAN, a model that has been used in many economic impact studies, including studies of the regional economic impacts of agriculture in other Virginia communities (Lamie, Benson, and Pease 2005). IMPLAN (IMpact analysis for PLANning) is an industry standard input-output model. The model uses the most current available national and regional economic data from several federal government agencies to update and regionally customize an older national table (in this case, the 2002 United States Benchmark Table). The result is a 440 sector input-output table that is customized for the particular region of study, in this case the City of Virginia Beach.[1]

1 This study uses SAM multipliers that are closed with respect to households. In order to avoid double counting of inputs, final demand sectors could not purchase inputs from the Virginia Beach agriculture sector. Double counting would occur if you include the impact as a direct effect and then count it as an indirect effect because it serves as an input to that sector.

Impacts are evaluated within IMPLAN using three different measures: (a) total sales or total industrial output (TIO), (b) value-added, and (c) employment. Total sales or industry output is the total value of industry production during a period. It measures sales of intermediate inputs for use in production as well as sales of products to final consumers. Value added is a subset of total industrial output. It reflects only sales to final consumers and therefore avoids the double counting that occurs when intermediate inputs are included. It is the most commonly used measure of economic activity. Value-added is the concept behind gross domestic product (GDP) and can be compared to the GDP numbers provided by the Bureau of Economic Analysis for states and metropolitan areas. It can also be represented as total factor income plus indirect business taxes. Employment is measured in terms of person-years of employment. A person-year of employment is a job of one year in duration. Employment includes full-time and part-time workers as well as the self-employed and is measured by place of work.

Virginia Beach Surveys

Surveys of the Virginia Beach farm community were conducted to gather current-up-to-date information that was not available from other sources. The information collected through the surveys served several purposes. First, it helped to corroborate information obtained from Virginia Cooperative Extension on the magnitude of Virginia Beach farm commodity values and their composition. Second, it provided up-to-date estimates of the size and composition of direct farm sales to consumers and information on the importance of various sales venues. The most recent estimates of direct sales are from the 2007 Census of Agriculture but the sizeable growth that is occurring in local food markets has made this information quickly outdated. Third, it provided estimates of the size and composition of value-added product sales. Fourth, it provided estimates on the number of farm visitors during the year and expenditures associated with agritourism

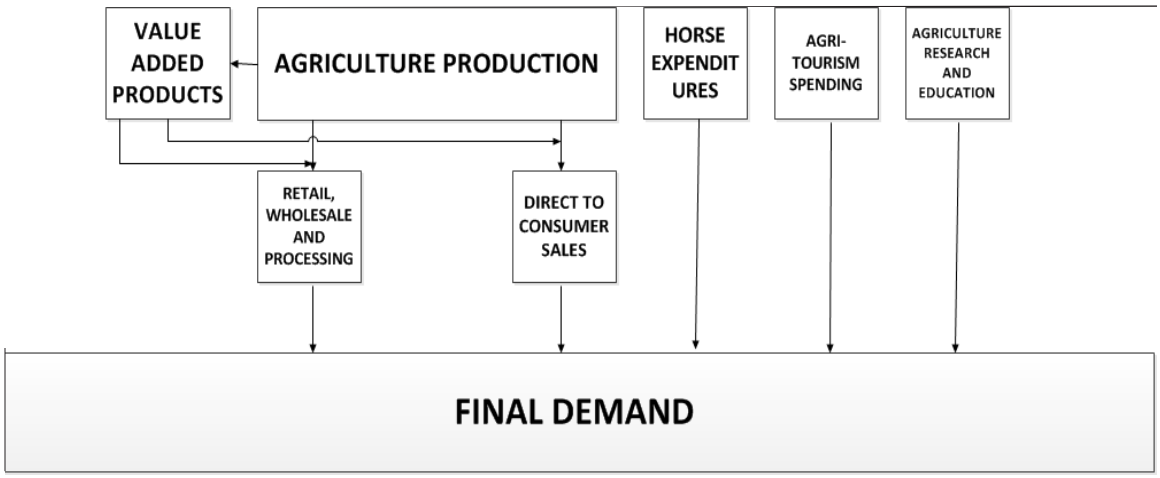
The surveys were administered during the months of August and September of 2011 by the Center for Economic and Policy Studies in cooperation with the Virginia Beach Department of Agriculture. Two questionnaires were administered (see **Appendix A.1** for copies of the survey instruments). The first questionnaire was directed at conventional farms and contained questions about farm characteristics, sales by commodity group, direct sales volume and features, value-added production, and agric-tourism activities. This survey customized to answer specific research questions pertaining to how the agriculture sector affects the Virginia Beach economy. Some questions with modification were drawn from other agribusiness surveys, including surveys of agritourism businesses (Schilling et al. 2006; Jensen et al. 2005) and farmers' markets participants (Miller 2005). A second questionnaire was sent to equine operations such as boarding, trail riding, training, and therapeutic riding facilities. This survey modeled one question on content from another equine survey (Groskreutz 2005). The survey questionnaire asked equine operations for information about selected features of their facilities and characteristics of agritourism visitors.

Two mailing lists were developed. The lists were drawn from mailing lists obtained from the Virginia Beach Department of Agriculture supplemented with records on horse event venues and facilities from Rephann (2010). One hundred and forty-nine addresses were assembled for the agriculture survey and 98 addresses for the horse facility survey.

The surveys were administered by mail. The survey mailing packets included a questionnaire, a personalized cover letter explaining the survey request, a supporting letter from the Virginia Beach Department of Agriculture, and a business reply mail envelope. A follow-up post card reminder was sent to non-completers ten days after the first mailing. Then a second survey packet was sent to non-completers seven days after the post-card mailing. Data collection efforts were finalized on October 19th.

Six farm survey replies indicated that they did not farm, and three horse facility contacts indicated that they had no horses. The adjusted response rate for the agriculture survey was 39 percent based on 56

Figure 2.1 Sources of Agriculture Sector Final Demand



responses from an adjusted sample of 143 farms. The adjusted response rate for the horse facility survey was 26 percent based on 25 responses from an adjusted sample of 95 horse facilities. Complete tabulations of surveys are presented in **Appendix A.2**.

Virginia Beach Agriculture Definition and Final Demand Estimation

The definition of Virginia Beach agriculture used in this study encompasses farm sales, expenditures made by horse operations and households on horses, agritourist spending, and agricultural education and research expenditures made by the Hampton Roads Agricultural Research and Extension Center (see **Figure 2.1**). Agritourism stems from visits to farms for activities as varied as hunting, education, and horse shows as well as visits to major agricultural festivals such as the Pungo Strawberry Festival. Each of these components is modeled quite differently in IMPLAN and relies on different assumptions and data sources. **Table 2.1** shows how each of these components is mapped onto IMPLAN sectors. Agricultural commodity production forms the single largest category of final demand. This production is sold to wholesalers and processors, as well as directly to consumers. In addition, a portion is used on the farm in both production and consumption. Estimates of agricultural production value were obtained from the Virginia Beach Cooperative Extension Office, which makes annual estimates of crop acreage, yields, and prices and livestock sales each year. The production values of these commodities were assigned to the corresponding IMPLAN sectors. Final demand resulting from value-added product sales was estimated and assigned to the food processing industry. In addition, grain elevator employment was included as a value-added wholesale and processing activity. It was estimated using ES202 records from the Virginia Employment Commission.

