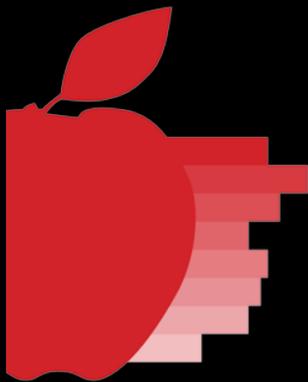


**Economic Impact  
Model for the  
Historic South  
Mountain Fruit  
Belt in Adams  
County  
Pennsylvania**



**Prepared By**

**t|c|g**  
THE CHESAPEAKE GROUP, INC.  
BUILDING A FOUNDATION FOR THE FUTURE

**With**

**TischlerBise**

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# Impact Model Introduction

The Chesapeake Group with TischlerBise, under contract to Adams County, with funding from the Community Development Block Grant Program, prepared the following economic impact model of the Historic South Mountain Fruit Belt in Adams County. The goal was to provide a refined, simplified model that does not require computer modeling skills and substantial person hours to update on an annual basis.

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## Impact Model Context

Adams County has a diverse fruit crop industry as does much of the rest of Pennsylvania. The county has long been known for apples, which are the largest crop. However, and while dwarfed by apple production, Adams County also ranks first in the state for peach production according to the Pennsylvania Agricultural Statistics Service (2012). Many other fruits, including grapes and berries, are also grown in the county.

Based on Penn State Extension surveys conducted at regional tree fruit workshops (2015-16), there are over 31,000 acres of tree fruit in the Commonwealth. The overwhelming number of fruit farms in the state—more than 120 on over 20,000 acres—are found in the Historic South Mountain fruit belt of Adams County.

According to the World Apple and Pear Association (<http://www.wapa-association.org/>):

- Apples are one of the most valuable fruit crops in the United States. The 2012 apple crop was valued at nearly \$3.1 billion, up from more than \$2.8 billion the previous year.
- While the actual origin of apples is not known, it is likely the apple tree originated between the Caspian and Black Seas. There is evidence that we have enjoyed apples for at least 750,000 years and that apples were a favorite of ancient Romans and Greeks. The early settlers of the United States brought apple seeds with them.
- Apples are grown in every state, with 29 states raising apples commercially. While Washington State produces about 70 percent of the apples in the United States, other significant production states include New York, Michigan, Pennsylvania, California, and Virginia.
- While most fruit cultivated is consumed within the country, the exports of fresh-market fruit account for about 15% of the country's available supplies. The leading fresh fruit exports are apples and grapes, with combined sales averaging over \$1.5 billion annually, or about half the value of fresh fruit exports. Apples and grapes averaged over \$700 million and \$600 million respectively in 2012.

The World Apple and Pear Association also indicates that there are hundreds of apple varieties grown worldwide, including the following 27 which are most significant. (Varieties commonly grown in the United States are designated with an asterisk.)

1. Bel de Boskoop is a dull red apple, often with extensive russeting and a somewhat sharp taste. It originated in 1856 in Holland.
2. \*Braeburn varies from orange to red over a yellow color and is crisp and juicy with a spicy-sweet flavor. It originated in New Zealand in the early 1950s as a chance seedling with Lady Hamilton and Granny Smith as possible parents.
3. Bramley originated as a seedling planted in Nottinghamshire, UK in 1809. It has a dark green color and a tart taste and it mainly used as a cooking apple.
4. \*Cameo has red stripes over a cream color with a sweet-tart taste. It was discovered as a chance seedling in the late 1980s in Washington.

5. \*Cortland is a sweet apple with some tartness. It originated in the late 1890s at the New York State Agricultural Experiment Station.
6. Cox's Orange Pippin has an orange-red coloring and a strong and complex flavor. It originated around 1830 in Buckinghamshire, England. Its parentage is unknown.
7. \*Cripps Pink (trademarked as Pink Lady) is bright pink with firm, crisp flesh and a tangy-tart, sweet flavor. It was developed in the 1970s by John Cripps in Western Australia as a cross between Golden Delicious and Lady Williams.
8. \*Elstar is golden yellow in color overlaid with deep red and has a sweet honeyed taste. It was developed in the Netherlands in the 1950s as a cross between Golden Delicious and Ingrid Marie.
9. \*Empire is maroon-red overlaying a light green background. It has a crispy, juicy and sweet-tart flavor. Empire premiered in 1966 in the State of New York and is a cross between Red Delicious and McIntosh. It was developed by the New York State Agricultural Experiment Station.
10. \*Fuji is bi-colored, typically yellow and red, and has a sweet flavor and firm texture. It was originally developed in Japan in the late 1930s.
11. \*Gala can vary in color and has a crispy, juicy and very sweet taste. This variety originated in New Zealand as a cross between Kidd's Orange Red and Golden Delicious.
12. \*Golden Delicious has a yellow skin, a spicy-sweet taste, and was discovered as a chance seedling in 1890 in Clay County, West Virginia.
13. \*Granny Smith is characterized by its distinctive green flesh. It is very tart. This Australian native variety was discovered in 1868 as a chance seedling.
14. \*Idared has a bright red skin and a tangy-tart flavor. This Idaho Agricultural Experiment Station product (1942) is a cross between the Jonathan and Wagener apples.
15. \*Jonagold is yellow-green with a red-orange blush. It is crispy and juicy with a honey-tart flavor. It is a New York (1953) native blend of Jonathan and Golden Delicious.
16. \*Jonathan is red with occasional touches of green. It has a spicy-tangy taste and was discovered in Woodstock, New York in the 1920s.
17. Lobo is dark, dull purple, changing to scarlet red over a dull green-yellow background color. It originated in Ottawa, Canada at the Central Experiment Farm from open-pollinated McIntosh in 1898.
18. \*McIntosh has a deep red color and a juicy, tangy-tart taste. It was discovered in Canada as a chance seedling in 1811.
19. \*Mutsu/Crispin has a greenish yellow to yellow color and a sweet honeyed flavor. It was developed in 1948 in Japan and is a cross between Golden Delicious and Indo.
20. \*Newtown/Albemarle Pippin has a distinctive green color with yellow highlights. It was discovered on Long Island in 1759. It is one of the oldest original U.S. varieties.
21. \*Northern Spy is dark purplish red on a greenish yellow background with bright red stripes. It is juicy with a sweet flavor. It was discovered in East Bloomfield, New York as a chance seedling and introduced in 1840.
22. \*Pinova/Pinata is yellow with a pink-orange flesh. It is a Golden Delicious x (Cox's Orange Pippin x Duchess of Oldenburg) cross introduced in Germany in 1986.
23. \*Red Delicious varies in color from striped red to solid red and has a sweet taste. It originated in Iowa in the 1870s.
24. \*Rome is a red colored apple with a mild sweet flavor. The apple was discovered in Rome Township, Ohio in 1816.
25. \*Spartan is purple-red in color and has a sweet taste. It was introduced in 1936 as a McIntosh and Newton Pippin cross raised at the Dominion Experiment Station in Summerland, British Columbia.
26. Winesap has a fully dark red color and has a tart-tangy taste. It originated in the eastern U.S. in the early 1800s, and parentage is unknown.
27. York is deep red with green streaks. It has an intense tart and sweet flavor. The York variety was discovered near York, Pennsylvania.

