



2015

The Organic Food Industry: An Analysis of Supply and Demand via Aggregate Prices

Caitlin Cronin
University of Pennsylvania

Follow this and additional works at: <http://repository.upenn.edu/spur>

 Part of the [Business Commons](#)

Recommended Citation

Cronin, C. (2015). "The Organic Food Industry: An Analysis of Supply and Demand via Aggregate Prices," *Summer Program for Undergraduate Research (SPUR)*. Available at <http://repository.upenn.edu/spur/1>

This paper is posted at ScholarlyCommons. <http://repository.upenn.edu/spur/1>
For more information, please contact repository@pobox.upenn.edu.

The Organic Food Industry: An Analysis of Supply and Demand via Aggregate Prices

Keywords

organic food, aggregate prices

Disciplines

Business

**The Organic Food Industry: An Analysis of Supply and
Demand via Aggregate Prices**

By

Caitlin Cronin

SPUR

Faculty Advisor: Professor Dylan Small

July 29, 2015

Introduction:

The food industry has been experiencing a moderate sales growth average of 0.7% annually for the past ten years, resulting in consolidation and a search for new markets.¹ Unlike the overall food industry, the organic food industry, still in its growth cycle after almost 30 years since its creation, has enjoyed fast paced post-recession expansion. The US organic sales growth rate has increased from a recession-induced low of 5.1% in 2009 to 11.5% in 2013.²

Restructuring the Food Industry

This robust increase in sales has induced more food retailers to enter the organic food industry. Companies such as Walmart, the largest food retailer, (who has been in this space since 2006), Costco (who doubled organic sales in 2 years and now ranks as the largest organic retailer), and Kroger are threatening the market share of organic stalwarts such as Whole Foods.

What also attracts their interest is the significant price premium that organics fetch. The continuous rise in demand demonstrates consumers' devotion to organics despite the higher price. However, and at a significant loss to policy makers, farmers, retailers and consumers, no comprehensive data exists for organic food products or for the actual premium to conventional food over time.

¹ Elitzak, Howard. Slow sales growth and increased company acquisitions impact U.S. food retailing. in USDA ERS [database online]. 2015 [cited 7/19 2015]. Available from <http://www.ers.usda.gov/amber-waves/2014-november/slow-sales-growth-and-increased-company-acquisitions-impact-us-food-retailing.aspx#.VakQZHiaRUS>.

² FiBL, & IFOAM. (n.d.). Organic food sales growth in the United States from 2000 to 2012. In *Statista - The Statistics Portal*. Retrieved June 30, 2015, from <http://www.statista.com/statistics/196962/organic-food-sales-growth-in-the-us-since-2000/>.

Although retailers have been flocking to the industry to capture the customers' high willingness to pay, farmers have not followed suit. Despite the opportunity to fetch higher prices for their products, farmers have been slow to convert to organics. One reason is the time it takes to convert a conventional farm to an organic one: farms must lie fallow for three years before being considered organic, and any product grown on the grounds during that time must be sold as conventional.³ Additionally, organic farm operations are subject to added fees and regulations.

Walmart has aggressively pledged to offer organic products at a 25 percent discount. However, at the same time that retailers are seeking to pioneer lower priced organics for the masses, the continued rise in demand and shortage of suppliers suggest that organic prices should not fall anytime soon. With the power of retail giants such as Walmart dictating supplier negotiations, forcing artificially low prices, a more severe shortage could be on the horizon.

Research Questions

What is the real reason that farmers are not converting in large numbers to meet the demand? What has been the price of organic foods? What has been the premium of organic to conventional? Has the premium varied over time or across products? Has pricing kept pace with the increase in sales consistent with economic theory? Does consumer purchase behavior reflect the expected inverse relationship to relative prices?

³ USDA Agricultural Marketing Service. (2014). National organic program.

In an attempt to see how pricing has changed over time, a price index for organics is needed. However, due to the relative infancy of the organic industry, what lacks in current research is a comprehensive organic pricing dataset over time. By compiling data from different sources and aggregating across products to achieve an aggregate price representation, one can compare organic prices to conventional prices to assess the profitability of organics over conventional products over time.

Outline of Paper

The next section reviews two notable articles. The methodology is discussed in section three. The conclusion, section four, summarizes the findings and provides recommendations for next steps for future research.