Horse operations and households owning horses are another important component of Virginia Beach agriculture. This component is treated differently from the farm sector. It encompasses all activities involved in maintaining and supporting horses. Most horse owners value horses beyond their income producing value as evidenced by studies that show that owners incur significant net operating losses on average (Deloitte Consulting 2005; Swinker et al. 2003; Gamrat and Sauer 2000). Therefore, expenditures on horses are used as the basis for estimating economic impact rather than horse sales. **Appendix A.3** shows expenditure data for calculating the economic impact of horse owner expenditures on support of horses. This expenditure data is based on information from the 2006 Virginia Equine Survey (U.S. Department of Agriculture, National Agricultural Statistics Service 2008) adjusted to 2010 prices (Rephann 2010). The Virginia Beach horse inventory is estimated

Table 2.1 Data Sources and IMPLAN Assignments by Component

Component	Data Sources	IMPLAN Assignment
Agricultural Commodity Production	Estimates of Virginia Beach agricultural production value from Virginia Cooperative Extension – Virginia Beach Office based on 3-year average of 2008-2010; employment and sales estimates for greenhouse and nursery sales obtained from IMPLAN.	IMPLAN Sectors 1 (oilseed farming), 2 (grain farming), 3 (vegetable and melon farming), 6 (greenhouse and nursery production), 10 (all other crop farming), and 15 (animal production, except cattle and poultry and eggs)
Value-added product sales	Virginia Beach Agriculture Survey	IMPLAN Sector 54 (fruit and vegetable canning and drying)
Grain Elevators	ES202 file from Virginia Employment Commission	IMPLAN Sector 340 (warehousing and storage)
Horse Expenditures[a]	National Agriculture Statistics Service 2006 Virginia Equine Survey expenditures adjusted to 2010 prices and 2006 Virginia Equine Survey estimated horse inventory	IMPLAN Sectors 10 (support activities for agriculture and forestry), 31 (electric power generation, transmission, and distribution), 33 (water, sewage and other treatment and delivery systems), 39 (maintenance and repair construction of nonresidential structures), 319 (wholesale trade), 320, 323, 326, 328, 331 (retail stores), 351 (telecommunications, 358 (insurance agencies, brokerages, and related activities), 360 (Real estate establishments), 362 (automotive equipment rental and leasing), 365 (commercial and industrial machinery and equipment rental and leasing), 367 (legal services), 368 (accounting, tax preparation, bookkeeping, and payroll services), 377 (advertising and related services), 379 (veterinary services), 404 (promoters of performing arts and sports), 411 (hotels and motels, 412 (other accommodations), 413 (food services and drinking places), and payroll (labor income change).
Agritourism spending	Visitor figures from Virginia Beach Agriculture Survey, Virginia Beach Equine Survey, Rephann (2010), and Pungo Strawberry Festival records. Visitor expenditure patterns from Rephann (2010)	IMPLAN Sectors 19 (support activities for agriculture and forestry), 323, 326-330 (retail stores), 335 (transport by truck), 362 (automotive equipment rental and leasing), 379 (veterinary services), 402 (performing arts companies), 403 (spectator sports companies), 404 (promoters of performing arts and sports), 405 (independent artists, writers, and performers), 406 (museums, historical sites, zoos, and parks), 407 (fitness and recreational sports centers), 408 (bowling centers), 409 (amusement parks, arcades, and gambling industries), 410 (other amusement and recreation industries), 411 (hotels and motels), 412 (other accommodations), 413 (food services and drinking places)
Agriculture Research and Education	Employment and expenditures from Hampton Roads Agricultural Research and Extension Center	IMPLAN Sector 432 Other state and local government enterprises

[a] The exact procedure for mapping survey data to the IMPLAN categories using equine budget information and other information is explained on page 28 of Rephann (2010).

Table 2.2 Virginia Beach Agritourism Estimates, 2010

Source	Visitors
Pungo Strawberry Festival	170,000
Farm agritourism	118,477
Total	288,477

to be 2,600 horses based on the same source. In order to avoid double counting of agricultural demand included in the agricultural commodity production, horse-related expenditures on farm commodities, such as hay crops, are not included.

Agritourism is another major aspect of Virginia Beach agriculture. Agritourism was separated into farm visitors (e.g., hunting, tours, pumpkin patches, trail riding, horse shows) and Pungo Strawberry Festival attendees (see **Table 2.2**). Farm agritourism figures are estimated on the basis of questions from the Virginia Beach Agriculture Survey (See Question 12 in Appendix A.2 for the Agriculture Survey) and the Virginia Beach Horse Facility Survey (see Question 4 in Appendix A.2 for the Horse Facility Survey). Survey results from the former indicated 13,525 farm visitors while results from the latter indicated 98,210 visitors in the categories of horse leasing, lessons, camps, and festivals (33,210). An additional estimate of 6,742 of attendance at 42 horse show and competitions during 2010 was based on data used in Rephann (2010). Therefore, total farm agritourism was estimated at 118,477. These estimates are largely based on tabulations of partial survey data and are not extrapolated. Therefore, they should be viewed as conservative visitation estimates. Estimates from the Pungo Strawberry Festival organizers place attendance in 2010 at 170,000.

To estimate agritourism direct expenditures, visitor estimates are combined with expenditure patterns for agritourists. Estimates of total trip expenditures for Virginia Beach agritourists were not available. Therefore, expenditure patterns for Virginia horse event visitors from Rephann (2010) were assumed to be representative too of Virginia Beach agritourists.

Appendix A.4 shows visitor expenditures by place of residence for spectators and participants. According to survey responses, 99 percent of Virginia Beach farm agritourists are derived from the Hampton Roads region. Therefore, the local expenditure amount of $23.32 spent per trip for local Virginia horse event spectators is applied to them. An expenditure amount of $79.42 for non-local, in-state horse event spectators is assumed for the remaining 1 percent. The Strawberry Festival is assumed to draw a similar audience as the Neptune Festival, which is also held in Virginia Beach. The Neptune Festival is estimated to derive 96 percent of its visitors from the Hampton Roads Area and 4 percent from elsewhere.[2] Therefore, the same local and non-local expenditure patterns are applied to visitors from each group. According to results from the Virginia Beach Horse Facility survey, all horse activity visitors come from the Hampton Roads region. However, for horse shows and competitions, it is estimated that 65 percent of visitors are local and 35 percent are from elsewhere. Once again, the corresponding local and non-local expenditure patterns are applied to the visitation figures by residence.

Two additional adjustments were made for horse show and competition participants. Horse show participants have much higher per capita expenditures and more diffuse spending patterns due to the additional costs of transporting, feeding, and showing horses. First, to avoid double counting of farm commodity sales, purchases of Virginia Beach farm commodities such as hay by participants were excluded. Second, the show and competition expenditures of Virginia Beach based participants were excluded since their horse show and competition expenditures should already be reflected in equine expenditures covered by the Horse expenditures component.

The final component of final demand is the Hampton Roads Agricultural Research and Extension Center. For this component, employment and operational budget figures for 2010 were assigned to the IMPLAN sector "other state and local government enterprises."