The Pennsylvania Apple Marketing Program (PAMP; <http://pennsylvaniaapples.org/>) is a commodity marketing program established through the Commodity Marketing Act of 1968. PAMP's goal is to promote the sale and consumption of Pennsylvania's fresh apples and processed apple products. According to the Pennsylvania Apple Marketing Program:

- When the colonists first arrived in this country, the only apple variety native to America was the Sour Crab. Apples were shipped from Europe during the 17th and 18th centuries as they were considered a staple commodity because they "kept well" on ships.
- During the 1720s, the first botanical gardens in America were established along the Schuylkill River in Pennsylvania, facilitating the cultivation of different apple varieties.
- In 1759, Benjamin Franklin first began growing Newtown Pippin seedlings and then grafting selected sports onto other trees in 1759. Benjamin Franklin inspired the founding of the Philadelphia Society for Promoting Agriculture in 1785. This was followed by the formation of the Pennsylvania Horticultural Society in 1827. The Pennsylvania Horticultural Society is believed to be the first horticulture society in the country.
- During the independence movement, farmers began efforts to expand the varieties of apples available in areas including Pennsylvania.
- By the 19th century, commercial apple orchards were a popular source of income for farmers in Pennsylvania. The State Horticultural Association of Pennsylvania reported 54 different apple varieties being commercially produced in 1898.
- From 1875 to 1879, apple exports to Europe from Pennsylvania and the surrounding areas quadrupled. The expansion of domestic and abroad commercial shipping contributed to the rapid growth of the apple industry in Pennsylvania.

According to a Penn State Extension ag-business publication on apple production (<http://extension.psu.edu/business/ag-alternatives/horticulture/fruits/apple-production>):

- The initial investment for apples can be high depending on the production method chosen, land preparation, and initial investment in the trees.
- A commercial orchard is expected to be productive for at least 20 years, so this investment will be spread over a longer period of time than many crops.
- Pennsylvania produces 400 to 500 million pounds of apples per year and ranks fourth in the nation for apple production. The majority of the production is centered in the southcentral part of Pennsylvania (due in large part to the topography of the land).
- Depending on the apple varieties produced (commonly referred to as "cultivars"), most apples are harvested and marketed from late August through October. If regular cold storage is used, the marketing season can be extended through March. If controlled-atmosphere (CA) storage is available, the marketing season can be extended through July. Apples can be sold directly to consumers (usually through a farmers market or roadside stand), marketed wholesale to packers, or sold to processors. Apples marketed wholesale are traditionally sold to a fruit packer or processor. Fruit packers grade and pack apples for the fresh market. Fresh-market apples typically yield a higher return than processed apples. Processors use apples to make apple sauce, slices for pie, apple juice, and a variety of other products.
- Apples sold through a roadside stand and farmers markets need to be of the highest quality. This will ensure repeat customers from year to year. Roadside marketers generally sell a wide variety of cultivars so the marketing season is not interrupted. Roadside marketing is time consuming, but it can also be very financially rewarding. Selling processed apple products is a good way to help diversify product mix and extend the marketing season for roadside and farmers markets.

- The success of any orchard is directly related to planning and preparation. The ideal site for an orchard consists of rolling or sloping land to enhance air drainage during periods of spring frosts. The best site is south facing with a slope of between 4 and 8 percent because operating equipment on steeper slopes may be difficult. Sites with deep, well-drained soils are preferred because shallow, poorly drained soils restrict root growth.
- The size of the mature tree will depend on the cultivar and rootstock of the tree. The rootstock, however, is the dominant factor that controls tree size. Most commercial growers are now utilizing dwarf rootstocks because they are easier to prune and harvest and produce higher yields. Another advantage of dwarf rootstocks is their earlier production. They usually produce fruit in the second or third season after planting as compared to five years for the larger trees.