Literature Review:

While organic prices have not undergone extensive research, there is a select set of notable papers on the subject. Zhang et. al. suggest that organic price premiums vary significantly among different types of produce. Their most interesting finding concludes that, “with the exception of potatoes, all other vegetables are found to have inelastic own-price effects and cross-price effects between organic and conventional vegetables, implying that a drop in the organic premium does not necessarily guarantee an increase in total organic revenues⁴”. This last finding is relevant in the current organic environment as large companies such as Walmart are seeking to decrease, or even eliminate, the organic price

⁴ Zhang, Feng, Chung L. Huang, Biing-Hwan Lin, and James E. Epperson. 2006. National demand for fresh organic and conventional vegetables: Scanner data evidence *American Association Agricultural Economics Annual Meeting*.

premium. However, offering lower prices, based on Zhang et. al.'s research, might not lead to a larger gain in revenue from the higher quantity demanded than the loss in revenue from lower prices.

Kuminoff and Wossink studied the conversion rates of farmers from conventional to organic. They found that government compensation, as of 2001, was not sufficient to elicit soybean farmers to make the organic transition. They also warn that a new policy favoring organic farming could cause farmer conversion rates to decrease if the future of the policy and organics is uncertain.⁵ Their research concludes that farmers need a high compensation rate to consider organics and that a policy that increases uncertainty decreases conversion. These points suggest that many other factors and uncertainties in the organic market are influencing farmers' decisions to remain conventional.

Methodology:

Due to the intermittent nature of available organic pricing data, an organic price index had to be created before any analyses of premiums, let alone supply and demand analysis, could begin. Pricing data was used primarily from the USDA data archives.⁶ Monthly data on both organic and conventional products was aggregated

⁵ Kuminoff, Nicolai V., and Ada Wossink. 2010. Why Isn't more US farmland organic? *Journal of Agricultural Economics* 61 (2) (06): 240-58.

⁶ USDA Agricultural Marketing Service. National organic program. 2014 Available from <http://www.ams.usda.gov/AMSV1.0/ams.fetchTemplateData.do?template=TemplateN&navID=NOPFAQsHowCertified&topNav=&leftNav=NationalOrganicProgram&page=NOPFAQsHowCertified&description=FAQ:%20%20Becoming%20a%20Certified%20Operation&acct=nopgeninfo>.

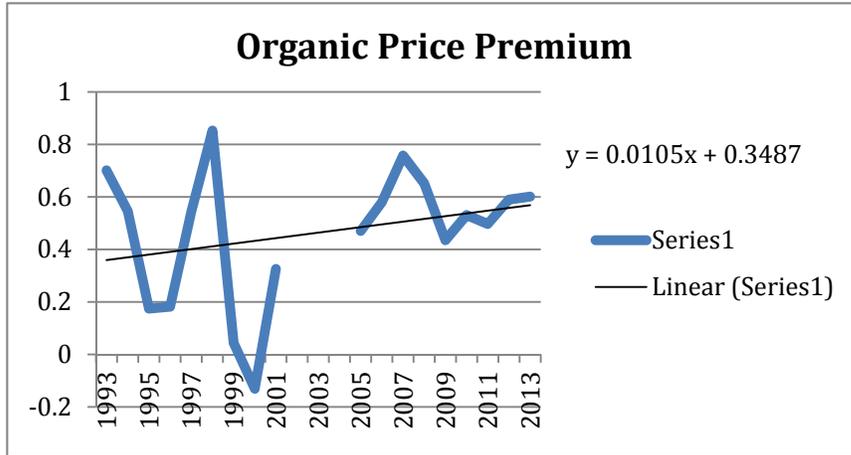
into annual data. Annual data was collected in this manner for numerous products, since different products had holes at varying periods of time.

Data was then compiled onto one spreadsheet whereby three metrics were calculated. First, the annual change in price for each product could be calculated and then averaged together with the other products to create an aggregated organic price percent change in price over time. Second, a price index was individually calculated for each product and then aggregated into a produce price index over time. Thirdly, an organic price premium was calculated by subtracting annual organic price changes for each product from its conventional annual price change.