2 http://www.neptunefestival.com/about-us/festival-facts

Figure 2.2 Methodology for Estimating Direct Expenditures by Component

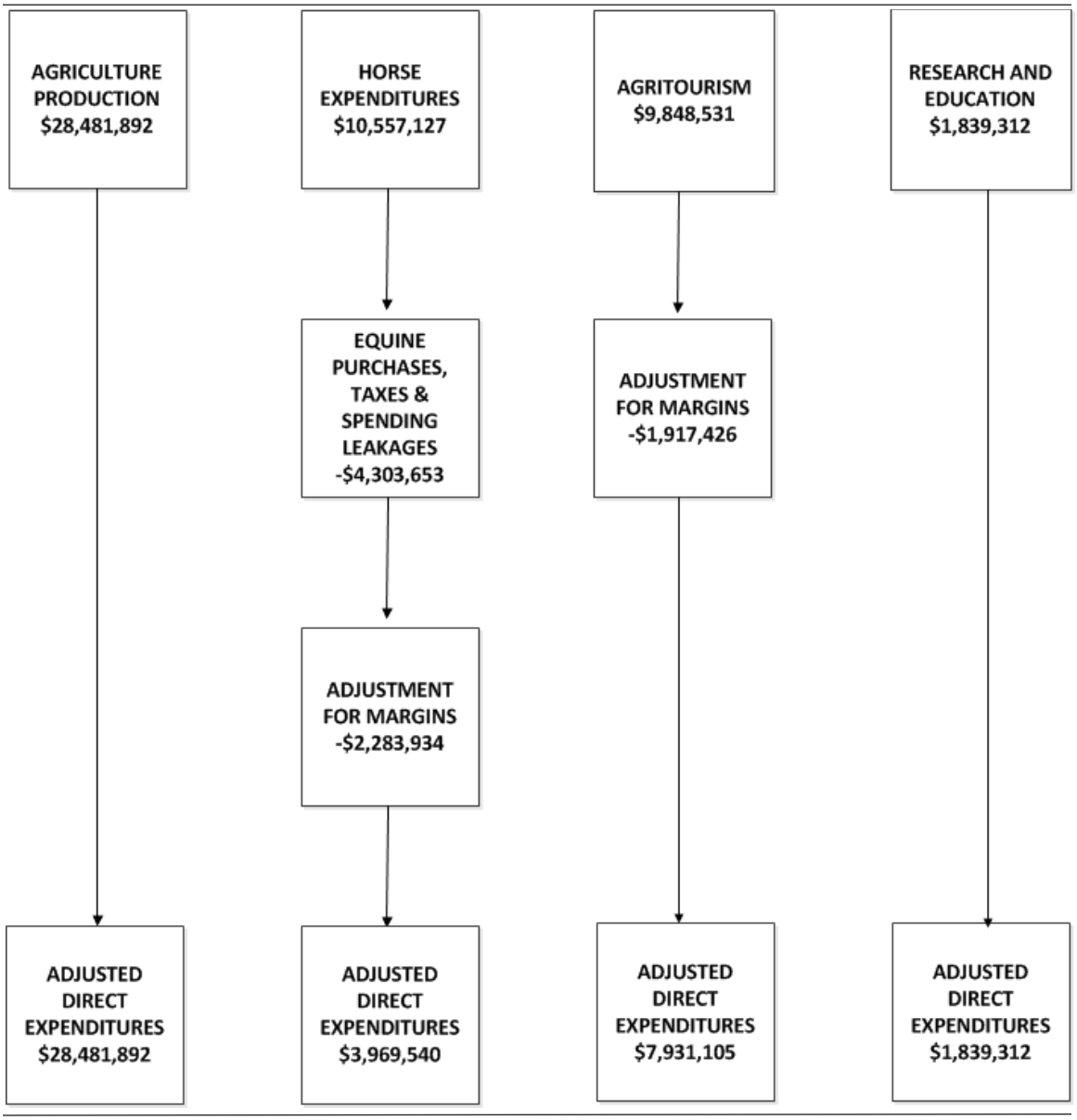


Figure 2.2 shows the sources of final demand for each component of the industry above and adjustments that were made to account to avoid double-counting, to subtract spending leakages and to adjust for margins. Spending leakages occur when direct spending occurs outside the Virginia Beach area. For instance, a local horse owner may purchase tack items or accounting services outside city boundaries. Adjustment for margins makes adjustments to retail trade, wholesale trade, and transportation sector expenditures so that the expenditures reflect the portion of the purchase actually retained by area businesses.

SECTION 3
RESULTS

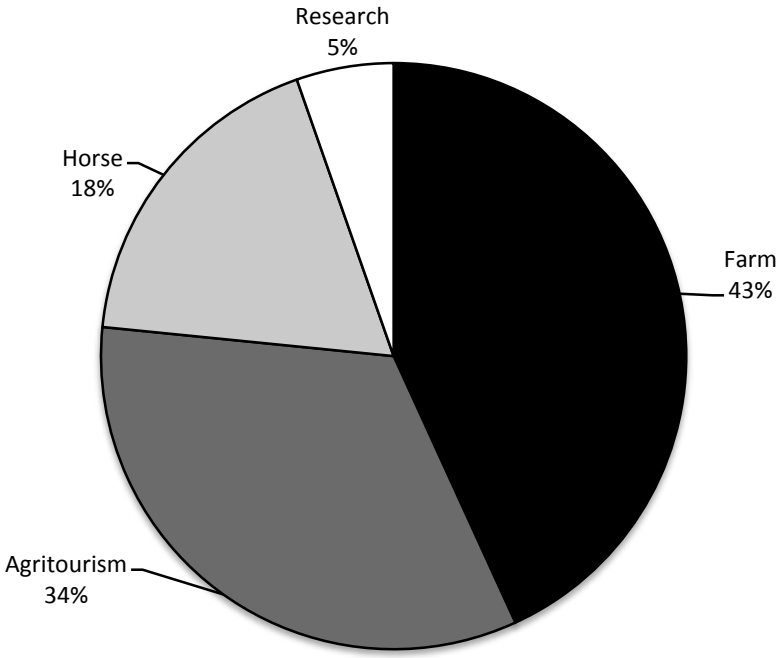
Table 3.1 shows the direct, indirect, induced, and total impacts of Virginia Beach agriculture disaggregated into its source components (i.e., agriculture commodity production, horse expenditures, agritourism, and education and research). The industry contributed $42.2 million in total direct output, 663 jobs, and $24.7 million in value-added. When the indirect and induced impacts resulting from cumulative expenditures made in the local economy are included, the industry accounted for nearly $61 million in total output, 820 jobs, and $35.6 million in value-added.

The largest source of employment impact (43 percent) was farming (see **Figure 3.1**), followed by agritourism at 34 percent. Agritourism measures the visitor-related expenditures made by customers except for purchases of Virginia Beach agriculture commodities. The source of the third largest impact is the expenditures of Virginia Beach horse owners and operations on horse maintenance and support (18 percent). Research and education accounts

Table 3.1 Virginia Beach Agriculture Impacts by Source, Output, Employment, and Value-added, 2010

	Output ($)	Employment	Value-added ($)
Farming			
Direct	28,481,892	290	16,538,298
Indirect	3,889,067	27	2,534,702
Induced	4,278,459	37	2,529,731
Total	36,649,418	354	21,602,731
Horse Expenditures			
Direct	3,969,540	120	2,982,093
Indirect	738,923	6	410,642
Induced	2,487,604	22	1,470,690
Total	7,196,067	148	4,863,425
Agritourism			
Direct	7,931,105	221	4,111,353
Indirect	3,210,683	32	1,597,612
Induced	2,497,595	21	1,476,944
Total	13,639,383	274	7,185,909
Education and Research			
Direct	1,839,312	32	1,099,441
Indirect	662,721	5	364,208
Induced	819,858	7	485,029
Total	3,321,891	44	1,948,678
Total			
Direct	42,221,849	663	24,731,185
Indirect	8,501,394	70	4,907,164
Induced	10,083,516	87	5,962,394
Total	60,806,759	820	35,600,743

Figure 3.1 Percentage of Total Virginia Agriculture Employment Impacts by Source, 2010



for the residual 6 percent of the total impact

Table 3.2 shows the impacts that can be assigned to sales in local markets (e.g., road-side stands, farmers markets). This is not an additive component but a subset of the total direct expenditure impact as highlighted in **Figure 2.1** and reflects the importance the sales of fresh fruits and vegetables in Virginia Beach. Survey results indicate that over $980,000 in sales of farm commodities were directly to consumers. When this result is extrapolated to all fruit and vegetables as a share of production, one obtains an estimate of $1.332 million in such sales in Virginia Beach. This estimate is 84 percent higher than the $725,000 value of direct sales to consumers provided in the 2007 Census of Agriculture and indicative of continual rapid growth.[1] Results indicate that $1.3 million in direct sales to consumers corresponds to 44 direct jobs and $765 thousand value-added. After accounting for indirect and induced impacts, the total impact of local direct sales to consumers is 47 jobs, $1.7 million in output, and $964 thousand value-added.