The Pennsylvania Apple Marketing Program (<http://pennsylvaniaapples.org/>) also notes that:

- Agriculture is Pennsylvania's leading industry, with apples being the state's fourth largest agricultural commodity.
- Pennsylvania ranks fourth in the country in apple production, behind only Washington, New York and Michigan.
- Apples are grown in all 67 counties in Pennsylvania with Adams, Franklin, Bedford and York counties having the highest concentration of orchards.
- Pennsylvania's climate and topography have nurtured a long-standing history of growing quality apples. Growers can be found managing fifth, sixth, and even seventh generation farms from Adams County to Erie County.
- Pennsylvania generally yields between 10 and 11 million bushels or approximately 440 million pounds of apples annually.
- There are approximately 100 apple varieties grown in Pennsylvania, with 20 of those varieties marketed commercially.
- Pennsylvania exports approximately 5% of its fresh market crop. Pennsylvania exported fresh-market apples to 12 different countries in 2013. Central American countries and India represent the largest export markets for Pennsylvania.
- Adams County apple production accounts for 70% of Pennsylvania's total crop.
- Pennsylvania wholesalers market their apples as "Pennsylvania Apples" in-state and as "Eastern Apples" regionally, nationally, and globally.
- Adams County is home to Knouse Foods, a grower-owned cooperative that is one of the largest fruit processing companies in the nation.

## THE CHANGING FRUIT INDUSTRY & IMPLICATIONS TO ADAMS COUNTY

The Pennsylvania Apple Marketing Program notes that "there has been much advancement in the production of apples in the form of new equipment utilized, growth regulating chemicals, and improved tree training techniques. There have also been significant changes in tree form and orchard design, with smaller trees being more closely spaced and intensively managed."

Penn State Extension reports that "growing calls by consumers for 'locally grown' food have brought increased demand for Mid-Atlantic fruit that in turn has positively influenced prices and movement. Rising transportation costs have also helped to eliminate the cost advantage that fruit from other regions of the country once enjoyed over locally produced fresh fruit."

While the United States Department of Agriculture anticipates a decline in supplies of several major fruit crops in production this year, declining supplies with robust demand will support prices.

Furthermore, there are many factors that impact harvests as well as timing in the production cycle. According to Penn State Extension "2016 Apple Maturity Assessments (<http://extension.psu.edu/plants/tree-fruit/news/2016/2016-apple-maturity-assessments-week-5>)," temperature, rainfall, and other climatic conditions are particularly relevant.

In recent years, the development of the Honey Crisp variety has altered the revenue flow as the revenue yield per acre for the variety at presents exceeds per acre revenue for other varieties.

There is little question of the past and future viability of the fruit belt and its primary product in Adams County. Area farmers are mutually dependent upon research and information furnished by Penn State Extension/the Penn State Fruit Research and Extension Center and the Pennsylvania Apple Marketing Program. Through cooperative efforts between the region's farmers, the State Horticultural Association of Pennsylvania, the Adams County Fruit Grower Association, the Agricultural Land Preservation Program (Office of Planning and Development), and support industries and services, the constant transition of the crops and industry have been and are being met. The signs of long-term viability and vitality include but are not limited to:

- **Number of fruit farms and farmers.**

Typical of virtually all industries in this country there has been a consolidation of both the number of farms and farmers in the fruit belt. Yet, cultivated acreage has not been impacted by this change.

As described by the farmers, most frequently when a farmer is forced to no longer farm because of age or change in health and no family member or business partner takes over, the land transitions (bought or leased) to one or more of the other famers in the area. Today, there are farmers that own 10, 20, or more farms that were once cultivated by others.

Furthermore, there has been a significant growth in farms and acreage either operated or influenced by younger members of the farming community who seek more than the status quo. These younger family members have a tendency to be more visionary and growth oriented, having substantial desire and energy to further invest in the future of the farms, migrating to diversification and enhanced revenues through such activity. Organizational and leadership activity by more youthful members of the community has expanded and is also flourishing.

While the average age of the current ownership is rising, this pattern is likely to reverse in the foreseeable future because of the current transitioning noted.

- **Acreage in cultivation.**

At any given time, there are acres of land that were previously cultivated that are temporarily left out of production. Most often this is a result of planting rotation crops to replenish soil fertility and health prior to planting a new fruit variety or other specialty crop in order to diversify production.

Furthermore and for larger operations in the area, there are lands that may be viable for cultivation that have not been used for this purpose in the past. Continued research and technological change (performed by Penn State and elsewhere) will likely increase the probability of cultivation on some of this acreage as the prospect of profitability increases.

Short of rezoning and resulting development to dissect the existing fruit belt fruit-growing region, the pattern of cultivation is unlikely to change.

- **Decrease in processed product and increase in fresh.**

Comparing the 2002 and 2008 Pennsylvania Orchard Surveys (National Agricultural Statistics Service), a majority (+/- 78% of apple farms in Pennsylvania and about 61% of the acreage) was associated with fresh apples versus processing apples. In Adams County about 54% of the farms and 48% of the acreage was in fresh apple production. However, Adams County's increases in acreage for the fresh market were double the rate of the overall state. Apple orchard acreage for dwarfing rootstocks had accelerated, growing by more than 100% between 2002 and 2008.

The noted pattern where older processing orchards are being replaced by newer fresh or retail production orchards is likely to continue. The process is slow because of the significant cost of such transformation. Costs include but are not limited to the loss of income for multiple years during the transition and cost of land preparation, trees, tree support systems, or other product purchases.

However, one of the benefits of the noted farm consolidation is that the farmer may likely have greater ability to reinvest in the future than in the past, which could accelerate the process. Apples on dwarf rootstocks produce earlier than those on semi-dwarf rootstocks, which will also accelerate the process (<http://extension.psu.edu/plants/tree-fruit/commercial-tree-fruit-production/economics-of-production>).

