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West Central Minnesota Farmers Market Pricing Study

A PRICE COMPARISON OF A MARKET BASKET FROM FARMERS MARKETS AND GROCERY STORES

Authored by Ryan Pesch and Maria Keeler



IN PARTNERSHIP WITH:



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EXECUTIVE SUMMARY

University of Minnesota Extension found that farmers market prices during peak growing season were highly competitive with regional grocery store prices. The average price of a produce-only market basket (1 pound of all produce items) cost less at farmers markets than at grocery stores, costing consumers \$12.85 and \$14.33 respectively.

To research how prices for these commonly purchased foods compare across food outlets in West Central Minnesota, University of Minnesota Extension partnered with the Center for Small Towns at University of Minnesota Morris to collect price data for a market basket of goods at seven farmers markets, six mainline grocery stores, and two natural food stores during peak growing season in July and August 2014. The primary purpose of this research was to learn the extent to which farmers markets are price competitive, as well as to provide data to vendors and farmers market organizers to help guide pricing strategies. A secondary purpose of this study was to investigate the mixed message that the cost of local foods in general, and farmers markets in particular, are either expensive alternatives or outright bargains when compared to grocery stores and big box retailers (Ruth-McSwain, 2012).

COMPARISON OF AVERAGE PRICES AT FARMERS MARKETS AND MAINLINE GROCERY STORES		
MARKET BASKET ITEM	AVERAGE FARMERS MARKET PRICE PER POUND	AVERAGE GROCERY STORE PRICE PER POUND
CABBAGE	\$1.07	\$0.86
CUCUMBERS	\$1.03	\$1.07
GREEN PEPPER	\$2.08	\$2.22
ONIONS	\$1.25	\$1.32
STRING BEANS	\$2.93	\$3.13
SUMMER SQUASH	\$0.95	\$1.45
SWEET CORN	\$0.55	\$0.62
TOMATOES	\$2.09	\$2.04
ZUCCHINI	\$0.90	\$1.62
PRODUCE MARKETBASKET	\$12.85	\$14.33

The average farmers market price for cucumbers, green peppers, onions, string beans, summer squash, and sweet corn was less than the average grocery store price per pound, although only the difference between summer squash and zucchini were statistically significant at a 95% confidence interval. The average grocery store price was less than the average farmers market price for cabbage and tomatoes, although the price difference was only statistically significant for cabbage. The average farmers market price was less than the average for all certified organic produce found at natural food stores

or mainline grocery stores, save string beans. Prices for eggs, whole chickens, and ground beef were also documented. A lack of observations and data compatibility issues, however, resulted in a focus only on produce in this report. Readers can access information and data comparisons made about these non-produce products in Appendix 1.

We recommend that farmers market vendors take these grocery store prices into consideration when setting prices, but they should also consider other important factors, including quality, the cost of production, brand value, and prices from other sales venues.

APPLICATION OF FINDINGS

Although the primary purpose of this project was to provide local data to inform the pricing strategies of vendors at farmers markets, it is important to emphasize that the “going rate” at competing grocery stores is only one factor among many when setting prices for farm products. Grocery store prices are important because they are the top outlet for food consumers in the United States, accounting for 63% of all dollars spent on food consumed at home (U.S. Economic Research Service, 2013). Vendors must also pay close attention to production and marketing costs, as well as brand value.

We suggest vendors list the price for each product they sell and compare them to the average prices in this report, as well as prices at other comparable food outlets, such as farmers markets, farm stands, or retailers (Table 1). With these figures side by side, vendors can make an informed price decision in relation to other sellers in the market. This competition-based pricing allows vendors to set prices that factor in what customers are paying across a range of sellers. Still, products do vary—one set of tomatoes may be quite different than another set—and vendors should also consider how their product compares to others sold at the same price. Chemical-free tomatoes, for example, may not be certified organic, but customers may value them more than standard hybrids trucked in from out of state and sold at a local grocery.

Table 1: Example of price-setting exercise for cabbage*

Your current price	Average price at grocery stores from this report	Average price at farmers markets from this report	Other price considerations	Your price for upcoming farmers market season
Cabbage = \$0.75/lb. *raised without chemicals but not certified organic	\$0.86/lb	\$1.07/lb	\$0.50/lb: Cost of production \$2.66/lb: Price of certified organic cabbage from this report \$1.20/lb: Price of chemical-free cabbage at nearby farm stand	\$1.00/lb

*However, to truly understand whether or not your pricing strategies are garnering a reasonable rate of return, you must undertake detailed recordkeeping to calculate your costs and breakeven price for each crop. We suggest Building a Sustainable Business (<http://www.misa.umn.edu/Publications/BuildingaSustainableBusiness/>) or Fearless Farm Finances (<http://mosesorganic.org/fearless-farm-finances/>) as resources for more information about farm business planning, as business planning methods are not the focus of this particular report.

BACKGROUND

Local farmers markets have grown increasingly popular. Nationally, there has been more than a threefold increase in the number of farmers markets from 1994 to 2013, with an increase of 4% from 2012-2013 (United States Department of Agriculture, 2014).

The reason consumers choose to shop at farmers markets stems largely from support for local farmers and desire for fresh, quality produce (Thilmany et al., 2009; Gao et al., 2014). A second factor that influences farmers market attendance is social interaction. Direct communication with market vendors and other families from the community is a feature of local farmers markets that attracts consumers (Gumirakiza, 2014). Few studies have been conducted regarding the price of farmers market produce. The Leopold Center for Sustainable Agriculture conducted an influential study of local food pricing in 2009. The study compared Iowa farmers market prices to those of conventional food stores (Pirog, 2009). The results indicated the mean price during peak season for a farmers market basket of produce was \$8.84. This price was lower than that of food stores, which was \$10.45. Overall, the difference was not statistically significant, although it was significant for some products and not others. The authors acknowledged that further research is necessary.

Another recent study conducted in Illinois produced contradictory findings. The study compared farmers market prices to grocery stores near a WIC clinic, with price checks done biweekly from May to August in 2011. Results indicated that, although the farmers markets overall had a higher price per pound than grocery stores, the consumers that shopped at markets consumed more vegetables (Wheeler et al., 2014). The higher prices for farmers markets could have resulted from a testing period that extended past peak season, which was when the study in West Central Minnesota occurred.

Since any geographic region faces distinct market and growing conditions for farm production, one would expect to find different pricing methods for produce across regions. Prior to the research presented here, there has not been a study performed on farmers market pricing specific to the West Central Minnesota region.