The impacts of Virginia Beach agriculture are felt in numerous other sectors of the economy (see **Table**

1 In all likelihood direct sales to consumers by Virginia Beach farms in 2010 is even higher because the Virginia Beach Agriculture Survey question 17 asked only about agricultural products sold "directly to Virginia Beach consumers" rather sales to all U.S. consumers as specified in the Census of Agriculture.

Table 3.2 Virginia Beach Agriculture Direct to Consumer Sales Economic Impacts, Output, Employment, and Value-added, 2010

	Output ($)	Employment	Value-added ($)
Direct	1,332,376	44	764,769
Indirect	156,715	1	99,943
Induced	167,315	2	98,864
Total	1,656,407	47	$963,575

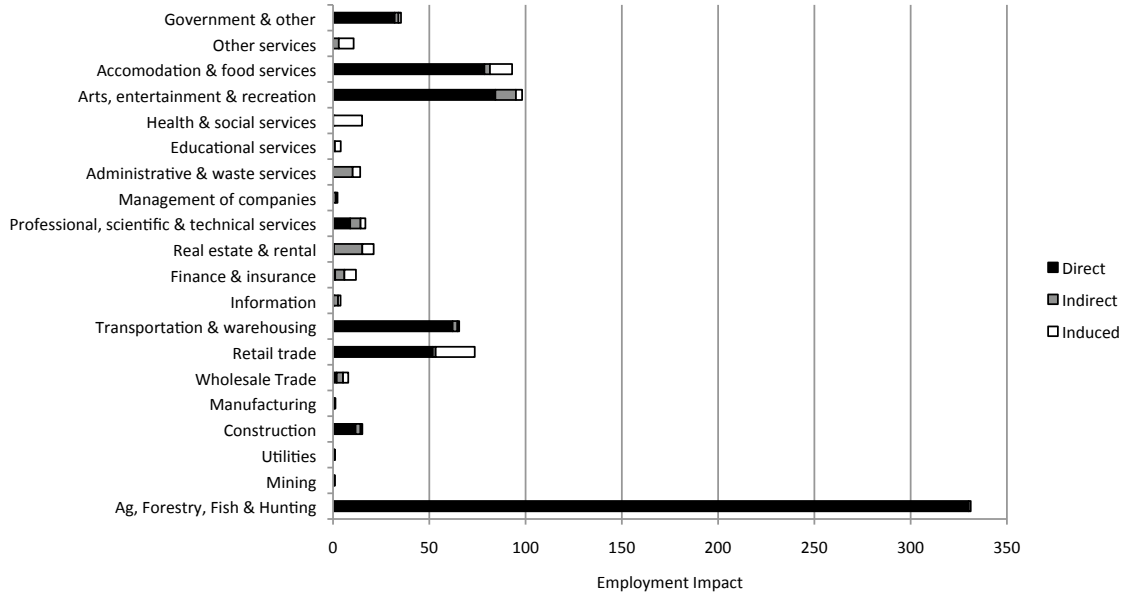
3.3 and **Figure 3.2**). The largest employment effects were in agriculture, forestry, fishing, and hunting, followed by arts, entertainment, and recreation, accommodation and food services, retail trade, transportation and warehousing, government, and construction, where direct impacts were dominant. These impacts reflect the combined role of traditional agriculture as well as the horse industry, agritourism, and agricultural research. In addition, Virginia Beach agriculture stimulated real estate, administrative and waste services, health and social services, and other sectors through the effects of interindustry purchases and subsequent rounds of spending.

Table 3.3 Total Impact of Virginia Beach Agriculture by Major Industry, Output, Employment, and Value-added, 2010

Industry	Output	Employment	Value-added
Total	60,606,759	820	35,600,743
Agriculture, forestry, fishing & hunting	25,116,568	331	13,595,675
Mining	1,335	0	798
Utilities	94,255	0	68,319
Construction	1,428,060	15	706,936
Manufacturing	123,659	1	30,563
Wholesale trade	1,094,436	8	896,541
Retail trade	2,625,227	74	3,211,602
Transportation & warehousing	5,433,731	65	4,227,052
Information	1,226,100	4	354,327
Finance & insurance	2,599,115	12	1,378,180
Real estate & rental	5,385,262	21	3,961,579
Professional, scientific & technical services	1,844,027	17	948,541
Management of companies	338,462	2	168,832
Administrative & waste services	749,292	14	462,125
Educational services	231,995	4	124,581
Health & social services	1,338,833	15	833,043
Arts, entertainment & recreation	2,733,567	98	402,708
Accomodation & food services	5,288,945	93	2,574,022
Other services	678,595	11	324,035
Government & other[1]	2,475,293	35	1,331,284

[1] Imputed rental payments for owner-occupied dwellings is captured in output and value-added impacts.

Figure 3.2 Distribution of Virginia Beach Agriculture's Direct, Indirect, and Induced Employment Impacts by Industry



SECTION 4
OTHER ECONOMIC BENEFITS

This study was not able to capture all of the economic impacts and social benefits associated with Virginia Beach's agriculture sector. For instance, agricultural landscapes preserve numerous environmental amenities and the agriculture sector forms part of a diversified regional economic base that helps in some small measure to insulate the local economy from more volatile swings in economic activity. These other economic effects are briefly discussed for the areas of environment and quality of life, education and health, civic society and social capital, and other economic impacts.

Environment and Quality of Life

The preservation of Virginia Beach's agriculture and forested landscape provides important environmental services to the city and Hampton Roads region. These environmental benefits include improved water quality and flood control, air quality, conservation of wildlife habitat, and containment of urban sprawl. The more orderly development pattern resulting from open space preservation can help lower the costs associated with development such as the provision of public utilities and reduce the costs associated with urbanization such as pollution and traffic congestion. Lastly, farmland protection helps to preserve the scenic beauty of the region, sustain agrarian and historic landscapes, and maintain a sense of place. There is substantial evidence that farmland confers amenity benefits to non-farm dwellers that results in higher property values (Ready, Berger and Blomquist 1997).

Health and Education

A vibrant local farm sector can promote healthy living and education in a variety of ways. Local food production can improve local food security and the availability of fresh, nutritious and high quality farm products to the city (Denckla Cobb 2011). Agricultural opens spaces also provide a more accessible venue for outdoor recreation and agritourism education. Virginia Beach's agriculture sector provides a number of learning, experiential and recreational opportunities that promote educational, physical, psychological and other therapeutic benefits for children. For example, the EQUI-KIDS riding program enlists over 200 volunteers and 18 horses to provide therapeutic services to thousands of children with mental, physical, emotional, and learning disabilities each year.[1] Such programs are known to build children's self-confidence and physical agility and teach responsibility (De Pauw 1996). The Virginia Beach 4-H program, which provides educational and recreational activities to area young people and offers 14 different clubs, had an enrollment of 5,178 youth in 2010 supported by 602 adult volunteers. Studies suggest that 4-H has a positive impact on participants including better performance in school, development of leadership skills, and better self-esteem (Kress). Much of the money raised for program activities is undertaken by the youths themselves including shows and sales and auctions of agricultural products and livestock that netted an average of $152 thousand per year over the period 2009-2011.