In addition, some processed apple acres are being converted to other crop acreage including, but not limited to fruits. This is being spurred by the increase in local retail activity to extend the market season.

- **Impact of Washington, China, and other exporting regions and countries.**

As noted, Washington State is dominant in the market based on acreage cultivated and production of apples. With the exception of a short-term glitch created by climate, pest infestations, or other natural phenomena, their position long-term is not likely to be challenged by other geographic production areas in this country. On the other hand and even with advantages that might exist in acreage yield, it is unlikely that they will attempt to flood the market in the long-term because it does not work to their advantage.

Furthermore and as noted, the fruit belt is clearly diversifying the production of apples and other specialty crops. Located in close proximity to at least 50 million people along the East Coast and many more millions in states immediately to the west of Pennsylvania, the fruit belt is and will continue to capitalize on the burgeoning activity associated with the farm to table, buy local, farmers markets, and other related fresh and retail components.

The emergence of China and other foreign countries into the market could result in market saturation for processed and non-processed primary product lines. From an economic perspective, the potential for saturation in processed product lines is greater than non-processed. Over the past two years, The Chesapeake Group has conducted surveys of more than 10,000 households east of the Mississippi. The data from the surveys suggest that the noted movements of farm to table have substantial staying power, and market shares associated with such activity continue to grow. Increases in number of products limiting "shelf space" in supermarkets and other mass sellers of produce will always be on-going with adjustments made based on volume sales. (All products in supermarkets have limited "shelf space" with adjustments made according to demand.)

- **Changes in labor pool.**

There are changes in the apple industry labor pool in Adams County that concern both fruit growers and related handlers/processors/wholesalers. These include increased "non-migratory" labor, an aging labor pool, lack of interest of current laborers by their next generation, and always uncertain immigration and visa policies. Some, such as the increase in "non-migratory" labor, may be beneficial. Others, such as immigration and visa policies, cannot be predicted or controlled.

Many of these changes are being addressed through industry, university, and community partnerships. Importantly, the introduction of technology is increasing labor efficiency and will continue to do so. The uncertainty and labor issues will likely continue to exist, but the collaborations that have evolved will continue to mitigate though not totally eliminate impacts on individual farmers.

- **Insect pests, diseases, invasive species, weather, natural disasters**

Pests and diseases, invasive species, climate conditions, and other natural or man-made factors have always impacted fruit production. Yet, the ability to control or mitigate impacts, if not events, has increased substantially through research that has resulted in precision in dealing with these events. Through cooperative efforts, farmers today have more precise information on pest thresholds, disease prediction, and crop load management. University and private sector research, technical assistance, monitoring, and outreach continue on a constant basis. Viability of the fruit belt or any other farming for that matter would be seriously jeopardized if such activity diminished or ceased.

- **Introduction of technology and continued research.**

Research continues and is the key to continued prosperity of the fruit belt. The "Specialty Crop Innovations Progress Report 2016" and other Penn State Cooperative Extension/Penn State Fruit Research and Extension Center publications (<http://extension.psu.edu/plants/tree-fruit/resources>) note that:

- ✓ Peach system trials have indicated significant differences in yield and fruit size between "V" peach system architectures and conventional Open Center systems. Moderate density quad-V systems are the most productive. However, other "V" systems produced more small sized fruit than Open Center trees. Furthermore mechanical blossom thinning and mechanical labor platforms enhance labor efficiency and increase fruit size resulting in net economic impacts of \$200 to \$1,200 per acre.
- ✓ With respect to apples, the evolving blueprint for a successful intensive apple system involves: size-controlling rootstocks and tree densities around 1000 trees per acre, quality nursery stock, supported canopies trained to fruiting walls, canopy shape complementing natural tree form, minimal pruning and branching structure, and simplification of a variety of tasks including pruning. As a result, 80% of new orchards are now planted on dwarfing rootstocks that increase net cumulative returns by \$20,000/acre.
- ✓ Technology and research enhancement continue to expand yields, fruit quality, and increases in labor efficiency. Precision agriculture will continue to be key. Penn State Extension has the capacity at present and is now assisting with providing assistance with individual crops in the diverse growth of apples and other fruit in Adams County. All aspects are constantly monitored in an exchange between growers and technical staff to increase productivity, profitability, and long-term viability. This process has been, is and will be critical and will continue to result in enhancement of the fruit belt.

- **Diversification, fresh and retail, in its infancy.**

As noted, diversification is occurring in the fruit belt in terms of movement away from processed apples to fresh and retail apples and other fruits and products that enhance the revenue flow to area farms. Also as noted, the process involves diminished acreage for processed apples to other alternatives.

As noted, the process is slow partially because of cost that often includes short-term loss of income from acreage removed from production temporarily in order to increase yields and revenue in the future. Penn State Extension publishes at its "Economics of Production" website both "Costs and Return Calculators" for varied tree densities and a "Cost of Production Calculator" that includes apples, peaches, cherries and pears.