Data:

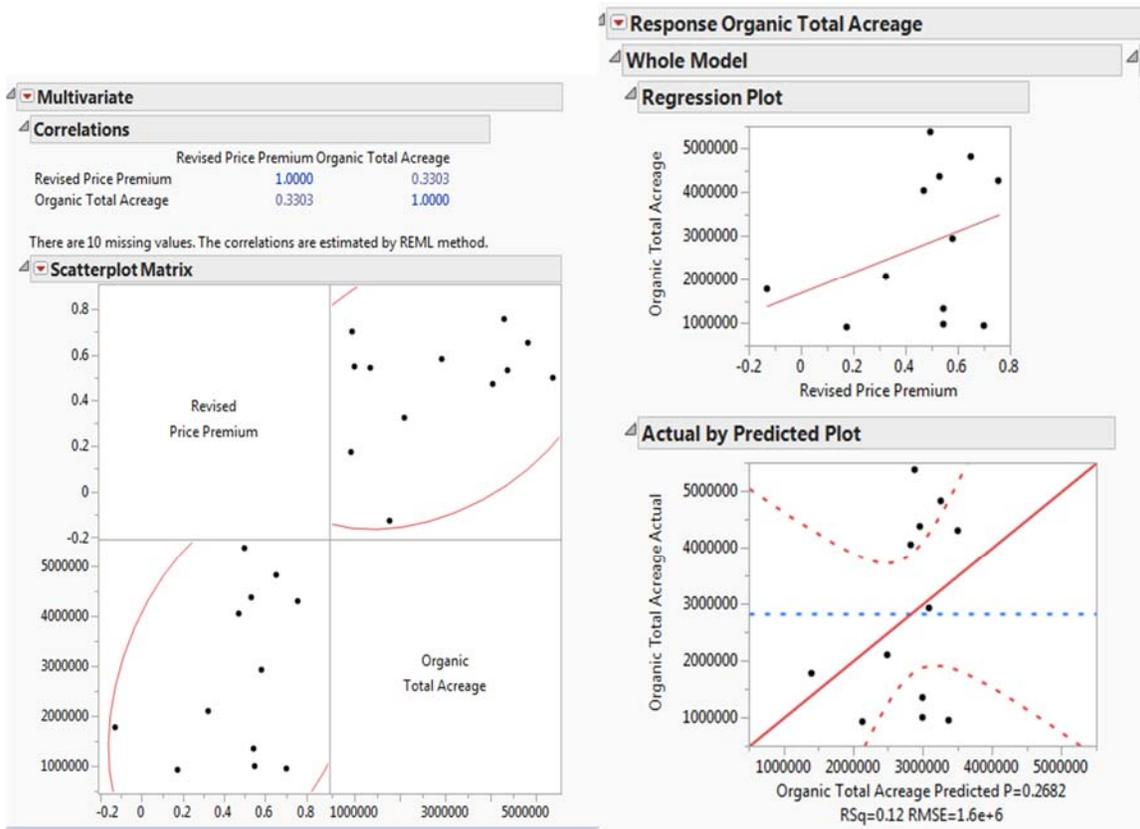
Organic Price Premium:

Aggregating USDA pricing data over numerous produce products bridges gaps within individual products price histories and decreases the effect of certain outliers that consistently have high or low premiums. The data reveals that the price has increased slightly over time, averaging about a 1% increase annually. The premium has also become less volatile, offering suppliers more predictable revenue projection capabilities/ a safer investment.



Supply:

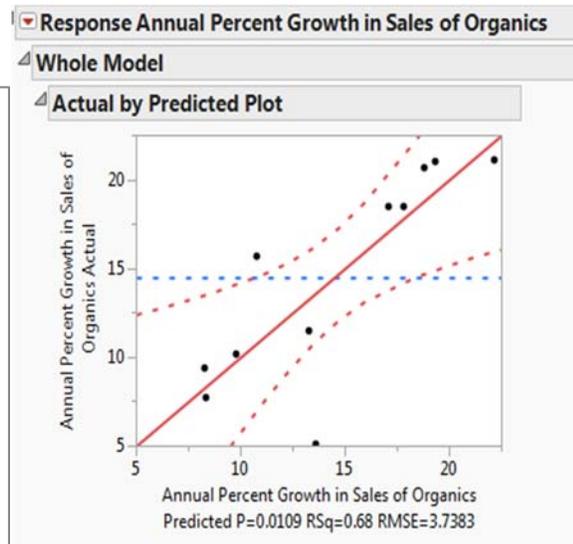
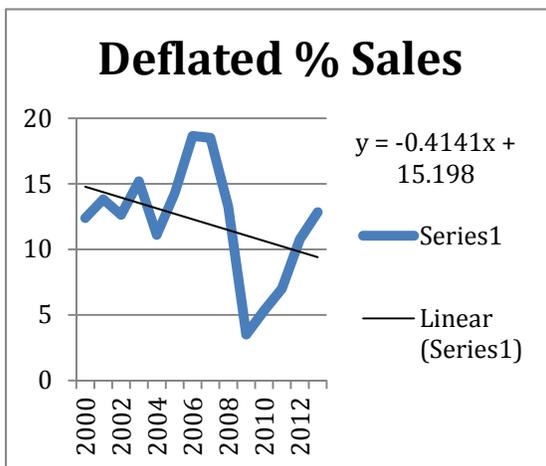
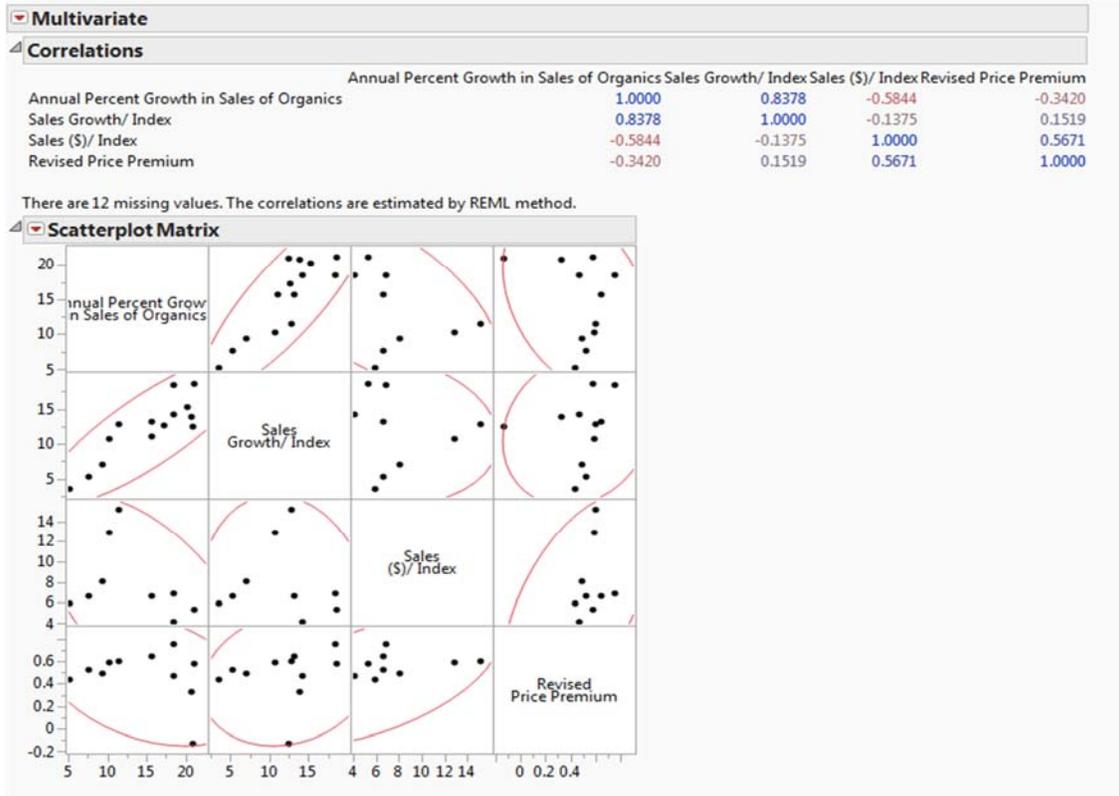
The regression of Organic Total Acreage by the Price Premium reveals the expected positive correlation: as the price premium increases, organic total acreage will increase. However, the insignificant P-value of .2682 reveals that the price premium is most likely not an effective determinant of organic acreage. Thus, other factors appear to influence farmers in their transition from conventional to organic production. Another possible explanation for the insignificance is that the prices in the data are not high enough to elicit a significant amount of farmers to convert. Due to such overwhelming costs, farmers need a high organic premium to overcome the insecurities inherent in organic farming. Additional factors affecting supply could include the farm input prices such as labor, fuel, and fertilizer. A lag structure might be a preferred specification.

