W&A Crop Insurance Division
A Division of Watts and Associates Inc.

Deliverable VIII
Organic Crops: Final Development of Additional Price Elections

Contract Number: AG-645S-C-09-0003

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Table of Contents

List of Tables

List of Figures

List of Appendices

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i

Risk Management Agency
Contract No: AG-645S-C-09-0003

Organic Crops: Final Development of Additional Price Elections

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SECTION I. EXECUTIVE SUMMARY

Following completion of the pricing research phase of the Organic Crops project, the United States Department of Agriculture (USDA) Risk Management Agency (RMA) exercised an option for the development of price election methods, and price elections, for selected organic crops. It must be noted that the organic price data for each of these crops are far sparser than data generally used for price determination and that only one of the crops (cotton) met all data standards listed in the original contract. The cotton data, however, is proprietary in nature and continued availability depends upon the good will of the supplier.

The contract provided rigorous standards for appropriate data. These standards are a factor in maintaining program integrity. In particular, RMA requires data to be credible, reliable, and available to RMA on an annual basis. Evaluations of organic price data performed in previous deliverables determined that adequate data were available for a limited selection of organic crops if the standards were selectively relaxed: corn, cotton, and soybeans. This determination reflects a level of pragmatic flexibility in use of the data standards to assess the application of alternative pricing to organic crops.

The data available for organic corn were provided by the USDA Agricultural Marketing Service (AMS), with monthly values derived from bi-weekly market reports from spot markets in the upper mid-west. The data for corn were more complete than data for other crops, but encompass a relatively brief historical period. Based on the sparse nature of the data, the Contractor considered four pricing models, all based on the relationships between organic and conventional feed-grade corn prices. Based on these assessments, the Contractor recommends the price election for organic corn be determined as the conventional corn base price multiplied by 1.52 (with the result rounded appropriately), which is the minimum ratio of organic corn price to conventional corn price over the data period. Further, the Contractor recommends these price elections be monitored carefully, with the objective of replacing this relationship-based price election with an approach based entirely on independent organic corn price data if feasible.

The data for organic soybeans were provided by the USDA AMS with monthly values derived from bi-weekly market reports from spot markets in the upper mid-west. While less detailed and extensive than the data available for corn, the data for soybeans were nearly complete for the years for which they have been collected. Based on the sparse nature of the data, the Contractor considered four pricing models, all based on the relationships between organic and conventional soybean prices. Based on these assessments, the Contractor recommends the price election for organic soybeans be determined as the conventional soybean base price multiplied by 1.68 (with the result rounded appropriately), which is the minimum ratio of organic soybean price to conventional soybean price over the available data period. Further, the Contractor recommends these price elections be monitored carefully, with the objective of replacing this relationship-based price election with an approach based entirely on independent organic soybean price data as those data become available.

The data available for organic cotton were provided by a large organic cotton marketing cooperative in Northern Texas. The data provided met all the standards included in the research

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2

Risk Management Agency Contract No: AG-645S-C-09-0003

and development contract: sales prices, locations, dates, and volumes were all recorded and verifiable through a number of outside sources. These data are proprietary in nature and were provided voluntarily by the dominant organic cotton marketing entity, and included only upland cotton observations from the state of Texas. As these are not public data, the failure of this single entity to provide data would result in the inability of RMA to determine organic cotton prices under the recommended methodology. Although the data were provided by a single source, they represent sales of 55 and 75 percent of the cotton grown organically each year. The Contractor tested five alternative approaches to assessing price elections for organic cotton, including two based on relationships between organic and conventional cotton prices and three based on analysis of the available organic cotton data series. Based on these assessments, the Contractor recommends the organic cotton price election be determined as the simple average of the observed organic cotton prices in the most recent three crop years and applied only to upland cotton in the state of Texas.

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3

Risk Management Agency
Contract No: AG-645S-C-09-0003

SECTION II. INTRODUCTION AND OVERVIEW

Following the completion of the pricing research phase of the Organic Crops project, the United States Department of Agriculture (USDA) Risk Management Agency (RMA) exercised an option for the development of price election methods, and price elections, for selected organic crops. Under current RMA Crop Insurance Handbook guidelines, "Price elections or dollar amounts of insurance applicable to both certified organic and transitional crops will be the same price elections or dollar amounts of insurance for conventional crops published by RMA as shown on the actuarial documents." Given the relatively small volume of organic production compared with the same commodity produced conventionally and the limited pricing data for organic crops, this approach was logical as a starting point. However, based on pricing research using data that have only recently become available, RMA directed the Contractor to develop separate price elections for organic corn, cotton, and soybeans.