There are substantial signs of reinvestment and growth including the constant changeover in process apples. These include but are not limited to:

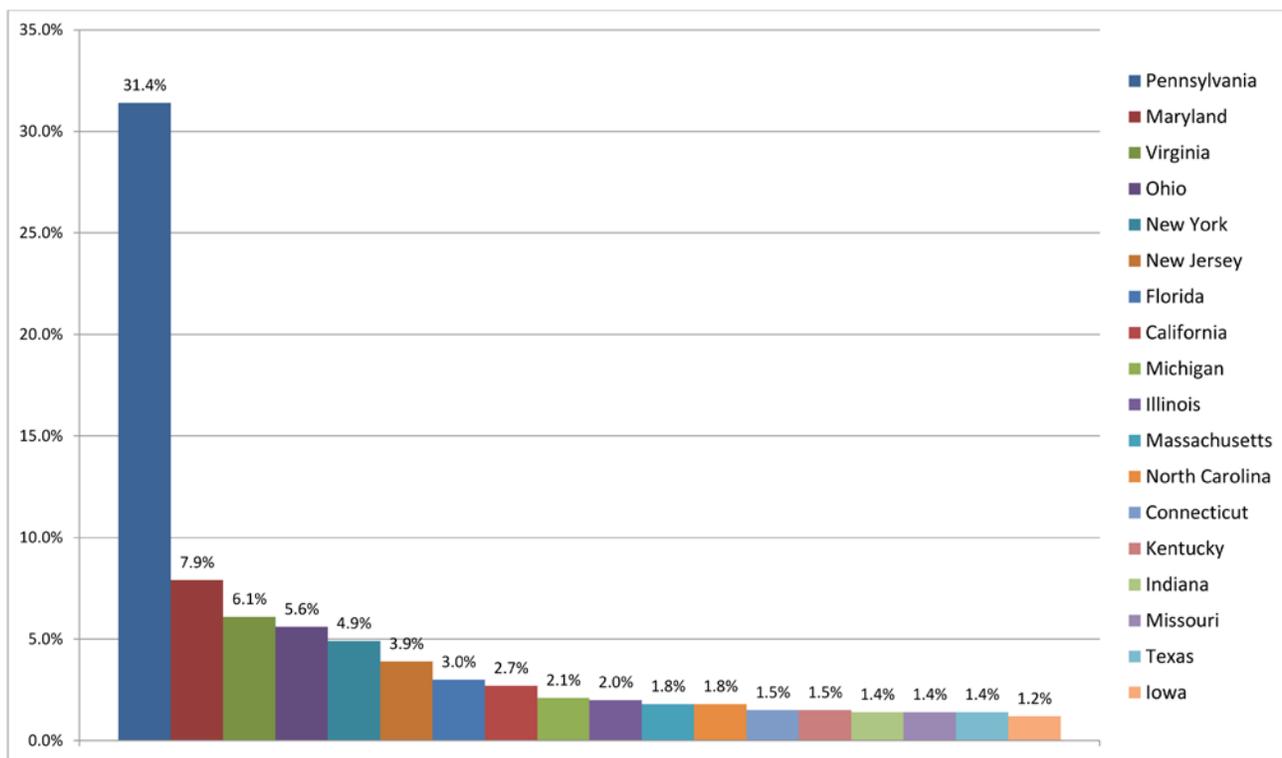
- ✓ Growing storage and cold storage capacity. Adams County is home to four fruit packinghouse and storage operations, and all have significantly expanded their packing and storage facilities in the past five years.
- ✓ Knouse Foods, operating as a cooperative, continues to expand their operations and diversify product lines in their Adams County facilities.
- ✓ There is an emergence of finished product production of wines, hard cider, and other value-added products in Adams County which will further diversify product lines, expand the seasonal nature of farming activity, and can result in further efforts related to on- and off-site sales. Such activity can be linked to other ag efforts in Adams County to produce emerging products such as wine ice cream. Some products are not "new" but reemerging in popularity. For example, cidermaking evolved in colonial times in Pennsylvania, having as much to do with necessity as great growing conditions for apple production. According to Ben Kishbaugh of Big Hill Ciderworks:

"Adams County isn't just a good place for cider making—it's also a great place for apple growing. Our soil types and small micro-climates here amongst the South Mountain Region are some of the best in the world. The soils at our particular spot are considered a channery silt loam. This is a silty, low clay content soil, which helps it drain very well. There is a lot of orchard land right around our area. While we may not grow the most volume of or the prettiest apples in the country, we can grow some of the best-tasting fruit right here."

- ✓ New products are being developed utilizing apples and other fruits. This year, certain large chain supermarkets operated by Royal Ahold began selling a host of products publicizing Honeycrisp flavoring or use in the final product. Examples include baked goods such as scones, breads, pies, and cookies along with other products such as seltzer water. Jim Beam now has an apple-based product.
- ✓ Retailing and direct merchandising through a variety of means including farmers markets is really in its infancy. Farmers market industry sources indicate that: 1) the number of markets continues to grow; 2) those operating once per week are considering expanding through adding days; 3) seasons have extended through product diversification without losing the basic theme; 4) the number of indoor facilities are growing; and 5) more communities are pursuing indoor full-year facilities. Some considering the latter options are in the Washington-Baltimore-Philadelphia region now served by certain fruit farming interests in Adams County.

- ✓ There are other means of direct sales to consumers of canned, bottled and other products that can play a role in expanding tourism in the region. Given market changes in the tourism industry, the potential for cooperative events and promotional efforts between the fruit industry and historic interests in Adams County will grow. The Chesapeake Group is associated with several travel agencies that specialize in bus tours. Wine tasting, farm tours, and other such activities sell well to aging Baby Boomers and could sell to a youth population when combined with the increasingly difficult historic tour markets.
- ✓ Irrespective of linkage with historic interests, agri-tourism is a growing industry by itself. Agri-tourism is generally defined as activities that include visiting a working farm or any agricultural, horticultural, or agribusiness operation to enjoy the rural setting, be educated, or be involved in a special activity.
- ✓ The U.S. Census of Agriculture clearly shows an increasing trend in agri-tourism and related recreational services. Between the 2007 and 2012 censuses, 10,249 farms grossing \$546-million in income increased to 13,334 farms grossing \$674-million. Farms with gross farm receipts of \$25,000 or more increased from 3,637 to 4,518. (October, 2015, Dan Burden, AgMRC, Iowa State University.)
- ✓ It is clear from data gathered at the 2014 Apple Blossom Festival that fruit farm related activity is capable of bringing residents from other areas into Adams County. In addition to Pennsylvania, visitors to the Apple Blossom Festival came from 17 other states.