METHODOLOGY

Certified organic and non-organic prices were documented at mainline grocery stores and natural food stores in West Central Minnesota for a market basket of some of the most commonly purchased produce at farmers markets. The market basket included cabbage, cucumbers, eggs, green peppers, ground beef, onions, string beans, summer squash, sweet corn, tomatoes, whole chicken, and zucchini. We conducted the study during peak growing season, when farmers markets offer the greatest variety of food, to assure complete data collection of all products in our market basket. Over the course of a week in late July and mid-August, 2014, we visited and recorded prices at seven farmers markets, six mainline grocery stores, and two natural food stores across West Central Minnesota:

Farmers Markets

Alexandria, Benson, Fergus Falls, Lowry, Morris, Sauk Center, and Willmar (Becker Market)

Mainline Grocery Stores

Walmart (Alexandria), Supervalu (Benson), Sunmart (Fergus Falls), Willie's Supervalu (Morris), Walmart (Sauk Centre), and Cub Foods (Willmar)



Natural Food Stores

Kadejan Market (Glenwood) and Pomme-de-Terre Co-op (Morris)

Sampling procedure

Before visiting each market, a preliminary message was sent to market operators, providing them with an overview of the study. The sampling period occurred between July 24th-29th and August 12th-18th. Each of the seven farmers markets and grocery stores were visited twice, once during each two-week time frame.

For each farmers market, we documented the number of vendors, their products, and their prices. If a vendor sold a product on a per-pound basis, we simply recorded the price. If a vendor did not sell a product per pound, however, we bought the product in the quantity typically sold by the vendor and later weighed the product to calculate a per-pound price. For example, if a vendor sold tomatoes by quart basket, we bought the basket, weighed the tomatoes, and divided the price of the basket by the weight to get the price per pound. We used the same procedure to record per pound prices at mainline grocery stores and natural food stores, although products are more often sold on a per pound basis in retail outlets.

Calculations and comparisons

We calculated an average price per pound for each item in the market basket based on all vendors or grocers selling the item. Since all produce at natural food stores was certified organic, and mainline grocery stores carried few certified organic products, we combined natural food store price data with certified organic price data from mainline grocery stores into a single category for comparison. For this study, we tested for statistical significance at a 95% confidence level. When testing for statistical significance, we tested averages 1) between farmers markets and grocery stores and 2) between farmers markets and certified organic prices sold at natural food and mainline grocery stores. In statistics, the smaller the sample size, the wider the range for differences that may occur by chance. Keeping this in mind, we found no statistical significance between some average price differences due, in large part, to the small sample size. This was especially true when making comparisons with the organic price data. In other instances, we had an ample sample size, but the differences between average prices was simply too small to be statistically significant.

FINDINGS

Farmers markets and farmers market vendors operating in West Central Minnesota vary according to size, product availability, and pricing. Some individual vendors price their products well above the average of mainline grocery stores, whereas others are well below. Large and small farmers markets alike carried a majority of the products in our market basket.

Product availability and market basket price ranges

The farmers markets we visited ranged in size from three to 16 vendors selling farm products, with the level of product availability corresponding to size. The largest of the farmers markets had all but one of the market basket goods available for purchase, whereas the smallest markets were missing three to four products. All markets carried a majority of market basket goods (Table 2).

Table 2: Number of vendors selling produce in July and August 2014 and percent of all market basket goods available (including meats and eggs)

FARMERS MARKET	NUMBER OF VENDORS SELLING FARM PRODUCTS	PERCENTAGE OF MARKET BASKET GOODS AVAILABLE FOR SALE
ALEXANDRIA	13-14	92%
BENSON	3-4	67%
FERGUS FALLS	7-8	83%
LOWRY	4-5	67%
MORRIS	4	75%
SAUK CENTER	3-4	83%
WILLMAR (BECKER MARKET)	2-4	75%

Although average prices are presented in this report to provide a wide context for pricing in the region, we found significant differences between the lowest and highest prices at both farmers markets and in grocery stores. Farmers markets, however, had the largest range, greater for every vegetable in the market basket than the price range at mainline grocery stores (Table 3). For example, we found a \$1.50 price spread between the highest and lowest cost zucchini prices at grocery stores (\$0.99 and \$2.49 per pound respectively), whereas farmers markets vendors varied by as much as \$2.82 (\$0.22 and \$3.00), almost double the variation among mainline grocery stores.

Table 3: Average prices at farmers markets and mainline grocery stores

MARKET BASKET ITEM	PRICE PER POUND RANGE AT FARMERS MARKETS	PRICE PER POUND RANGE AT MAINLINE GROCERY STORES
CABBAGE	\$0.50 - \$3.50	\$0.59 - \$1.00
CUCUMBERS	\$0.38 - \$2.67	\$0.64 - \$2.00
GREEN PEPPER	\$0.67 - \$5.00	\$1.05 - \$2.95
ONIONS	\$0.67 - \$2.67	\$0.90 - \$1.49
STRING BEANS	\$1.33 - \$5.81	\$1.00 - \$5.32
SUMMER SQUASH	\$0.22 - \$3.00	\$1.29 - \$1.99
SWEET CORN	\$0.44 - \$0.80	\$0.48 - \$1.14
TOMATOES	\$1.00 - \$3.00	\$1.29 - \$2.49
ZUCCHINI	\$0.22 - \$3.00	\$0.99 - \$2.49

The wide price variation at farmers markets is explained, in part, by the swing in prices we found from our first to second visit, perhaps tied to the availability of the product from one visit to the next. The prices for nearly all products in the market basket decreased between July and August. This was not only the case for the highest price we documented, but also the lowest price; generally both

the lowest-price and highest-price providers lowered their rates in August. The number of vendors with a given product appears to have contributed to the lowering of prices overall. We observed an increase in the number of vendors selling products in the market baskets (Table 4) and assume prices fell as vendors bid their prices lower to attract business in the face of increased competition.

Table 4: Price ranges at farmers markets by visit

MARKET BASKET ITEM:	VISIT ONE (JULY)			VISIT TWO (AUGUST)		
	MIN PRICE PER POUND	MAX PRICE PER POUND	NO OF VENDORS SELLING ITEM	MIN	MAX	NO OF VENDORS SELLING ITEM
CABBAGE	\$1.00	\$3.50	12	\$0.50	\$1.50	13
CUCUMBERS	\$0.38	\$2.67	22	\$0.44	\$1.60	26
GREEN PEPPER	\$1.00	\$5.00	15	\$0.67	\$2.67	21
ONIONS	\$0.80	\$2.67	17	\$0.67	\$2.00	20
STRING BEANS	\$1.60	\$5.81	25	\$1.33	\$4.00	15
SUMMER SQUASH	\$0.50	\$3.00	10	\$0.22	\$1.20	11
SWEET CORN	\$0.00	\$0.00	1	\$0.44	\$0.80	9
TOMATOES	\$1.60	\$3.00	8	\$1.00	\$3.00	22
ZUCCHINI	\$0.50	\$3.00	21	\$0.22	\$1.50	22

Community price comparisons

We assume residents of West Central Minnesota are highly mobile and able to travel to purchase food. Consequently, farmers market vendors likely face a regional market for their products, in which pricing across the region has some bearing on their pricing strategies. Still, recent University of Minnesota research suggests that grocery shopping remains more local than other retail shopping (Center for Small Towns, Grant County report). Therefore, in this local context, often the best price for comparison for farmers market vendors is the mainline grocery located in the local community (Table 5).