Civic Society and Social Capital

Many agriculture-related organizations and activities in Virginia Beach help build community spirit, generate volunteer services, and raise funds for worthy charitable causes. For instance, the 2010 Pungo Strawberry festival raised over $48,000 for 78 local charities in 2010. Such festivals also promote community development by building "community pride, sense of place, or identity, volunteerism, and the general benefit of pulling people together" (Marcouiller 1995). They form a part of an overall tourism effort and build interest in other area venues or help create a critical mass of activities to attract and retain tourists. Another notable program is Virginia Cooperative Extension's Master Gardner Program, which provides specialized training to avid gardeners who in turn provide volunteer education

1 More information is available at the Equikids website: http://www.equikids.org/

and service to the community. In 2010, 236 active Master Gardeners donated 24,793 hours of volunteer labor towards 24 gardening and landscaping projects in Virginia Beach.[2] The estimated economic value of these volunteer hours is $340,259.[3] The Virginia Farm Bureau is the major sponsor of the Virginia Beach Amphitheatre that will host numerous nationally recognized musical artists in 2011.

Other Economic Effects

The study excluded some economic impacts that might reasonably be associated with Virginia Beach agriculture. For example, the rapidly growing "green industry" has areas of intersection with commercial agriculture. It produces horticultural plants and turf grass-related inputs, landscape and horticultural services, golf course and sport facility turf grass maintenance services, and retail/wholesale trade and distribution of horticultural products such as garden centers and florists (Hughes and Hinson 2000). Greenhouse and nursery and Christmas tree production is included in the Virginia Beach agriculture impact estimates, but the bulk of other sales is not.[4] It is important to note that excluded parts of the Green Industry are big employers. The landscaping sector alone employed 977 workers in Virginia Beach in 2010 (Virginia Employment Commission 2011).

Although this study included the effects of direct sales of local agricultural products to consumers in venues such as farmers markets and roadside stands, it did not include the impact of such activities on nearby venues such as other merchandisers and other businesses due to the increased customer traffic. Farmers markets draw increased customer flow to conventional shopping areas because of the wide variety of vendors, unique types of products available, and recreational and entertainment offerings. Some studies estimate the sales that occur at nearby businesses at equal or more than the farmer market sales (Hughes et al 2008).

Virginia Beaches agriculture sector also helps to diversify the local economy. Such economic diversification can have a countercyclical employment effect. For instance, during the recent recession, the agricultural economy has been buoyed by high commodity prices due to increased international demand for fuel, food, and fiber. While Virginia Beach employment decreased by over 13,000 over the period 2007-2009, the farm sector remained a steady source of employment.

2 Virginia Beach Master Gardeners website: http://www.vbmg.org/

3 This estimate was made by assessing the value of voluntary labor at 73 percent of the value of compensation for an average hourly wage earner ($18.80) in the Virginia-Beach-Norfolk-News, VA-NC metropolitan area using July 2010 figures available from the U.S. Department of Labor, Bureau of Labor Statistics (2010). The 73 percent weighting factor is suggested by Brown (1999) to translate volunteer time into a recipient-oriented measure of value.

4 According to the 2007 Virginia Green Industry Survey (Virginia Department of Agriculture and Consumer Services 2010) survey, only 29 percent of green industry sales consist of plant and Christmas tree sales. This figure includes retail trade as well as commercial nurseries and greenhouses. The remainder consists of landscape design and installation, wholesale distribution, grounds maintenance, and other activities and

REFERENCES

Bailey, L. H. Ed. 1910. *Cyclopedia of American agriculture*. London: MacMillan and Company.

Brown, Eleanor. 1999. Assessing the value of volunteer activity. *Nonprofit and Voluntary Quarterly* 28, 3: 3-17.

City of Virginia Beach. 2009. *It's our Future*. Comprehensive Plan Policy Document. October 1, 2009.

Denclka Cobb, Tanya. 2011. Virginia an emerging leader in nation's local food movement. *The Virginia News Letter* 87, 6: 1-16.

De Pauw, K. P. 1986. Horseback riding for individuals with disabilities: Programs, philosophy, and research. *Adapted Physical Activity Quarterly* 3: 217-226.

Groskreutz, Christopher Glenn. 2005. Estimating the economic importance of the Georgia equine industry's trail riding and boarding stable sector. A Thesis Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment of the Requirements for the Degree of Master of Science. Athens, GA: University of Georgia.

Hughes, David W. and Roger A. Hinson. 2000. Estimating the value of the green industry to Louisiana's economy. *Journal of Agribusiness* 18, 2: 207-220.

Hughes, David W., Cheryl Brown, Stacy Miller, and Tom McConnell. 2008. Evaluating the economic impact of farmer's markets using an opportunity cost framework. *Journal of Agricultural and Applied Economics* 40, 1: 253-265.

Jensen, Kim, Gena Dawson, Megan Bruch, Jamey Menard, and Burton English. 2005. *Agri-tourism in Tennessee: Current status and future growth, 2003-2004*. Knoxville, TN: Department of Agricultural Economics, University of Tennessee.

Kress, Cathann A. Does participation in a 4-H clubs make a difference in a young person's life?

Lamie, R. David, Matt Benson, and Jim Pease. 2005. *The economic impact of the agriculture sector in Clarke County, Virginia*.

Marcoulier, David. 1995. The community impacts of festivals and events. *Community Economics Newsletter*. http://www.aae.wisc.edu/pubs/cenews/docs/ce222.txt.

Miller, Stacy M. 2005. Characteristics of Farmers' Market Vendors in West Virginia. Thesis submitted to the Davis College of Agriculture, Forestry and Consumer Sciences at West Virginia University.

Ready, Richard C., Mark C. Berger, and Glenn C. Blomquist. 1997. Measuring amenity benefits from farmland: Hedonic pricing vs. contingent valuation. *Growth and Change* 28: 438-458.

Rephann, Terance J. 2008. *The economic impact of agriculture and forestry on the Commowealth of Virginia*. Charlottesville, VA: University of Virginia, Weldon Cooper Center for Public Service.

Rephann, Terance J. 2011. *The economic impact of the horse industry in Virginia*. Charlottesville, VA: University of Virginia, Weldon Cooper Center for Public Service.

Schilling, Brian J., Lucas J. Marxen, Helen H. Heinrich, and Fran J.A. Brooks. 2006. T*he opportunity for agritourism development in New Jersey*. New Brunswick, NJ: Food Policy Institute, Rutgers, the State University of New Jersey.

U.S. Department of Agriculture, National Agricultural Statistics Service. 2008. *Virginia equine survey report*: 2006.

U.S. Department of Agriculture (USDA), National Agricultural Statistics Service. 2009. 2007 census of agriculture. United States summary and state data. Volume 1, Geographic Area Series, Part 51. AC-07-A-51

U.S. Department of Labor, Bureau of Labor Statistics. 2010. National Compensation Survey. http://www.bls.gov/ncs/ocs/sp/ncbl1645.txt

Virginia Beach Department of Agriculture. 2011a. *Agricultural Fact Sheet: Strawberries*.

Virginia Beach Department of Agriculture. 2011b. *Agricultural Fact Sheet: Corn*.

Virginia Department of Agriculture and Consumer Services. 2010. 2007 *Virginia Green Industry Survey*.

Virginia Employment Commission. 2011. Quarterly Census of Employment and Wages. http://www.vawc.virginia.gov/analyzer/session/session.asp?CAT=HST_EMP_WAGE_IND

Watson, Philip, Joshua Wilson, Dawn Thilmany, and Susan Winter. 2007. Determining economic contributions and impacts: What is the difference and why do we care? *Journal of Regional Analysis and Policy* 37, 2: 140-146.

APPENDIX A.1
Survey Instruments

VIRGINIA BEACH AGRICULTURE SURVEY

This survey is being conducted as part of a study to measure the economic impact of agriculture in Virginia Beach. The study is being sponsored by the City of Virginia Beach Department of Agriculture. Participation is voluntary, but your cooperation in this effort will be valuable to the industry and City's future. The survey should take approximately 10 minutes to complete. **All information that you provide will be kept strictly confidential**. Thank you for your participation.