It must be noted that the price data for the organic markets for each of these crops do not meet the stipulated data standards as completely as do the data for conventional markets for these same crops. Although corn and soybeans offer sustained and publicly available data, only cotton met the full data standards listed in the original contract. The cotton data, however, is entirely proprietary in nature and subject to availability concerns.

The contract for this research provided rigorous standards for appropriate data used for pricing. These standards are a factor in maintaining program integrity. In particular, RMA requires data to be credible, reliable, and available on an annual basis to RMA. To be acceptable, data collected at the farm level must include the quantity sold at a particular price, the method of sale (contract or open market), location documented with the price, and the contractual arrangement. Price data not available at the farm level must be verifiable by a disinterested third party, whenever possible; be aggregated to protect buyer identity, and provide the necessary information (including quantity sold) allowing prices to be adjusted to the farm level. Based on evaluations of organic price data performed in previous deliverables, it was determined that adequate data to support the development of independent organic price elections was available for a limited selection of organic crops if the standards were selectively relaxed: corn, cotton, and soybeans. This determination was made despite the severe limitations on the data for even the selected crops and reflects a level of pragmatic flexibility in use of these crops to assess the application of alternative pricing to organic crops in general.

SECTION III. ORGANIC PRICING FOR CORN

Most of the corn grown conventionally in the United States each year is used in livestock feed, production of ethanol, and for many food products such as starches, sweeteners, etc. While most crops grown organically are intended largely for human consumption (fruits and vegetables particularly), a majority of the organic corn produced each year is used in non-food channels, particularly as feed for animals being produced with organic practices. Organic corn commands a premium primarily based on the perception that grain grown without the use of synthetically modified genetics, chemical fertilizers, or synthetic crop protection products is more wholesome or potentially less subject to residues that may be deleterious to consumer health. Price premiums for organic production, while more pronounced in food-grade products, are persistently present in feed-grade corn (spatially and temporally) across available data sources, including those maintained by the Federal government.

Data available for development of price elections that meet the data standards outlined in the contract are very sparse (see Organic Crops Pricing Report). The Contractor obtained organic corn price data from a number of sources, including bi-weekly data collected by the USDA Agricultural Marketing Service (AMS), from a public-private partnership dataset collected by the Rodale Institute under a partnership contract with RMA, and a number of smaller datasets provided by organic advocacy organizations and producer groups. Based on extensive assessment of these, only the AMS dataset was found to meet almost all the data standards outlined in the contract (see Organic Crops Pricing Report). AMS gathers price data and reports market prices based on its survey methodology. Consequently, there is no reporting of volume sold at a price, although the reported price typically represents a price representative of a market for the period of time measured.[1] However, the frequency of the AMS reporting provides a snapshot of relative price levels that can support inferences about annual tendencies.

AMS reports prices for both food-grade and feed-grade organic corn. Due to numerous and substantial gaps in the food-grade corn dataset and the overall thinness of its market, this contractual effort focused on feed-grade corn. Only feed-grade corn data are used in this analysis. Although the data available for food-grade corn were very thin, both our discussions with AMS and our assessment of the data indicated that food-grade corn consistently sold at a substantial premium to feed-grade corn. As a result, the contractor recommends that the organic price calculated in this analysis is applicable to both feed-grade and food grade corn. This recommendation recognizes that separate actuarial structures incorporating individual types are not likely at this time. This still would represent a substantial improvement over the current pricing (applying conventional corn pricing to all organic production). Further, the contractor recommends that AMS pricing data for food-grade corn be monitored on an ongoing basis, with consideration of applying a similar analysis for the development of a separate organic food-grade price when data are sufficient to support identification of an appropriate type on the actuarial documents.