Table 5: Average prices at farmers markets and mainline grocery stores by community and product
 *Lowry not listed due to absence of local grocery

PRODUCT	ALEXANDRIA		BENSON		FERGUS FALLS		MORRIS		SAUK CENTER		WILLMAR (BECKER MARKET)	
	FM	GROCERY	FM	GROCERY	FM	GROCERY	FM	GROCERY	FM	GROCERY	FM	GROCERY
CABBAGE	\$1.31	\$0.84	\$0.84	\$0.77	\$1.19	\$1.04	\$1.21	\$0.84	\$0.80	\$0.79	\$0.75	\$1.22
CUCUMBERS	\$1.12	\$1.36	\$0.76	\$0.80	\$0.96	\$1.18	\$1.00	\$1.32	\$1.42	\$0.73	\$1.17	\$1.03
GREEN PEPPER	\$2.73	\$1.24	\$1.20	\$2.45	\$1.77	\$2.67	\$2.67	\$3.47	\$1.50	\$2.06	\$3.20	\$1.42
ONIONS	\$1.45	\$0.96	\$1.10	\$1.36	\$1.19	\$1.54	\$1.37	\$1.30	\$1.00	\$1.26	N/A	\$1.29
STRING BEANS	\$3.28	\$2.66	\$2.05	\$3.37	\$3.50	\$5.19	\$2.15	\$3.09	\$2.24	\$2.49	\$3.80	\$2.14
SUMMER SQUASH	\$1.02	\$0.99	N/A	\$1.29	\$0.88	\$1.50	\$1.50	\$1.89	\$1.00	\$1.28	\$0.67	\$1.49
SWEET CORN	\$0.80	\$0.51	\$0.53	\$0.48	\$0.48	\$0.76	\$0.54	\$0.94	\$0.47	\$0.67	\$0.80	\$0.63
TOMATOES	\$2.13	\$1.68	\$1.00	\$1.79	\$1.95	\$2.39	\$1.84	\$1.74	\$1.80	\$2.27	\$2.70	\$2.42
ZUCCHINI	\$0.94	\$1.24	\$1.10	\$1.69	\$0.96	\$1.99	\$0.72	\$2.49	\$1.06	\$1.33	\$0.75	\$1.29
PRODUCE MARKETBASKET	\$14.78	\$11.48	\$8.58 EXC SM SQUASH	\$14.00	\$12.88	\$18.26	\$13.00	\$17.08	\$11.29	\$12.88	\$13.84 EXC ONIONS	\$12.93

Regional price comparison

We found that during peak season (mid-July through August), there were multiple price differences—some statistically significant, others not—between farmers markets and mainline grocery stores. Significant differences were found between farmers market per pound prices and grocery store per pound prices for cabbage, summer squash, and zucchini. Statistical significance was found between farmers market prices and certified organic produce sold at natural food stores or mainline grocery stores for green peppers, string beans, and summer squash.

Table 6: Comparison of average prices by food outlet

*Denotes a price difference from average farmers market prices that is statistically significant at the 95% confidence level

MARKETBASKET ITEM	AVERAGE FARMERS MARKET PRICE PER POUND	AVERAGE GROCERY STORE PRICE PER POUND	AVERAGE ORGANIC PRICE PER POUND
CABBAGE	\$1.07	\$0.86*	\$2.66
CUCUMBERS	\$1.03	\$1.07	\$2.74
GREEN PEPPER	\$2.08	\$2.22	\$6.33*
ONIONS	\$1.25	\$1.32	\$1.78
STRING BEANS	\$2.93	\$3.13	\$2.50*
SUMMER SQUASH	\$0.95	\$1.45*	\$1.70*
SWEET CORN	\$0.55	\$0.62	N/A
TOMATOES	\$2.09	\$2.04	\$2.52
ZUCCHINI	\$0.90	\$1.62*	\$2.49
PRODUCE MARKETBASKET	\$12.85	\$14.33	\$22.72 (EXCLUDING SWEET CORN)

Overall, average per pound prices for cucumbers, green peppers, onions, string beans, summer squash, sweet corn, and zucchini were lower at farmers markets than at grocery stores. However, the prices for cucumber, onions, sweet corn, and tomatoes differed from those of grocery stores by a very small amount, so the price differences were not found to be statistically significant (Table 6).

Average per pound prices for cabbage, cucumbers, green peppers, onions, summer squash, tomatoes, and zucchini, overall, were lower at farmers markets than organic products found at natural food stores and mainline grocery stores. Many of these differences were not statistically significant, because the average price for organic products was based on just a few values; consequently, the range for insignificant differences, statistically speaking, was broad.

Several aspects of the data could have had an effect on the significance of the results. The organic price data was not very large in quantity—mostly three or four values for each produce item—which does not provide a very strong basis for valid comparison. Additionally, some data, such as ground beef, was not found at enough markets to be of use in data comparisons.

Some farms selling at markets were in the process of becoming certified organic, which may affect future pricing. This factor opens up the potential for future local foods studies to test for certified organic produce, a detail that may affect significance testing.

FUTURE RESEARCH

Based on this research, the following recommendation regarding local foods pricing should be considered:

1. A local foods pricing study in the West Central region of Minnesota with increased attention to factors that make prices incomparable/comparable to one another (e.g., certified organic produce at markets).
2. A broader study that includes a greater number of natural food stores and certified organic products for more valid data comparison to farmers markets.
3. Continued documentation of prices in the West Central region of Minnesota for comparisons over time.
4. Data collection of farmers market prices for a time period longer than peak season.