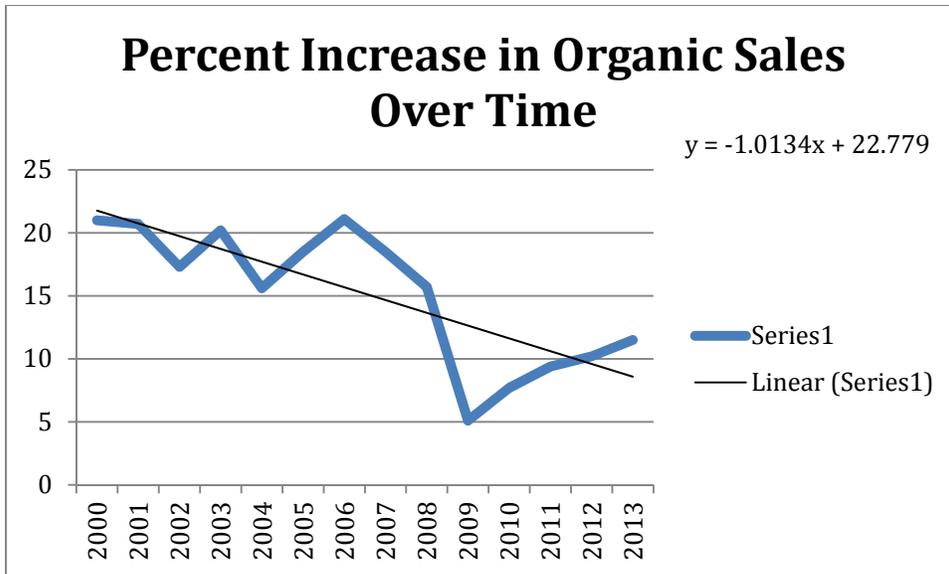


Demand:

The expected negative correlation between the price premium and sales was seen with sales growth (\$) percentage over time. However, once deflated, a positive relationship ensued. There are possible explanations. Firstly, the consumers of organic products tend to be high income, and thus increasing prices take a smaller percentage of household income if the household is wealthy; thus, they are insensitive to small price increases. Secondly, food as a percentage of overall household expenditure has decreased dramatically in the past 50 years, causing the same insensitivity. Thirdly, consumers of organic products purchase for reasons other than price, such as health, environmental concerns, and ethics. Additional

factors affecting demand could include overall food prices and some representation of changing tastes/concerns.





Conclusions:

First, the organic price premium has been increasing over time. Second, the organic price premium has grown less volatile. Third, this increase has been met with a decrease in the percentage growth of consumer demand in the form of sales dollars. Fourth, however, while growth has slowed, the percentage increase in growth is still larger than the overall food market. Fifth, the need for suppliers is greater than ever before. Sixth, despite this need and the more stable price premium, farmers still resist the transition to organics. Seventh, consumers of organic produce lack sensitivity to price increases. Eighth, the main conclusion is that price is not the main factor in both consumer and supplier decision-making. One possible explanation is that consumers face low switching costs between organic and conventional: consumers just pick up the conventional product and purchase it instead. However, for suppliers, the switching costs are much higher: regulations,

three years of fallow ground, uncertain yields. The price they receive for a single unit of an organic product, therefore, is less valuable if it comes with greater risk.

Next Steps:

If price cannot induce farmers to switch from conventional to organic, what incentives will cause a behavioral change? With demand continuing to outstrip supply, more research must be conducted to discover what will increase supply sufficiently to meet demand. The organic market can only grow as far as farmers are willing to start growing organics.

Bibliography:

Belli, Brita. 2013. Organic confusion. *E: The Environmental Magazine* 24 (3) (May): 8-.

Bezawada, Ram, and Koen Pauwels. 2013. What is special about marketing organic products? how organic assortment, price, and promotions drive retailer performance. *Journal of Marketing* 77 (1) (01): 31-51.

Bird, Sarah. 2015. A call for an organic checkoff. *Progressive Grocer* 94 (4) (04): 106-.

Brat, Ilan. 2015. Hunger for organic foods stretches supply chain. *Wall Street Journal (Online)* (04/04): 1.

Dimitri, Carolyn. 2012. Use of local markets by organic producers. *American Journal of Agricultural Economics* 94 (2) (02): 301-6.