For the price analysis, bi-weekly observations in the AMS dataset were aggregated to a monthly

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[1] Interview: Ami Rayer, USDA AMS

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5

*Risk Management Agency
Contract No: AG-645S-C-09-0003*

basis by calculating the simple average of all observations from each calendar month.[2] Figure 1 displays the aggregated AMS organic feed corn price data for the entire term of the series.

FIGURE 1. AMS Organic Feed Corn Price Data
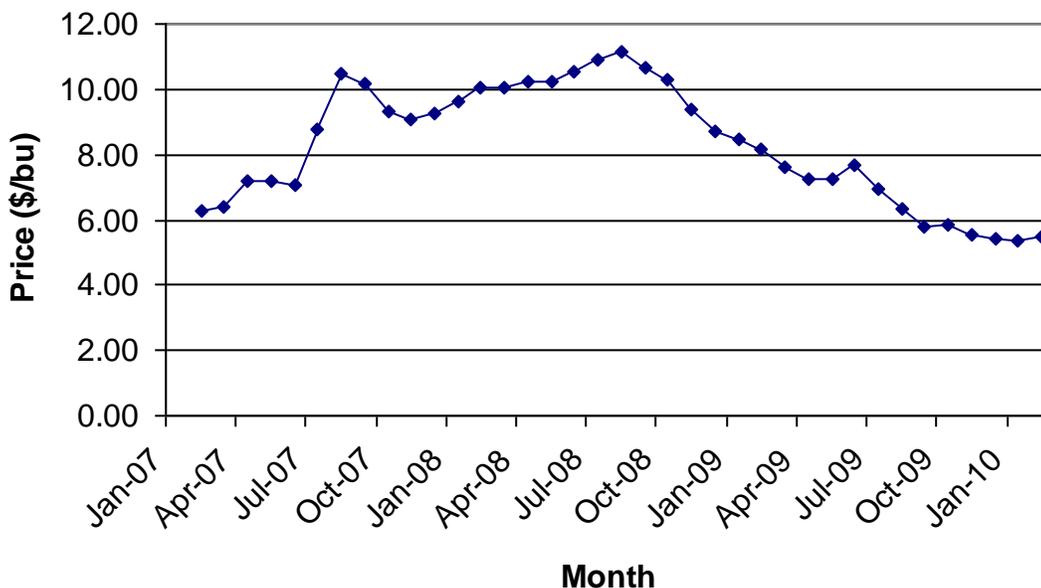
Figure 1 Data.

Month	Organic Price	Month	Organic Price
Jan-07		Aug-08	11.17
Feb-07	6.29	Sep-08	10.65
Mar-07	6.42	Oct-08	10.32
Apr-07	7.19	Nov-08	9.35
May-07	7.19	Dec-08	8.73
Jun-07	7.06	Jan-09	8.50
Jul-07	8.75	Feb-09	8.19
Aug-07	10.50	Mar-09	7.64
Sep-07	10.16	Apr-09	7.25
Oct-07	9.30	May-09	7.27
Nov-07	9.10	Jun-09	7.69
Dec-07	9.24	Jul-09	6.95
Jan-08	9.63	Aug-09	6.35
Feb-08	10.08	Sep-09	5.77
Mar-08	10.05	Oct-09	5.82
Apr-08	10.26	Nov-09	5.56
May-08	10.26	Dec-09	5.43
Jun-08	10.51	Jan-10	5.39
Jul-08	10.92	Feb-10	5.47

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[2] All AMS data included in these analyses were provided by AMS Market News. The primary contact was Ami Rayer (ami.rayer@ams.usda.gov, 515-284-4460). She provided a wealth of information, answering questions about the data collection, affirming its veracity, and offering insights into the events in the organic markets over the last three years. These data were updated for the final version of the report in early March, 2010.

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6

*Risk Management Agency
Contract No: AG-645S-C-09-0003*

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Price data for conventional corn are widely available. Given the many sources of data available, it is important to consider the most appropriate conventional price series for comparison to the AMS data. As the AMS data reported are based on actual producer sales, direct comparison of time series prices to the commodity futures prices for conventional corn would be less than optimal. For this comparison, the Contractor instead obtained National Agricultural Statistics Service (NASS) Prices Received by Producers data for each of the months for which AMS organic corn price data were available.[3] NASS prices received by producers for corn represent the average price of corn sold for all uses, which is dominated by corn for export, ethanol production, and feed. Figure 2 displays the aggregated monthly AMS organic corn prices relative to the NASS Prices Received by Producers as reported for conventional corn.