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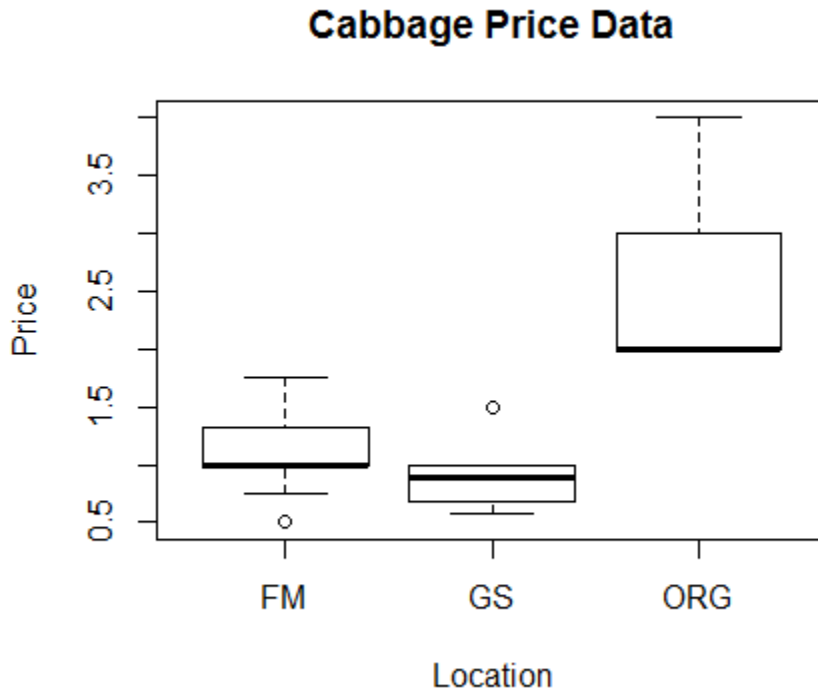
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APPENDIX 1: DETAILED PRICE DATA BY CROP AND FOOD OUTLET

This appendix gives greater context to the distribution of price data we observed. For each item in the market basket, you will find a boxplot illustrating the price ranges and the mean (delineated as a bold line). An interpretation of findings and an explanation of statistical significance for each item follow the boxplot.

Cabbage



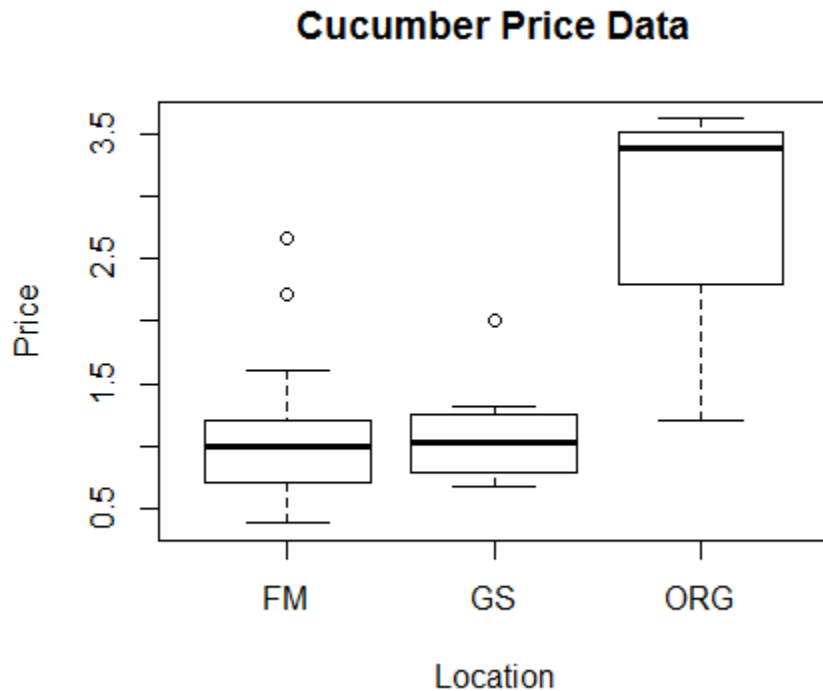
The above boxplot represents the per pound price of cabbage data gathered from Farmers Markets (FM), Grocery Stores (GS), and certified organic cabbage found at grocery stores and natural food stores (ORG). Note the spreads represent different quantities of data. There are 3 ORG values, 25 FM values, and 19 GS values.

Prices were documented for both green and red cabbage. The mean price per pound for cabbage at the farmers markets was \$1.07. The mean price per pound at grocery stores was \$0.86. The t-test, at a confidence level of 95%, produced a p-value of .013, indicating a statistically significant difference between the prices of cabbage at local farmers markets and those at grocery stores. Note that farmers market prices had a larger range than grocery stores, and the means, while significantly different, are very close values.

The mean price per pound for cabbage at the farmers markets was \$1.07. The mean price per pound of organic cabbage at natural food stores and grocery stores was \$1.66. The t-test produced a p-value of .140, indicating a lack of significance between the prices of cabbage at local farmers markets and certified organic cabbage sold at natural food stores and mainline grocery stores. Only

having three price values in the organic category to compare likely contributed to the lack of statistical significance.

Cucumber

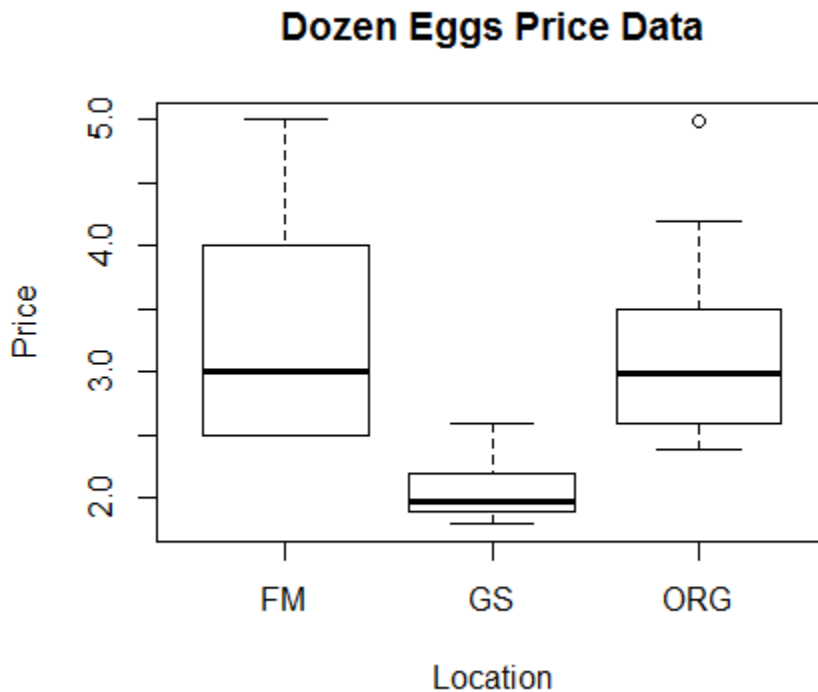


The above boxplot represents the per pound price of cucumber data gathered from Farmers Markets (FM), Grocery Stores (GS), and certified organic at natural food stores and mainline grocery stores (ORG). Note the spreads represent different quantities of data. There are 3 ORG values, 48 FM values, and 12 GS values.

The mean price per pound for cucumber at the farmers markets was \$1.03. The mean price per pound at grocery stores was \$1.07. The t-test, at a confidence level of 95%, produced a p-value of .789, indicating a lack of statistical significance between the price of cucumber at local farmers markets and those at grocery stores. Both farmers market and grocery store values contained outliers.