A. YOUR FARM'S CHARACTERISTICS

1. How many acres did your farm own or rent/lease to/from others in 2010 in Virginia Beach?
   a. Own _____
   b. Rent/lease from others _____
   c. Rent/lease to others _____

2. How many acres of crops did your farm harvest in during 2010?

	Acres
a. Oilseed crops (e.g. soybeans)	_____
b. Grains	_____
c. Vegetables and melons	_____
d. Tree nuts	_____
e. Fruit	_____
f. Greenhouse and nursery (include short rotation woody crops and Christmas trees)	_____
g. Timber and firewood	_____
h. Other crops (please describe _____)	_____

3. How many livestock/poultry did your farm sell during 2010?

	Number
a. Cattle	_____
b. Poultry and eggs	_____
c. Hogs/Swine	_____
d. Horses	_____
e. Other livestock (please describe _____)	_____

4. Do you produce value-added products on your farm? (Check all that apply)

a. Processed fruits, vegetables, berries, meats or dairy products (e.g. jams, cheese, jerky) ❑
b. Dried or arranged herbs and flowers (e.g., teas, floral arrangements) ❑
c. Baked goods ❑
d. Other value-added products (e.g., soaps, candles) (Please describe _____) ❑

B. YOUR FARM'S INVOLVEMENT IN LOCAL FOOD MARKETS

5. Did you sell any farm commodities or value added products directly to consumers for human consumption or direct to retail in 2010? (Check the appropriate answer)
   a. Yes ❑
   b. No ❑

IF you answered "YES," please complete the remaining part of this section. Otherwise, please move to the next section (Section "C").

6. Which direct to consumer/retail methods did you use to sell your farm products or value added products in 2010? (Check all that apply)
   a. Farmer's markets ❑
   b. Pick-your-own ❑
   c. On-farm or roadside stand ❑
   d. Subscription service or Community Supported Agriculture ❑
   e. Flea markets ❑
   f. Natural food stores ❑
   g. Conventional supermarkets or grocery stores ❑
   h. Restaurants or caterers ❑
   i. Institutions (e.g., hospitals, schools) ❑
   j. Other (please describe _____)

7. If you sold at a market during 2010, which venue(s) did you use? (Check all that apply)
   a. Fresh on Fridays Farmers Market at the JCC ❑
   b. Old Beach Farmers Market ❑
   c. Red Mill Green Market ❑
   d. Virginia Beach Farmers Market ❑
   e. Why not Wednesdays Farmers Market ❑
   f. Markets outside of Virginia Beach ❑
   g. Other (please describe _____)

8. How many times did you sell at markets during 2010?
   Total visits on weekdays _____
   Total visits on weekends _____

9. What products did you sell directly to consumers or directly to retail? (Check all that apply)
   a. Vegetables ❑
   b. Fruits and nuts ❑
   c. Dairy and eggs ❑
   d. Meat ❑
   e. Live plants ❑
   f. Herbs and flowers ❑
   g. Value-added products ❑
   h. Other (please describe _____)

C. YOUR FARM'S INVOLVEMENT IN AGRITOURISM

10. Did you receive visitors on your farm for tourism or recreation in 2010? (Check the appropriate answer)
    a. Yes ❑
    b. No ❑

IF you answered "YES," please complete the remaining part of this section. Otherwise, please move to the next (section "D").

11. What types of agritourism attractions are offered on your farm? (Please check all that apply).
    a. Horseback riding ❑
    b. Festivals, events, and shows (e.g., harvest festival, music festival, horse show) ❑
    c. Farm/farm products related festivals or fairs ❑
    d. On-farm tour ❑
    e. Pumpkin patch ❑
    f. Corn maze ❑
    g. Field rides (e.g., wagon, tractor or hayrides) ❑
    h. Petting zoos or farm animal displays ❑
    i. Cultural or historic exhibits (e.g., museums, antiques) ❑
    j. On-farm bed and breakfast ❑
    k. On-farm fee fishing ❑
    l. On-farm fee hunting ❑
    m. On-farm camping ❑
    n. On-farm restaurant/eating establishment ❑
    o. Other (please describe _____)

12. How many people visited your farm for tourism, education or recreation in 2010? _____

Please estimate: %

    a. Percentage of visitors who were residents of Virginia Beach _____
    b. Percentage of visitors who reside in Hampton Roads area but outside of Virginia Beach _____
    c. Percentage of visitors who reside within state but outside of Hampton Roads _____
    d. Percentage of visitors who reside outside of Virginia _____

13. Did you charge a fee for any of the agritourism activities offered on your farm? (Check the single best answer)
    a. No, all of the activities are free of charge ❑
    b. Yes, some of the activities are offered for a fee ❑
    c. Yes, all of the activities are offered for a fee ❑

14. What is the average amount spent per agritourism visitor during a typical visit in 2010?
    a. Admission or user fees $_____
    b. Purchasing farm products (e.g., pick your own, farm stand) $_____
    c. Concession food and drink or non-food items $_____
    d. Other (please describe _____) $_____

15. How many years have you offered agritourism activities on your farm? _____

D. INFORMATION ABOUT YOUR FARM'S SALES AND EMPLOYMENT

16. Please report the gross value of agricultural products sold by your farm in 2010. Exclude value-added products (e.g., jams, cheese, floral arrangements, soap)

a. Oilseed crops (e.g. soybeans) $_____
b. Grains $_____
c. Vegetables and melons $_____
d. Tree nuts $_____
e. Fruit $_____
f. Greenhouse and nursery $_____
(include short rotation woody crops and Christmas trees)
g. Timber and firewood $_____
h. Other crops (please describe _____) $_____
i. Cattle $_____
j. Poultry and eggs $_____
k. Hogs/Swine $_____
l. Horses $_____
m. Other livestock (please describe _____) $_____
Total $_____

17. Estimate the gross value of agricultural products sold directly to Virginia Beach consumers for human consump tion by your farm in 2010. Include sales from roadside stands, farmers markets, pick your own, etc. Exclude value-added products (e.g., jams, cheese, floral arrangements, soap)
$_____

18. Estimate the gross value of agricultural products sold directly to Virginia Beach retail by your farm in 2010. In clude sales to food stores, supermarkets, restaurants, hospitals, schools, etc. Exclude value-added products (e.g., jams, cheese, floral arrangements, soap) $_____

19. Estimate the gross value of value-added products (e.g., jams, cheese, floral arrangements, soap) sold in 2010.
$_____

20. Estimate the gross value of agri-tourism and recreational products and services sold by your farm in 2010. Please do not include sales of agricultural products or value-added products. $_____

21. What impact did government sponsored local food initiatives such as (a) Buy Fresh, Buy Local, (b) Taste of the Market, and (c) Virginia Beach organized farmers markets (i.e., Virginia Beach Farmers Market, Why not Wednesdays Farmers Market) have on your sales in 2010? (Please provide your best estimate)
$_____ Estimated increase in sales (if no change in sales, please indicate 0)

22. Estimate your farm-related income in 2010 from other sources (e.g., agricultural program payments, payments received for renting/leasing farmland, animal boarding, crop and livestock insurance payments, customwork and other agricultural services) $_____

23. Do you plan to begin, expand, decrease, or discontinue direct to consumer or direct to retail sales in the next five years?

a. Begin ❑
b. Expand ❑
c. Decrease ❑
d. Discontinue ❑
e. None of the above ❑

24. Do you plan to begin, expand, decrease, or discontinue agri-tourism or recreation services at your farm in the next five years?

a. Begin ❑
b. Expand ❑
c. Decrease ❑
d. Discontinue ❑
e. None of the above ❑

25. How many people (including yourself) were employed on your farm in 2010?

	Number
a. Full-time year-round	_____
b. Full-time seasonal	_____
c. Part-time year round	_____
d. Part-time seasonal	_____

26. Is there anything else that you would like to tell us about your farm operation, involvement in local food markets, or agritourism activities?