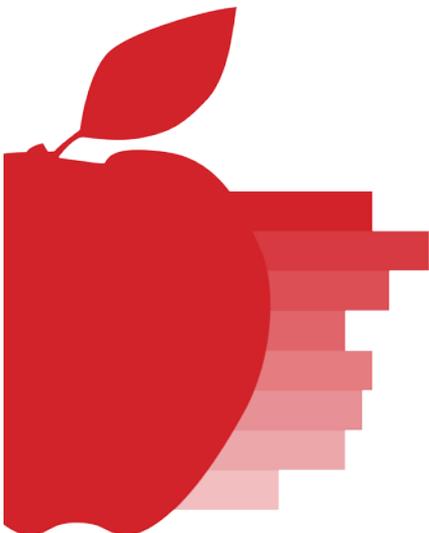
## 2014 Visitor State of Origin Analysis Request



All other state representation is less than one percent of the total 2014 sample.

## CONCLUSIONS AS TO THE SOUTH MOUNTAIN FRUIT BELT'S FUTURE

Short of a catastrophic, non-predictable national or global physical or fiscal event and with continued growth in precision fruit growing in partnership with Penn State Extension/the Penn State Fruit Research and Extension Center, the South Mountain Fruit Belt will remain healthy and viable for the foreseeable future, playing a major role in the economy of Adams County, Pennsylvania and the United States.



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# Impact Model Process

In addition to reviewing and analyzing secondary information from the previously noted sources which provided significant context, patterns, and trends for Adams County's fruit belt and related activity, the primary data base was derived from face-to-face interviews with growers, processors, wholesalers, suppliers, and others that provided substantial fiscal and other confidential information. The analysis and resulting model would not have been possible if not for the remarkable level of cooperation from these entities as well as the staffs of the Penn State Cooperative Extension Service and Adams County Planning and Development Office.

As previously noted, Adams County estimates that there are about 120 farms in the fruit belt. The Chesapeake Group interviewed about twenty growers. Many of the growers cultivate numerous farms, including some with more than 15 individual farms leased or owned. It is conservatively estimated that more than 80% of the farms were covered through the interviews with growers. The growers furnished income/revenue, cost, and employment information as well as information on where supplies were purchased.

In addition to growers, finished product producers and the largest processing and fresh wholesale and storage entities were interviewed. These entities also provided invaluable data on sales volumes, dollar distributions to growers, employment, and other information.

Furthermore, information was obtained from select suppliers of a range of materials utilized by fruit farmers, including trees and other products, through either interviews or telephone conversations.

Several complex processes were involved in creating either or both totals and averages to be employed in the assumptions utilized for the model:

- There are many different farm "corporate" structures that are involved which result in differing ownership patterns. Some operate under one entity while others maintain separate entities for differing farms. These impact how payments to family members are made and under which account they fall as an example.
- Different accounting procedures exist for costs of operation. This means "pieces" of the overall farm model from which revenue is derived and costs incurred are handled differently. For example, for some that participate in farmers markets, equipment costs, supplies, etc. are handled differently from other entities. As an example, one may show fuel as a cost of operation for the general farm while another isolates those costs for the retail "piece."
- Third, farms make many purchases ranging from fuel to boxes, insurance, and equipment. Some have a trust in certain brands of farm equipment for which there is not even a dealer in Adams County while others may generally buy equipment locally.
- Finally, within a grower's operation there may be differing visions and directions for their future which impacts the speed of change as well as the likelihood of any transformation. As noted, those farms with full participation by younger household members have a tendency to be more aggressive with new product development, diversification, and retail activity than those where youth are not involved in the same capacity.

The above factors result in significant review time of individual pro forma and other financial information and the consolidation into averages and totals that could be employed in the model. The assumptions and notes that follow resulted from that analysis coupled with the secondary information.

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# Key Assumptions & Notes for the Impact Model

The following are the primary notes and assumptions that are built into the model.

1. Both the growing/farming component of the industry and "but for" activity is considered. (Often farm activity and impact is understated because processing activity that would not exist if not for the farming is considered manufacturing by the federal tracking systems.)
2. Growth is anticipated for fresh and retail activity to varying degrees as built into the model. (It is noted that the share of products associated with processed is expected to decline at a slow pace as acreage is converted at relatively high short-term costs but for long-term revenue enhancement for the farmers as previously noted. This does not infer that the same decline will be associated with revenues to farmers from Knouse at any given time. Those revenues will decline but are impacted by market price at any given time. Furthermore, fresh products grown do not always meet consumer standards as to form, blemishes or lack thereof, etc. and are often sent for processing.)
3. Labor is the highest cost for farmers, processors and other business activity associated with the fruit farms and related activity. Based on the interviews and review of financial statements, **45% to 50%** of annual costs are associated with labor. Therefore, residence is an important factor of those involved in any and all processes as it impacts contributions to the Adams County economy in different ways and impacts the multiplier (what is generated in the economy as income flows to the labor force). Those who work in any part of the fruit production process and live in Adams County have higher multipliers (amount circulating through the economy) than those who do not.
4. Average annual repairs and maintenance of equipment, etc. is estimated at **+/- 10%**.
5. Chemical/fertilizer annual costs are between **10% to 15%**.
6. Annual cost of fuel is estimated to be between **5% to 10%**. Annual added labor, fuel, and equipment costs for farmers market participants (whether or not internalized costs are family members) is slightly higher than for those not involved with this type of retailing activity.
7. Areas involving primary local expenditures other than labor are chemicals/fertilizers, shipping containers, and to a lesser extent equipment.
8. While the task was to define the impact on Adams County, it must be noted that the fruit belt's impact on the Pennsylvania economy is likely many times greater than the impact on Adams County's economy as a result of residency of many workers and the purchases of goods and services from entities beyond the County's borders.
9. All dollar figures are in current dollars and have excluded inflation.