The mean price per pound for cucumber at the farmers markets was \$1.03. The mean price for certified organic per pound at natural food stores and grocery stores was \$2.74. The t-test produced a p-value of .158, indicating a lack of significance between the price of cucumber at local farmers markets and organic cucumbers sold at natural food stores or mainline grocery stores. Although the price difference is large, there are so few values for natural food stores that the difference cannot be found statistically significant.

Eggs



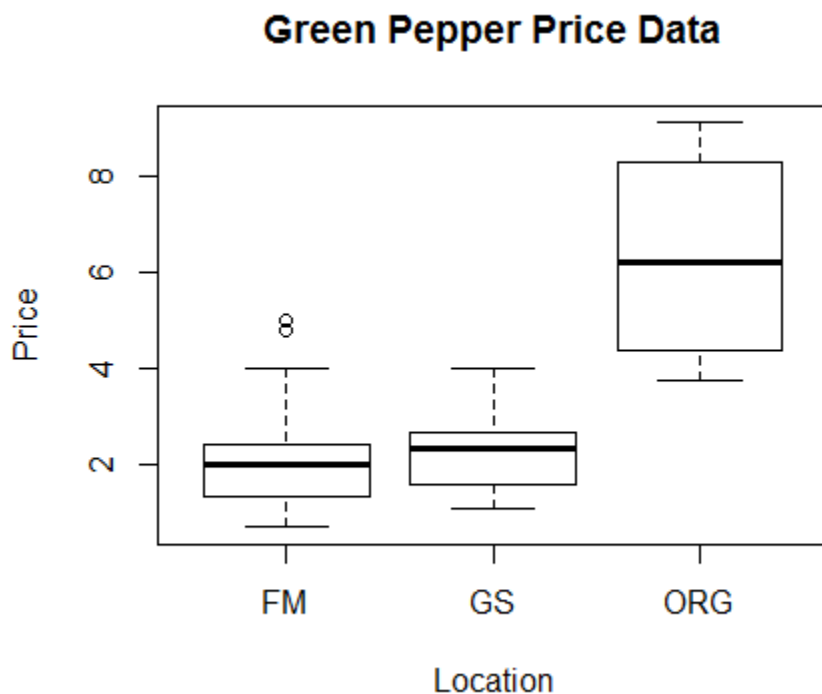
The above boxplot represents the spread of price data for a dozen large eggs gathered from Farmers Markets (FM), Grocery Stores (GS), and organic or brown cage-free eggs from natural food stores and mainline grocery stores (ORG). Note the spreads represent different quantities of data. There are 21 ORG values, depicting prices for organic or large brown eggs sold at natural food stores or mainline grocery stores. There are six FM values. In addition, there are 14 incomparable GS values that should be disregarded since they represent prices for large white eggs.

Note the price for a dozen large *brown* eggs at farmers markets was compared to grade A *white* eggs from grocery stores (GS), as well as large *brown* organic or cage-free eggs from grocery stores and natural foods stores (ORG). Comparison to the latter is more accurate pertaining to the types of eggs sold at markets. Thus, **disregard the GS boxplot**, as it does not contain comparable data.

The mean price for one dozen large eggs at the farmers markets was \$3.33. The mean price for one dozen at grocery stores was \$2.04. The t-test, for a confidence level of 95%, produced a p-value of .024, indicating a statistically significant difference between the prices of one dozen eggs at local farmers markets and those at grocery stores. **This should be disregarded**, however, as large white eggs are not comparable to large brown eggs.

The mean price for one dozen large eggs at farmers markets was \$3.33. The mean price for one dozen at natural food stores was \$3.17. The t-test produced a p-value of .648, indicating a lack of significance between the prices of one dozen eggs at local farmers markets and comparable brown eggs at natural and mainline grocery stores.

Green Pepper

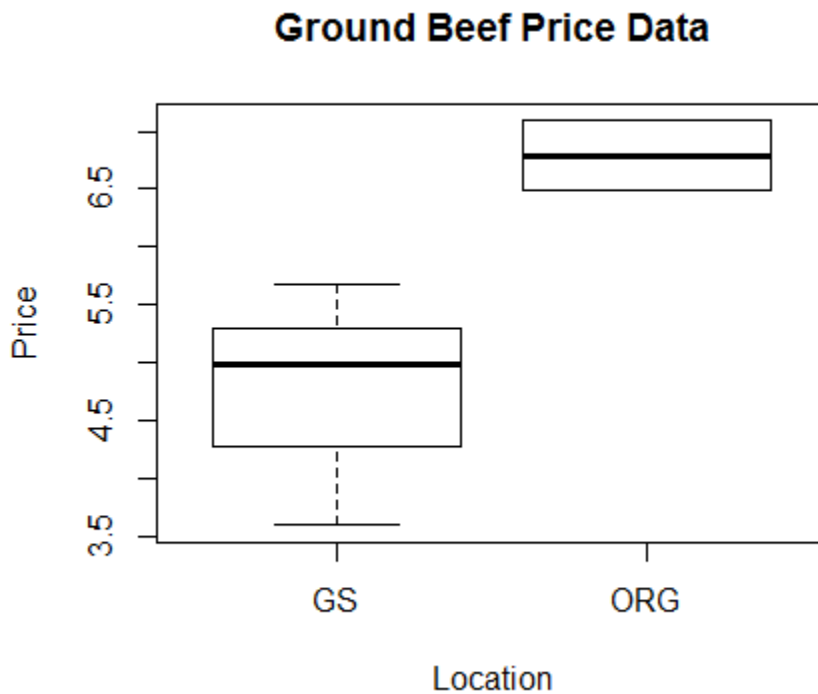


The above boxplot represents the per pound price of green pepper data gathered from Farmers Markets (FM), Grocery Stores (GS), and certified organic green peppers at natural and mainline grocery stores. Note the spreads represent different quantities of data. There are 4 ORG values, 37 FM values, and 12 GS values.

The mean price per pound for green pepper at the farmers markets was \$2.08. The mean price per pound at grocery stores was \$2.22. The t-test, for a confidence level of 95%, produced a p-value of .670, indicating a lack of statistical significance between the prices of green pepper at local farmers markets and those at grocery stores.

The mean price per pound for green pepper at the farmers markets was \$2.08. The mean price per pound for certified organic peppers at natural food stores and mainline grocery stores was \$6.33. The t-test produced a p-value of .0398, indicating a statistically significant difference between the prices of green pepper at local farmers markets and certified organic green peppers. It is important to note, however, that the natural food store data, while visibly ranging higher than the market pepper data, has far fewer values used for the comparison.