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[3] NASS Data are easily available through their website. The most recent Agricultural Prices report at the time this research was being conducted was accessed at: http://usda.mannlib.cornell.edu/usda/current/AgriPric/AgriPric-09-29-2009.pdf. New Agricultural Prices reports are published late each month and can be downloaded from the NASS website.

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7

*Risk Management Agency
Contract No: AG-645S-C-09-0003*

FIGURE 2. Organic and Conventional Corn Prices
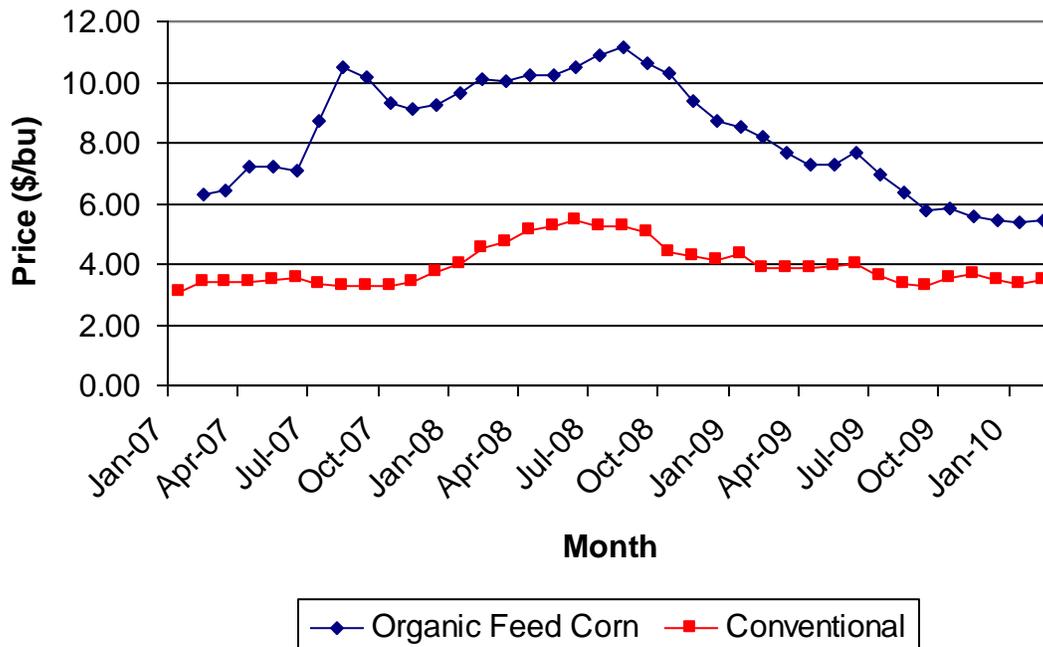
Source: Figure developed by the Contractor based on data provided by AMS and NASS

Figure 2 Data.

Month	Organic Price	Conventional Price	Month	Organic Price	Conventional Price
Jan-07		3.05	Aug-08	11.17	5.26
Feb-07	6.29	3.44	Sep-08	10.65	5.02
Mar-07	6.42	3.43	Oct-08	10.32	4.37
Apr-07	7.19	3.39	Nov-08	9.35	4.26
May-07	7.19	3.49	Dec-08	8.73	4.1
Jun-07	7.06	3.53	Jan-09	8.50	4.36
Jul-07	8.75	3.32	Feb-09	8.19	3.87
Aug-07	10.50	3.26	Mar-09	7.64	3.86
Sep-07	10.16	3.28	Apr-09	7.25	3.87
Oct-07	9.30	3.29	May-09	7.27	3.96
Nov-07	9.10	3.44	Jun-09	7.69	4.01
Dec-07	9.24	3.77	Jul-09	6.95	3.6
Jan-08	9.63	3.98	Aug-09	6.35	3.33
Feb-08	10.08	4.54	Sep-09	5.77	3.25
Mar-08	10.05	4.7	Oct-09	5.82	3.54
Apr-08	10.26	5.14	Nov-09	5.56	3.65
May-08	10.26	5.27	Dec-09	5.43	3.49
Jun-08	10.51	5.47	Jan-10	5.39	3.36
Jul-08	10.92	5.25	Feb-10	5.47	3.45