# The Impact Model

As noted, the goal was to provide a refined, simplified model that does not require computer modeling skills and substantial person hours to update on an annual basis. The model is in Excel because of its availability and widespread use. The model updating requires the following easy processes and steps.

1. Information needs to be obtained from 7 to 10 entities in total. Two of the entities are Knouse Foods and Rice Fruit Company. Three or four of the entities are those who go to farmers markets, have markets in Adams County, or are producing commodities such as wine, hard cider, etc. Two or three others are "but for" entities –one of which is Knouse.
2. Obtain from Knouse the dollar amount paid to the growers in Adams County for fruit received for processing. That number is placed in the yellow "One Year Income" box under processed in the Excel table.
3. Obtain from Rice the similar figure for the total fresh product distributions to Adams County growers. Place that figure in the yellow "One year Income" box (second on the chart) under non-processed.
4. Obtain from three of four (or more if desired) entities the percentage increase in the past year from retail activity. Develop the average increase from the percentage obtained from each. Convert the average percentage increase to a fraction. Multiply \$4,800,000 times 1. + average fractional increase. Place this number in the yellow box for "Direct Retail and New Product." **(No confidential information or total dollar revenues are necessary or sought.)**
5. Obtain from 2 or three entities and Knouse the percentage increase this past year in business from other products/suppliers located in the area. (For example, Knouse revenues to area fruit growers are a small part of their costs and revenue stream. Their local employment is much greater than the employment attributed only to the yields of local farmers and, therefore, the impact is much greater in "but for" activity.) The entities could include supply chain companies, like fruit tree nurseries, fertilizer companies, shipping box producers, canning suppliers, etc. Develop the average increase from the percentage obtained from each. Convert the average percentage increase to a fraction. Multiply \$343,200,000 times 1. + average fractional increase. Place this number in the yellow box for "But For" activity. **(No confidential information or total dollar revenues are necessary or sought.)**
6. Finally enter the local taxes in the yellow box associated with "Local Taxes" directly attributed to the fruit belt properties. (The base figures were furnished by the County and are readily available and may not require annual updating.)

## MODEL INPUTS

Note: Data entry should only occur in the yellow cells on this tab.

Type of Income	Source	One Year Income	
Processed	Knouse		<==Enter Processing Income from Knouse
Non-processed/Package	Rice		<==Enter Non-processed/Package Income from Rice
Direct Retail and New Product	Three Entities		<==Enter Direct Retail and New Product Income from 3 Entities
"But For" Activity	Knouse + 2 Other Entities		<==Enter "But For" Activity Income from Knouse and 2 Other Entities
Local Taxes			<==Enter Related Local Taxes

For the past full fiscal year, the Model Inputs Table is provided as follows.

## MODEL INPUTS

Type of Income	Source	One Year Income
Processed	Knouse	\$26,294,590
Non-processed/Package	Rice	\$24,000,000
Direct Retail and New Product	3 to 5 Entities	\$4,800,000
"But For" Activity	Knouse + 2 Other Entities	\$343,200,000

<b>Local Taxes</b>	<b>\$16,427,481</b>
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The model will perform all other calculations based on the applied multipliers.

## MULTIPLIERS

Income Base		Impact Multipliers						Future Year Multipliers		
Base	One Year Income		Impact from Adams County Residents	Impact from Non-county Residents	Dollars to County Operations for Chemicals, Fertilizers, Etc.	Dollars to County Operations for Other Supplies, Etc.		Year 2	Year 5	Year 10
Processed Income	\$26,294,590	Multiplier 1	4.25	1.69	3.0054	3.0054	Multiplier	0.99	0.9606	0.9294
		Multiplier 2	0.3	0.2	0.125	0.11	Future Base	\$26,031,644.10	\$25,258,583.15	\$24,438,191.95
Non-Processed/Packing Income	\$24,000,000	Multiplier 1	4.25	1.69	3.0054	3.0054	Multiplier	1.02	1.0824	1.1951
		Multiplier 2	0.3	0.2	0.125	0.08	Future Base	\$24,480,000	\$25,977,600	\$28,682,400
Direct Retail & New Products	\$4,800,000	Multiplier 1	4.25	1.69	0.629	3.0054	Multiplier	1.03	1.1555	1.3148
		Multiplier 2	0.9	0.1	0.15	0.075	Future Base	\$4,944,000.00	\$5,545,400.00	\$6,311,040.00
"But For" Activity	\$343,200,000	Multiplier 1	4.25	1.69	3.0054	0	Formula	1	1	1
		Multiplier 2	0.26	0.05	0.02	0.00	Future Base	\$343,200,000.00	\$343,200,000.00	\$343,200,000.00

The multipliers are impacted largely but not totally by the employment multipliers as noted in the notes and assumptions. Those are found in the table that follows for your edification. **(Other factors vary but include under fresh (non-processed) other area storage and packing entities that are smaller than Rice.)**