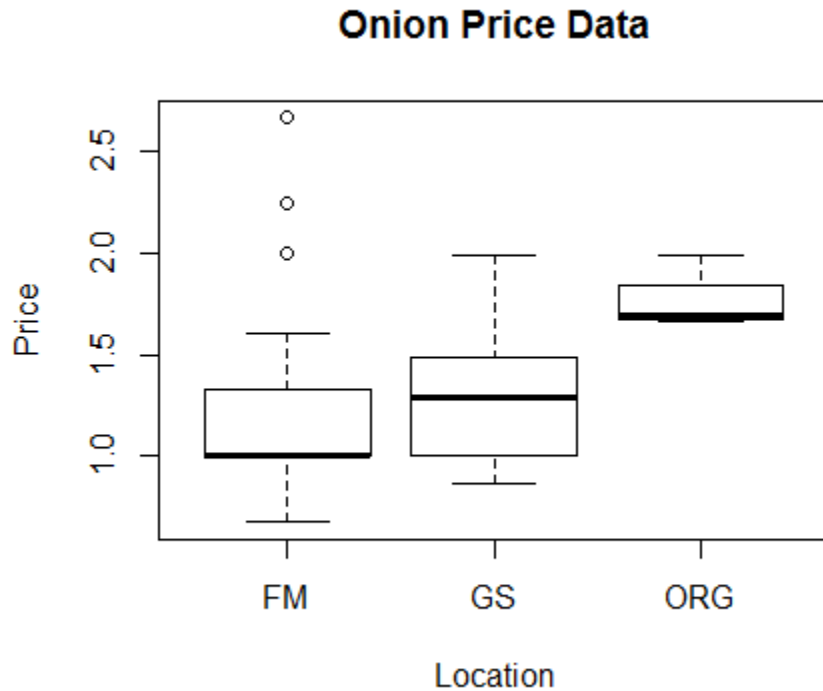
Ground Beef



The above boxplot represents the per pound price of ground beef data gathered from Grocery Stores (GS) and organic or grass-fed beef sold at natural food stores (ORG). Note the spreads are representing different quantities of data. There are 2 ORG values, 21 GS values, and an insignificant amount of FM values for display.

The mean price per pound for ground beef at grocery stores was \$4.73. The mean price per pound for organic or grass-fed beef at natural food stores was \$6.79. The t-test, for a confidence level of 95%, produced a p-value of .1000, indicating a lack of significance between the prices of ground beef at mainline groceries (GS) and at natural food stores (ORG). The lack of significance could be attributed to the small amount of data gathered from natural food stores used for the testing.

Onions

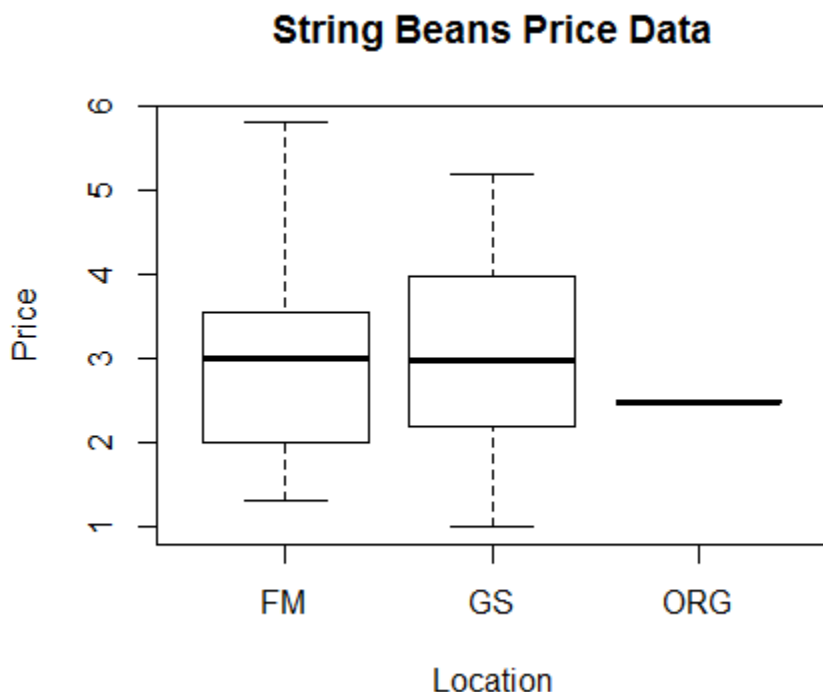


The above boxplot represents the per pound price of onion data gathered from Markets (FM), Grocery Stores (GS), and certified organic onions at natural food stores and mainline grocery stores (ORG). Note the spreads are representing different quantities of data. There are 3 ORG values, 37 FM values, and 25 GS values.

The mean price per pound for onions at the farmers markets was \$1.25. The mean price per pound at grocery stores was \$1.32. The t-test, for a confidence level of 95%, produced a p-value of .518, indicating a lack of statistical significance between the prices of onions at local farmers markets and those at grocery stores. Although the means are visibly different, the ranges for grocery and market prices largely overlap, accounting for the lack of significance. Additionally, the farmers market data contains three outliers.

The mean price per pound for onions at the farmers markets was \$1.25. The mean price per pound for certified organic onions at natural food stores and at mainline grocery stores was \$1.78. The t-test produced a p-value of .1000, indicating a lack of significance between the prices of onions at local farmers markets and certified organic onions sold at natural food stores and mainline grocery stores. The lack of significance could be attributed to the small amount of data gathered from natural food stores used for the testing.

String Beans

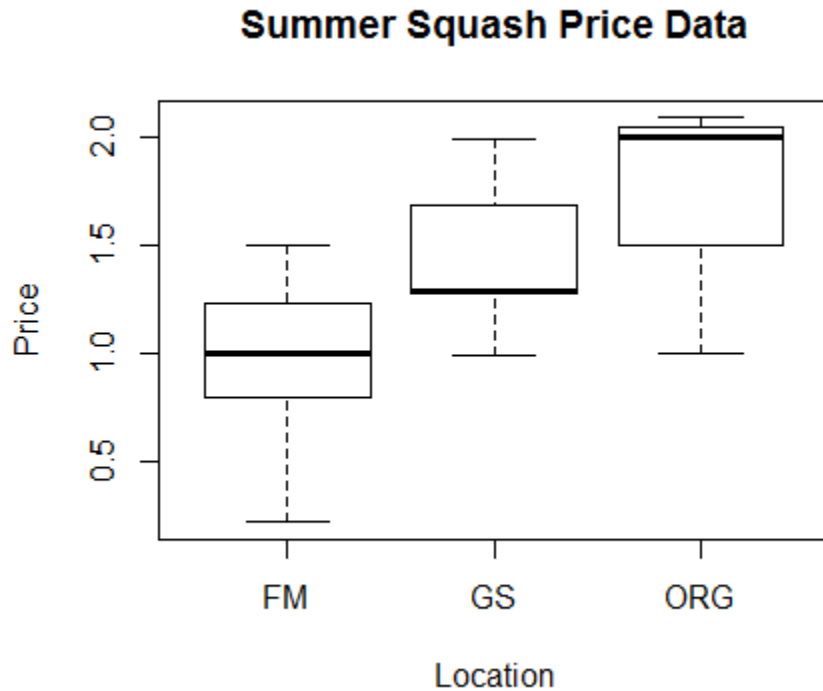


The above boxplot represents the per pound price of string beans data gathered from Farmers Markets (FM), Grocery Stores (GS), and certified organic beans sold at natural food stores or mainline grocery stores (ORG). Note the spreads are representing different quantities of data. There are 2 ORG values, 40 FM values, and 16 GS values.