_____
_____
_____
_____
_____
_____

Thank you for taking the time to complete this survey. If you have any questions about the survey, please contact Terry Rephann at the Weldon Cooper Center for Public Service, P.O. Box 400206 Charlottesville, VA 22904-4206. Phone (434)-982-4501. Fax (434) 982-4501. e-mail: trephann@virginia.edu.

VIRGINIA BEACH HORSE FACILITY SURVEY

This survey is being conducted as part of a study to measure the economic impact of agriculture in Virginia Beach. The study is being sponsored by the City of Virginia Beach Department of Agriculture. Participation is voluntary, but your cooperation in this effort will be valuable to the industry and City's future. The survey should take approximately 10 minutes to complete. **All information that you provide will be kept strictly confidential**. Thank you for your participation.

1. Which of the following best describes your horse operation? (Please check all that apply.)
   a. Boarding facility ❑
   b. Riding center ❑
   c. Therapeutic center ❑
   d. Working farm ❑
   e. Other (please describe _____)

2. How many acres did your horse operation own or rent/lease from/to others in 2010 in Virginia Beach?
   a. Own _____
   b. Rent/lease from others _____
   c. Rent/lease to others _____

3. How many years have you offered horse-related services or activities at your farm/facility? _____

4. How many visitors/customers did your horse operation have in 2010 for each of the following categories?

	Total	% Virginia Beach Customers	% Other Hampton Roads Customers
a. Horse-leasing/rental	_____	_____	_____
b. Horse-boarding	_____	_____	_____
c. Lessons	_____	_____	_____
d. Training	_____	_____	_____
e. Horse shows and competitions	_____	_____	_____
f. Camps	_____	_____	_____
g. Festivals, fairs, expos or emporiums	_____	_____	_____
h. Other (Please describe _____)	_____	_____	_____

5. What types of amenities do you offer at your facility? (Please check all that apply)

   a. Pasture space for horses ❑
   b. Outdoor arena ❑
   c. Covered arena ❑
   d. Indoor arena ❑
   e. Jumps ❑
   f. Trails ❑
   g. On-site veterinary services ❑
   h. Horse grooming facilities ❑
   i. Feed and hay ❑
   j. Snack shop/restaurant ❑
   k. Gift shop ❑
   l. On-site tack shop ❑
   m. Barn/stalls ❑
   n. Camping area ❑
   o. Picnic area/grills ❑
   p. Bed and breakfast/Inn ❑
   q. Changing/locker-room facilities ❑
   s. Shower facilities ❑
   t. Toilet facilities ❑
   u. Guided tours ❑
   v. Other (please describe _____)

6. If your facility hosted horse shows and competitions in 2010, how many events did you host? _____

7. Please estimate the total number of horses at your operation in 2010 that you . . .
   a. Owned _____
   b. Boarded _____
   c. Sold _____

8. How many people (including yourself) were employed by your operation in 2010?
   a. Full-time year-round _____
   b. Full-time seasonal _____
   c. Part-time year round _____
   d. Part-time seasonal _____

9. Do you plan to expand, decrease, or discontinue or expand horse-related services or activities in the next five years? (Check the single best answer)
   a. Begin ❑
   b. Expand ❑
   c. Decrease ❑
   d. Discontinue ❑
   e. None of the above ❑

10. Is there anything else that you would like to tell us about your horse operation?

_____
_____
_____
_____
_____
_____

Thank you for taking the time to complete this survey. If you have any questions about the survey, please contact Terry Rephann at the Weldon Cooper Center for Public Service, P.O. Box 400206 Charlottesville, VA 22904-4206. Phone (434) 982-4501, Fax (434) 982-5536. E-mail: trephann@virginia.edu

APPENDIX A.2
Survey Results

Agriculture Survey

Question 1. How many acres did your farm own or rent/lease to/from others in 2010 in Virginia Beach?

	Total Acreage
Own	5,438
Rent/lease from others	12,067
Rent/lease to others	1,126

Size of operation by farm acreage

	# of farms	% of total respondents
Lease to others only	9	16.07
1-9 acres	5	8.93
10-49 acres	10	17.86
50-179 acres	19	33.93
180-499 acres	7	12.50
500-999 acres	1	1.79
1,000 acres or more	5	8.93
Total	56	

Question 2. How many acres of crops did your farm harvest during 2010?

	Acreage
Oilseed crops (e.g., soybeans)	9,846
Grains	7,598
Vegetables and melons	316
Tree nuts	4
Fruit	39
Greenhouse and nursery	15
Timber and firewood	5
Other crops	179

Question 3. How many livestock/poultry did your farm sell during 2010?

	Livestock
Cattle	100
Poultry and eggs	680
Hogs/swine	18,400
Horses	6
Other livestock	84

Question 4. Do you produce value-added products on your farm?

	# of farms
Processed fruits, vegetables, berries, meats or dairy products	5
Dried or arranged herbs and flowers	1
Baked goods	3
Other value-added products	3
Producing any value-added products	7

Question 5. Did you sell any farm commodities or value added products directly to consumers for human consumption or direct to retail in 2010?

	# of farms	% of Total
Yes	22	39.29
No	27	50.00
NA/No Response	6	10.71
Total	56	100.00

Question 6. Which direct to consumer/retail methods did you use to sell your farm products or value added products in 2010?

	# of farms
Farmer's markets	12
Pick-your-own	12
On-farm or roadside stand	14
Subscription service or Community Supported Agriculture	3
Flea markets	2
Natural food stores	1
Conventional supermarkets or grocery stores	1
Restaurants or caterers	6
Institutions (e.g., hospitals, schools)	1
Other	3

Question 7. If you sold at a market during 2010, which venue(s) did you use?

	# of farms
Fresh on Fridays Farmers Market at the JCC	3
Old Beach Farmers Market	2
Red Mill Green Market	3
Virginia Beach Farmers Market	7
Why not Wednesdays Farmers Market	3
Markets outside of Virginia Beach	4
Other	3

Question 8. How many times did you sell at markets during 2010?

(Number of responding farms was 10)

	Total	Mean
Total visits on weekdays	84	8.4
Total visits on weekends	135	15.0

Question 9. What products did you sell directly to consumers or directly to retail?

	# of farms
Vegetables	13
Fruits and nuts	14
Dairy and eggs	2
Meat	2
Live plants	6
Herbs and flowers	6
Value-added products	5

Question 10. Did you receive visitors on your farm for tourism or recreation in 2010?

	# of farms	% of total
Yes	8	12.96
No	41	74.07
NA/No response	7	12.96
Total	56	100.00

Question 11. What types of agritourism attractions are offered on your farm?

	# of farms
Horseback riding	0
Festivals, events, and shows	1
Farm/farm products related festivals or fairs	2
On-farm tour	6
Pumpkin patch	2
Corn maze	0
Field rides	2
Petting zoos or farm animal displays	3
Cultural or historic exhibits	1
On-farm bed and breakfast	0
On-farm fee fishing	0
On-farm fee hunting	2
On-farm camping	0
On-farm restaurant/eating establishment	0
Other	4

Question 12. How many people visited your farm for tourism, education or recreation in 2010? (N=6)
(Number of responding farms was 7)

Total number of visitors	103,525
% of visitors who were residents of Virginia Beach	38
% of visitors who reside in Hampton Roads area	61
% of visitors from elsewhere	1

Question 13. Did you charge a fee for any of the agritourism activities offered on your farm?