The Contractor recommends the price elections for organic corn be developed as a derivative of Commodity Exchange Price Provisions (CEPP) price elections for conventional corn. This recommendation is based on two primary concerns. First, there is a lack of long-term data for organic prices (the AMS series was initiated in February 2007) and the lack of data related to

Organic Crops: Final Development of Additional Price Elections

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stocks, planting intentions, supply, or demand for organic corn. Therefore, consideration of relationships between the available data for organic corn and the data available for conventional corn is likely to provide much more reliable conclusions. Second, organic corn and conventional corn are substitutes, ultimately competing for acreage and market share among alternative non-food grain products. Although this substitute role is imperfect, if the price for organic corn were to get high enough, buyers would have to seriously consider the impact and benefits of substituting less expensive conventional corn. Alternatively, conventional producers would have to consider diverting acreage to organic practices (a process that, admittedly, has high barriers to entry and is not likely to be based on a single year's price). Thus the prices are linked, if imperfectly, by the degree to which one can be substituted for the other.

The relationship between the price of conventional corn and organic corn is complex, with many factors at play. Whereas the conventional corn market is vast (conventional corn crops exceed 12 billion bushels for recent crop years, with a farmer received value in excess of $30 billion) and serves a dizzying array of industries and end uses, the market for organic corn is still in its infancy with a relatively small number of producers and buyers. Organic production consistently receives a substantial premium over conventional prices, but a literature review revealed little published information assessing the relationships between conventional and organic pricing.

Based on the data available (and their limited capacity to support more complex modeling), the Contractor considered two simple relationship measures between conventional and organic corn prices: (1) the difference of the aggregated monthly organic price and the reported conventional price and (2) the ratio of the aggregated monthly organic price to the conventional price. The Contractor calculated the differences and ratios of all observations (consisting of 37 monthly observations between February 2007 and February 2010). Summary statistics for the "difference" and "ratio" calculations are displayed in Table 1.

TABLE 1. Organic and Conventional Corn Price Relationship Summary Statistics

	Price Difference	Price Ratio
Average	4.32	2.10
Median	4.32	2.00
Maximum	7.24	3.22
Minimum	1.91	1.52
Standard Deviation	1.45	0.39
Coefficient of Variation	0.33	0.19
Count	37	37

Source: Table developed by the Contractor based on data provided by AMS and NASS

The median premium for organic production is $4.32/bu, or 2.00 times the conventional price. The average organic price appears to be unduly influenced by a few observations and the mode is meaningless (no two values are repeated in the observation set); thus, the median appears to be the most reasonable measure of the relationship's central tendency.

The maximum and minimum measures provide a sense of the extremes in the dataset. Since the period of time encompassed by the dataset is short, a level of conservatism in warranted. This particular period of time encompasses prices for corn much higher than was the norm in prior years. As such, the minimum price difference and ratio over the term of the data provide a useful starting point in considering development of organic prices. The smallest difference and ratio between organic and conventional prices represent the best available measure of a "floor" premium for organic production. Using a minimum historical relationship minimizes the potential for over-insurance; an advisable approach in this data poor environment. In the development of organic price elections, it is important to acknowledge that historically organic producers have had to insure under conventional prices, which offered no recognition of the premium prices received for organic production. Price elections that increase conventional prices by the minimum observed differences or ratios will provide estimates that substantially more closely approximate actual realized organic prices.

The price difference data series is displayed in Figure 3. For the convenience of the reader, the median price difference and minimum price difference are displayed on the figure.