The mean price per pound for string beans at the farmers markets was \$2.93. The mean price per pound at grocery stores was \$3.13. The t-test, for a confidence level of 95%, produced a p-value of .516, indicating a lack of statistical significance between the prices of string beans at local farmers markets and those at grocery stores.

The mean price per pound for string beans at farmers markets was \$2.93. The mean price per pound of certified organic string beans sold at natural food stores and mainline grocery stores was \$2.50. The t-test produced a p-value of .00675, indicating a significant difference between the prices of string beans at local farmers markets and certified organic beans. This significance is not very reliable, as there were only two values for natural food store produce (thus, only a mean and no visible range is displayed for the ORG boxplot category).

Summer Squash

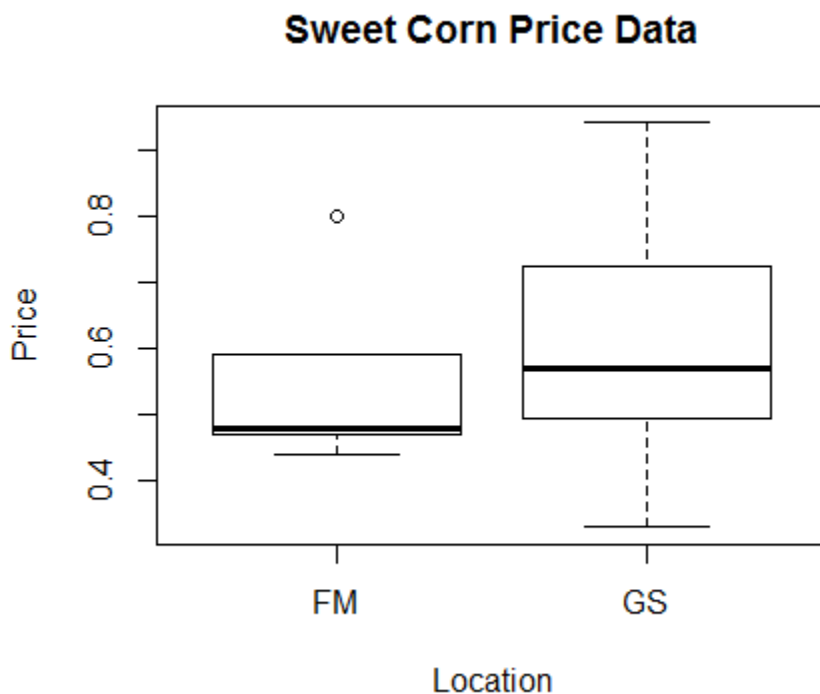


The above boxplot represents the per pound price of summer squash data gathered from Farmers Markets (FM), Grocery Stores (GS), and certified organic summer squash from natural food stores and mainline grocery stores (ORG). Note the spreads are representing different quantities of data. There are 3 ORG values, 21 FM values, and 13 GS values.

The mean price per pound for summer squash at the farmers markets was \$0.95. The mean price per pound at grocery stores was \$1.45. The t-test, for a confidence level of 95%, produced a p-value of .000350, indicating a statistically significant difference between the prices of summer squash at local farmers markets and those at grocery stores. The mean price for grocery squash is visibly higher than that for farmers markets, supporting the significant results.

The mean price per pound for summer squash at the farmers markets was \$0.95. The mean price per pound for certified organic summer squash sold at natural food stores and mainline grocery stores was \$1.70. The t-test produced a p-value of .00587, indicating a significant difference between the prices of summer squash at local farmers markets and certified organic summer squash at natural food stores and mainline grocery stores. This statistical significance is not very reliable, however, as the natural food store category contains only three data values.

Sweet Corn

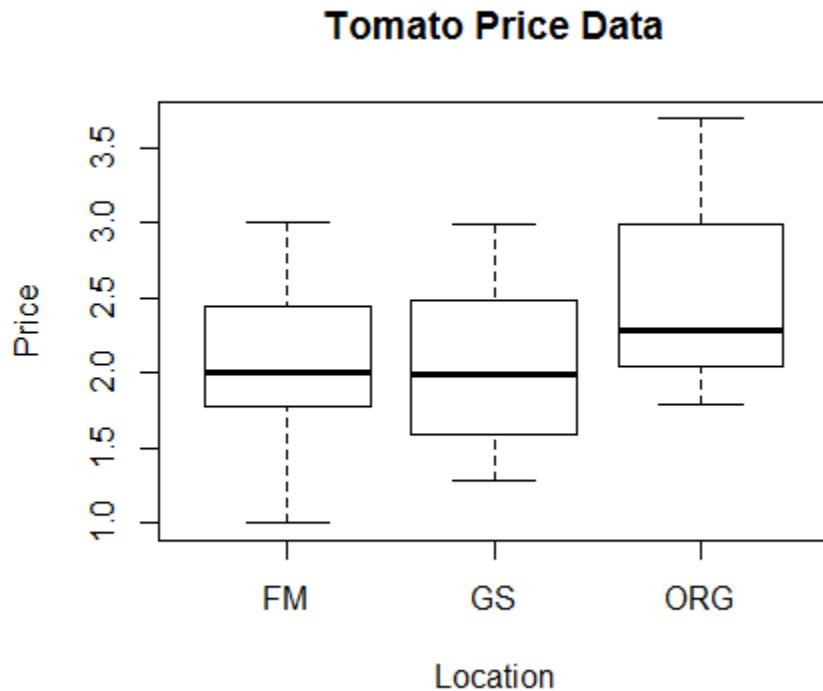


The above boxplot represents the per pound price of sweet corn data gathered from Farmers Markets (FM) and Grocery Stores (GS). Note the spreads are representing different quantities of data. There are 10 FM values, 11 GS values, and an insignificant amount of ORG values for display.

The mean price per pound for sweet corn at the farmers markets was \$0.55. The mean price per pound at grocery stores was \$0.62. The t-test, for a confidence level of 95%, produced a p-value of .366, indicating a lack of statistical significance between the prices of sweet corn at local farmers markets and those at grocery stores. The range of market prices is far smaller than that for grocery stores. Additionally, market data has one price outlier that could have affected the significance.

We did not find any certified organic sweet corn at either natural food stores or mainline grocery stores.