	# of Farms
No, all of the activities are free of charge	4
Yes, some of the activities are offered for a fee	5
Yes, all of the activities are offered for a fee	1
Total	10

Question 14. What is the average amount spent per agritourism visitor during a typical visit in 2010?
(Number of responding farms was 5)

	Average
Admission or user fees	$12
Purchasing farm products	$7.7
Concession food and drink or non-food items	$0
Other	$33

Question 15. How many years have you offered agritourism activities on your farm?

	# of Farms offering agritourism
1-4 years	1
5-9 years	2
10-19 years	2
20+ years	3
NA/No response	2
Total	10

Question 16. Please report the gross value of agricultural products sold by your farm in 2010.

(Number of responding farms was 37)

Oilseed crops	$3,102,845
Grains	$3,838788
Vegetables and melons	$2,344,625
Tree nuts	$10,000
Fruit	$155,825
Greenhouse and nursery	$10,000
Timber and firewood	$6,000
Other crops	$9,200
Cattle	$46,900
Poulty and eggs	$11,100
Hogs/swine	$2,462,000
Horses	$0
Other livestock	$2,800
Total Sales	$12,000,083

Questions #17-20 Estimate the gross value of agricultural products by your farm in 2010

Sold directly to Virginia Beach consumers for human consumption	$979,865
Sold directly to Virginia Beach retail	$130,000
Sales of value-added products	$17,000
Sales of agritourism and recreational products and services	$12,700

Question 21. What impact did government sponsored local food initiatives such as (a) Buy Fresh, Buy Local, (b) Taste of the Market, and (c) Virginia Beach organized farmers markets have on your sales in 2010?

$32,100

Question 22. Estimate your farm-related income in 2010 from other sources:

$607,571

Question 23. Do you plan to begin, expand, decrease, or discontinue direct to consumer or direct to retail sales in the next five years?

	#	% of total
Begin	0	0
Expand	13	23.21
Decrease	4	7.41
Discontinue	1	1.79
None of the above	25	44.64
NA/No Response	13	23.21
Total	56	100.00

Question 24. Do you plan to begin, expand, decrease, or discontinue agritourism or recreation services at your farm in the next five years?

	#	% of total
Begin	0	0
Expand	9	16.07
Decrease	0	0
Discontinue	0	0
None of the above	31	55.56
NA/No Response	16	28.57
Total	56	100.00

Question 25. How many people (including yourself) were employed on your farm in 2010?
(Number of responding farms was 29)

	# Employed
Full-time year round	59
Full-time seasonal	18
Part-time year round	13
Part-time seasonal	58
Total	148

Horse Facility Survey

Question 1. Which of the following best describes your horse operation?
(Number of respondents was 25)

	#
Boarding facility	16
Riding center	5
Therapeutic center	0
Working farm	5
Other	7

Question 2. How many acres did your horse operation own or rent/lease from/to others in 2010 in Virginia Beach?

	Total acreage
Own	403
Rent/lease from other	54
Rent/lease to others	0

Question 3. How many years have you offered horse-related services or activities at your farm/facility?

	#
1-4 years	5
5-9 years	3
10-19 years	7
20+ years	5
NA/No response	5

Question 4. How many visitors/customers did your horse operation have in 2010 for each of the following categories?

	#	% Virginia Beach	% Hampton Roads
Horse leasing/rental	93	94	6
Horse-boarding	126	86	14
Lessons	2,821	73	27
Training	845	80	20
Horse shows and competitions	604	NA	NA
Camps	294	98	2
Festivals, fairs, expos or emporiums	30,002	77	23
Other	27	100	0

NA=Estimate not available

Question 5. What types of amenities do you offer at your facility?

	#
Pasture space for horses	20
Outdoor arena	16
Covered arena	1
Indoor arena	4
Jumps	11
Trails	5
On-state veterinary services	3
Horse grooming facilities	10
Feed and hay	15
Snack shop/restaurant	0
Gift shop	2
On-site tack shop	1
Barn/stalls	18
Camping area	1
Picnic area/grills	3
Bed and breakfast/Inn	0
Changing/locker-room facilities	7
Shower facilities	3
Toilet facilities	11
Guided tours	2
Other	1

Question 6. If your facility hosted horse shows and competitions in 2010, how many events did you host?

	#
0 events	11
1-4 events	1
5-9 events	1
10+ events	1
NA/No response	11
Total	25

Question 7. Please estimate the total number of horses at your operation in 2010 that you . . .

	#
Owned	188
Boarded	125
Sold	22

Question 8. How many people (including yourself) were employed by your operation in 2010?

	#
Full-time year round	56
Full-time seasonal	7
Part-time year round	10
Part-time seasonal	146
Total	219

Question 9. Do you plan to expand, decrease, or discontinue or expand horse-related services or activities in the next five years?

	#	% of Total
Begin	1	4
Expand	13	52
Decrease	2	8
Discontinue	1	4
None of the above	5	20
NA/No response	3	12
Total	25	100

APPENDIX A.3
Horse Maintenance Expenditures

Table A.3 Virginia Horse Operations Expenditures, 2010

Expenditure	Average per Horse ($)
Purchases and upkeep	
Feed and bedding	$540
Equipment purchases	$455
Horse purchases	$339
Veterinarian/health	$323
Boarding	$211
Training fees	$207
Farrier services	$190
Taxes	$182
Maintenance repair expenses	$192
Breeding fees	$123
Insurance premiums	$86
Tack	$75
Utilities	$59
Rent and lease expenditures	$61
Grooming supplies	$52
Horse related activities	
Travel and lodging	$108
Advertising expenses	$22
Professional fees	$21
Miscellaneous expenses	$34
Labor and capital improvements	
Capital improvements	$405
Paid labor	$334
Other contracted labor expenses	$39
Total	$4,060

Source: National Agricultural Statistics Service (2008) and Rephann (2010)

APPENDIX A.4
Agritourism Visitor Expenditures

Table A.4.1 Horse Show and Competition Participant and Spectator Average Travel and Expenditure Patterns in Local Area, 2010

Expense Category	In-County Residents		Other In-State Residents		Out-of-State Residents	
	Participants	Spectators	Participants	Spectators	Participants	Spectators
Tourist expenditures						
Spectator admission fees, parking, and program	N/A	$4.67				
N/A	$13.81	N/A	$15			
Food and drink	$50.87	$11.18	$196.38	$75.27	$343.99	$226.25
Lodging	$0	$0	$284.29	$73.95	$505.53	$343.72
Entertainment	$23.33	$0	$14.36	$8.41	$37.16	$16.43
Gifts, souvenirs, clothing, etc.	$23	$4	$52.35	$34.28	$138.56	$76,87
Travel	$22.50	$3.47	$52.17	$20.33	$103.19	$81.07
Car Rental	$0.33	$0	$0.36	$0.40	$13.98	$3.57
Other	$7.03	$0	$25.17	$12.22	$6.37	$14.64
Participant expenditures						
Entry, registration, showing fees	$282.37	N/A	$515.45	N/A	$878.3	N/A
Stall or boarding fees	$74.17	N/A	$192.01	N/A	$254.2	N/A
Feed and bedding	$23.17	N/A	$75.73	N/A	$116.94	N/A
Horse care services	$26.67	N/A	$117.98	N/A	$152.90	N/A
Tack and horse supplies	$16.33	N/A	$68.80	N/A	$151.77	N/A
Horse Transport	$11.50	N/A	$10.83	N/A	$11.51	N/A
Other horse-relates expenses	$13.5	N/A	$102.02	N/A	$78.44	N/A
Average spending per travel group	$574.77	N/A	$1,707.90	$238.67	$2,792.84	$777.65
Exhibit						
Average number in travel party	3.8	2.4	3.8	3.0	3.9	3.3

Source: Rephann (2010)
N/A=Not applicable