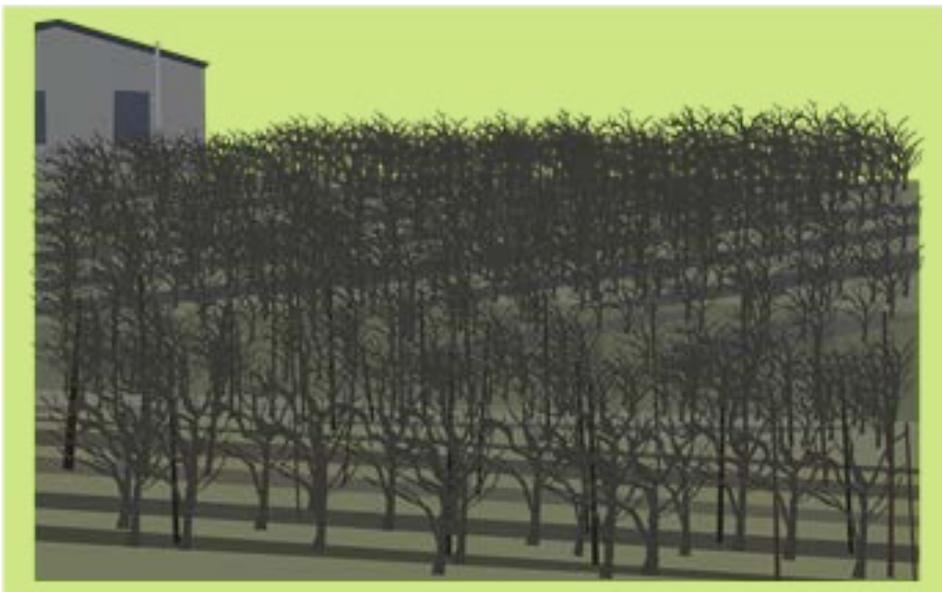
## Fruit Belt Multiplier – Employment

		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Adams Co Res	1	0.5	0.5	0.75	0.75	0.75	0.5	0.5	0.25	0.25	0.25
		0.5	0.2500000	0.375	0.5625	0.5625	0.375	0.375	0.125	0.0625	0.0625
											3.25
Adams Co Non-Res	1	0.5	0.2	0.1	0.05	0.025	0.025	0.025	0.025	0.025	0.01
		0.5	0.1	0.02	0.005	0.00125	0.000625	0.000625	0.000625	0.000625	0.00025
											0.629
<b>Total employment</b>											<b>3.879</b>

The model will provide the current impact as well as potential impact on Adams County for select years through 10 years.

### OUTPUT

Type of Income	Impacts				Totals				
	From Adams County Residents	From Non-county Residents	To County Operations for Chemicals, Fertilizers, Etc.	To County Operations for Other Supplies, Etc.	Year 1	Year 2	Year 5	Year 10	
Processed	\$33,525,602.25	\$8,887,571.42	\$9,878,220.10	\$8,692,833.69	\$60,984,227.45	\$60,374,385.18	\$58,581,448.89	\$56,678,741.00	
Non-processed/Package	\$30,600,000.00	\$8,112,000.00	\$9,016,200.00	\$5,770,368.00	\$53,498,568.00	\$54,568,539.36	\$57,906,850.00	\$63,936,138.62	
Direct Retail and New Products	\$18,360,000.00	\$811,200.00	\$452,880.00	\$1,081,944.00	\$20,706,024.00	\$21,327,204.72	\$23,925,810.73	\$27,224,280.36	
"But For" Activity	\$379,236,000.00	\$29,000,400.00	\$20,629,065.60	\$0.00	\$428,865,465.60	\$428,865,465.60	\$428,865,465.60	\$428,865,465.60	
					<i>Subtotal</i>	<i>\$564,054,285.05</i>	<i>\$565,135,594.86</i>	<i>\$569,279,575.23</i>	<i>\$576,704,625.57</i>
					<i>Local Taxes</i>	<i>\$16,427,481</i>	<i>\$16,427,481</i>	<i>\$16,427,481</i>	<i>\$16,427,481</i>
					<b>Total Impact</b>	<b>\$580,481,766.05</b>	<b>\$581,563,075.86</b>	<b>\$585,707,056.23</b>	<b>\$593,132,106.57</b>



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# The Impact of the Fruit South Mountain Belt on Adams County

It is estimated that the fruit belt contributed roughly **\$580 million to the economy of Adams County** this past year. To provide some perspective, if all of the dollars went to pay for employment and assuming an average annual wage rate of \$30,000, this is the **equivalent of over 19,300 full-time jobs**.

It is noted that:

- The direct impact of **non-processed apple fruit production (more than \$70 million) presently exceeds the impact of apples grown for processing purposes (roughly \$61 million) when "but for" activity is excluded.**
- Excluding "but for" activity, the impact of fruit grown for non-processed purposes in ten years (more than \$91 million) is expected to grow while apples grown for processing purposes' impact will diminish to below \$57 million.
- **Fresh and retail production impact is expected to grow by 24% over the next ten years.**
- In addition, local taxes associated with fruit belt properties contribute \$16.4 million to the economy.
- Knouse Foods Cooperative, through continued diversification, will potentially expand their product lines, production, etc., but largely from intakes of fruit or other products from outside of the South Mountain Fruit Belt. (Such increases are excluded from the model.)

To reiterate, since half of all employees associated with the fruit belt and "but for" activity live outside of Adams County, and many supplies associated with costs of operations are purchased outside of Adams County in other counties in Pennsylvania and to a lesser extent beyond Pennsylvania's borders, the impact of the Adams County section of the fruit belt on Pennsylvania is far greater and at a minimum twice the impact on Adams County.

The Historic South Mountain Fruit Belt is healthy and growing. Barring natural or man-made catastrophic events, it will remain as a significant contributor to the County's economy in the foreseeable future.