Tomatoes

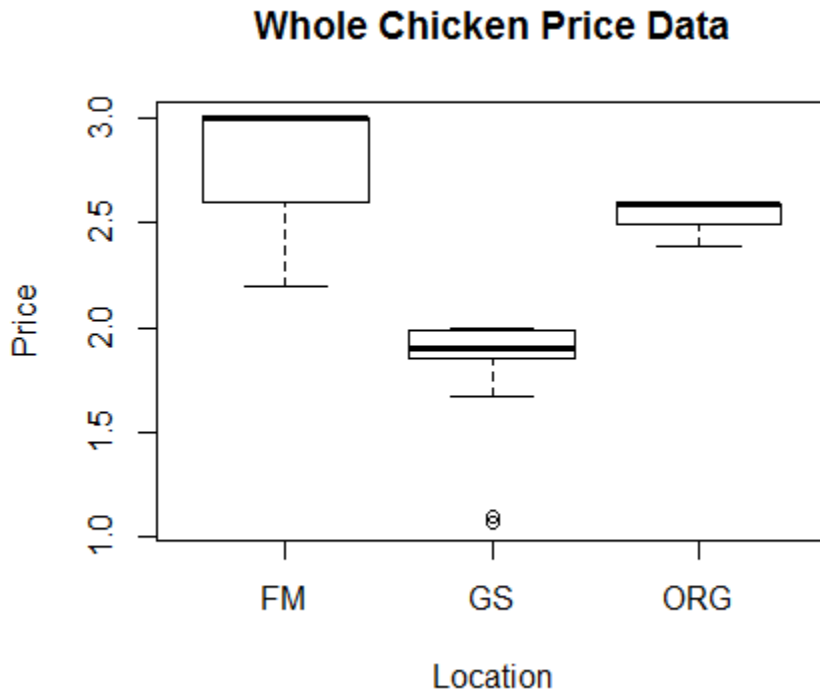


The above boxplot represents the per pound price of tomato data gathered from Farmers Markets (FM), Grocery Stores (GS), and certified organic tomatoes sold at natural food stores and mainline grocery stores (ORG). Note the spreads are representing different quantities of data. There are 4 ORG values, 31 FM values, and 32 GS values.

The mean price per pound for tomatoes at the farmers markets was \$2.09. The mean price per pound at grocery stores was \$2.04. The t-test, for a confidence level of 95%, produced a p-value of .752, indicating a lack of statistical significance between the prices of tomatoes at local farmers markets and those at grocery stores.

The mean price per pound for tomatoes at the farmers markets was \$2.09. The mean price per pound of certified organic tomatoes sold at natural food stores and mainline grocery stores was \$2.52. The t-test produced a p-value of .177, indicating a lack of significance between the prices of tomatoes at local farmers markets and certified organic tomatoes sold at natural food stores or mainline grocery stores. Again, a small quantity of natural food store data values may have contributed to a lack of significant results.

Whole Chicken



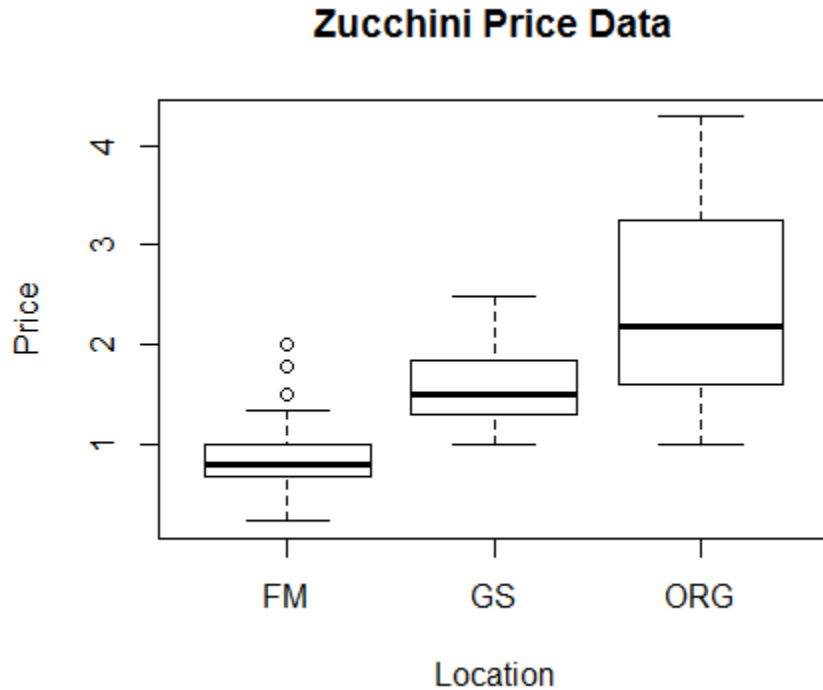
The above boxplot represents the per pound price of whole chicken data gathered from Farmers Markets (FM), Grocery Stores (GS), and organic or free-range chicken sold at natural food stores or mainline grocery stores (ORG). Note the spreads are representing different quantities of data. There are 3 ORG values, 3 FM values, and 14 GS values. Chicken from grocery stores was not organic, so the price is not as comparable to those at farmers markets, which were all organic, pastured, or free-range.

The mean price per pound for a whole chicken at the farmers markets was \$2.73. The mean price per pound at grocery stores was \$1.79. The t-test, for a confidence level of 95%, produced a p-value of .000567, indicating a statistically significant difference between the prices of a whole chicken at local farmers markets and those at grocery stores. This significant result is not very reliable, however, as there were very few values for farmers markets used in the statistics testing, and no prices recorded from grocery stores were for organic, pastured, or free-range chicken. Additionally, the grocery store data contains two price outliers.

The mean price per pound for a whole chicken at the farmers markets was \$2.73. The mean price per pound at natural food stores (ORG) was \$2.52. The t-test produced a p-value of .487, indicating a

lack of significance between the prices of a whole chicken at local farmers markets and those at natural food stores.

Zucchini



The above boxplot represents the per pound price of zucchini data gathered from Farmers Markets (FM), Grocery Stores (GS), and certified organic zucchini sold at natural food stores and mainline grocery stores (ORG). Note the spreads are representing different quantities of data. There are 3 ORG values, 44 FM values, and 11 GS values.

The mean price per pound for zucchini at the farmers markets was \$0.90. The mean price per pound at grocery stores was \$1.62. The t-test, for a confidence level of 95%, produced a p-value of 0.000000699, indicating a statistically significant difference between the prices of zucchini at local farmers markets and those at grocery stores.

The mean price per pound for zucchini at the farmers markets was \$0.90. The mean price per pound for certified organic zucchini sold at natural food stores and mainline groceries was \$2.49. The t-test produced a p-value of .240, indicating a lack of significance between the prices of zucchini at local farmers markets and certified organic zucchini sold at natural food stores and mainline grocery stores.