Elitzak, Howard. Slow sales growth and increased company acquisitions impact U.S.

- food retailing. in USDA ERS [database online]. 2015 [cited 7/19 2015]. Available from <http://www.ers.usda.gov/amber-waves/2014-november/slow-sales-growth-and-increased-company-acquisitions-impact-us-food-retailing.aspx#.VakQZHiaRUS>.
- Gottschalk, Ingrid, and Tabea Leistner. 2013. Consumer reactions to the availability of organic food in discount supermarkets. *International Journal of Consumer Studies* 37 (2) (03): 136-42.
- Greene, Catherine. 2014. Support for the organic sector expands in the 2014 farm act. *Amber Waves* (Jul 2014): 1G,1G,2G,3G,4G,5G,6G,7G.
- Gupta, Arun. 2014. How walmart threatens organic food. *In these Times*. Jul 2014.
- HAMSTRA, MARK. 2013. Pressure rising. *SN: Supermarket News* 61 (35) (09/02): 32-6.
- Hollyer, James, Fred Brooks, Lindsay Fernandez-Salvador, Luisa Castro, Donna Meyer, Ted Radovich, Steve Russo, et al. 2013. The allowed* use of commercial fertilizers, pesticides, and synthetic substances on U.S. farms under the USDA national organic program *Food Safety and Technology* FST-56 .
- Killman, Scott, and Sumathi Reddy. 2012. Organic milk prices are pulled higher on tug of supply-demand fundamentals. *Wall Street Journal - Eastern Edition* 259 (40) (02/18): B4-.
- Kuminoff, Nicolai V., and Ada Wossink. 2010. Why Isn't more US farmland organic? *Journal of Agricultural Economics* 61 (2) (06): 240-58.
- Lee, Brandon. 2013. Organic growth. *Business Strategy Review* 24 (2) (Summer

- 2013): 42-5.
- Liu, Annie H., My Bui, and Mark Leach. 2013. Considering technological impacts when selecting food suppliers: Comparing retailers buying behavior in the united states and europe. *Journal of Business-to-Business Marketing* 20 (2) (Apr): 81-98.
- Liu, Zhuo, Christopher A. Kanter, Kent D. Messer, and Harry M. Kaiser. 2013. Identifying significant characteristics of organic milk consumers: A CART analysis of an artefactual field experiment. *Applied Economics* 45 (21) (07/20): 3110-21.
- Martin, Andrew. 2014. Wal-mart promises organic food for everyone. *Business Week*. Nov 3-Nov 9, 2014.
- Nassauer, Sarah. 2015. What if we all bought organic? --- coke, general mills and kellogg are chasing premium shoppers; taking honest tea, annie's mac and cheese and kashi cereal mass market. *Wall Street Journal*, Mar 18, 2015, 2015.
- Rödiger, Manika, and Ulrich Hamm. 2015. How are organic food prices affecting consumer behaviour? A review. *Food Quality & Preference* 43 (07): 10-20.
- USDA Agricultural Marketing Service. National organic program. 2014 Available from <http://www.ams.usda.gov/AMSV1.0/ams.fetchTemplateData.do?template=TemplateN&navID=NOPFAQsHowCertified&topNav=&leftNav=NationalOrganicProgram&page=NOPFAQsHowCertified&description=FAQ:%20%20Becoming%20a%20Certified%20Operation&acct=nopgeninfo>.
- Zhang, Feng, Chung L. Huang, Biing-Hwan Lin, and James E. Epperson. 2006.

National demand for fresh organic and conventional vegetables: Scanner data evidence *American Association Agricultural Economics Annual Meeting*.

Zhang, Feng, Chung L. Huang, Biing-Hwan Lin, James E. Epperson, and Jack E.

Houston. 2011. National demand for fresh organic and conventional vegetables: Scanner data evidence. *Journal of Food Products Marketing* 17 (4) (Jul): 441-58.

USDA Agricultural Marketing Service. (2014). National organic program. Retrieved from <http://www.ams.usda.gov/AMSV1.0/ams.fetchTemplateData.do?template=TemplateN&navID=NOPFAQsHowCertified&topNav=&leftNav=NationalOrganicProgram&page=NOPFAQsHowCertified&description=FAQ:%20%20Be%20coming%20a%20Certified%20Operation&acct=nopgeninfo>