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Figure 3. Corn Price Difference Data Series

Median: 4.32

Minimum: 1.91

Difference: Organic less Conventional
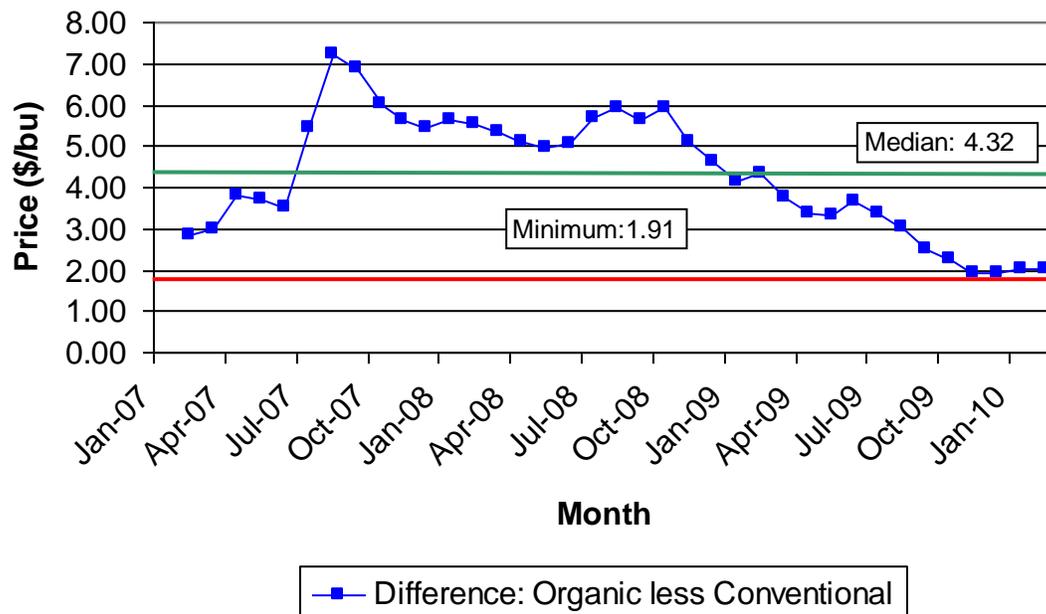
Source: Figure developed by the Contractor based on data provided by AMS and NASS

Figure 3 Data.

Month	Difference Org less Conv.	Median	Minimum	Month	Difference Org less Conv.	Median	Minimum
Jan-07		4.32	1.91	Aug-08	5.91	4.32	1.91
Feb-07	2.85	4.32	1.91	Sep-08	5.63	4.32	1.91
Mar-07	2.99	4.32	1.91	Oct-08	5.95	4.32	1.91
Apr-07	3.80	4.32	1.91	Nov-08	5.09	4.32	1.91
May-07	3.70	4.32	1.91	Dec-08	4.63	4.32	1.91
Jun-07	3.53	4.32	1.91	Jan-09	4.14	4.32	1.91
Jul-07	5.43	4.32	1.91	Feb-09	4.32	4.32	1.91
Aug-07	7.24	4.32	1.91	Mar-09	3.78	4.32	1.91
Sep-07	6.88	4.32	1.91	Apr-09	3.38	4.32	1.91
Oct-07	6.01	4.32	1.91	May-09	3.31	4.32	1.91
Nov-07	5.66	4.32	1.91	Jun-09	3.68	4.32	1.91
Dec-07	5.47	4.32	1.91	Jul-09	3.35	4.32	1.91
Jan-08	5.65	4.32	1.91	Aug-09	3.02	4.32	1.91
Feb-08	5.54	4.32	1.91	Sep-09	2.52	4.32	1.91
Mar-08	5.35	4.32	1.91	Oct-09	2.28	4.32	1.91
Apr-08	5.12	4.32	1.91	Nov-09	1.91	4.32	1.91
May-08	4.99	4.32	1.91	Dec-09	1.94	4.32	1.91
Jun-08	5.04	4.32	1.91	Jan-10	2.03	4.32	1.91
Jul-08	5.67	4.32	1.91	Feb-10	2.02	4.32	1.91

Monthly premiums for organic production increased sharply in the 2007 and 2008 crop years, and hovered around $5.00/bu before returning to approximately $3.00/bu shortly before harvest of the 2009 crop and falling to approximately $2.00/bu after harvest was complete. Based on discussion with organic corn producers, the high premiums were linked to small quantities of

organic production available. Consistent with many crops that are subject to thin markets, short supplies can have substantial impacts on prices in the short and intermediate term. The price ratio data series is displayed in Figure 4. For the convenience of the reader, the median price ratio and minimum price ratio are displayed on the figure.

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FIGURE 4. Corn Price Ratio Data Series

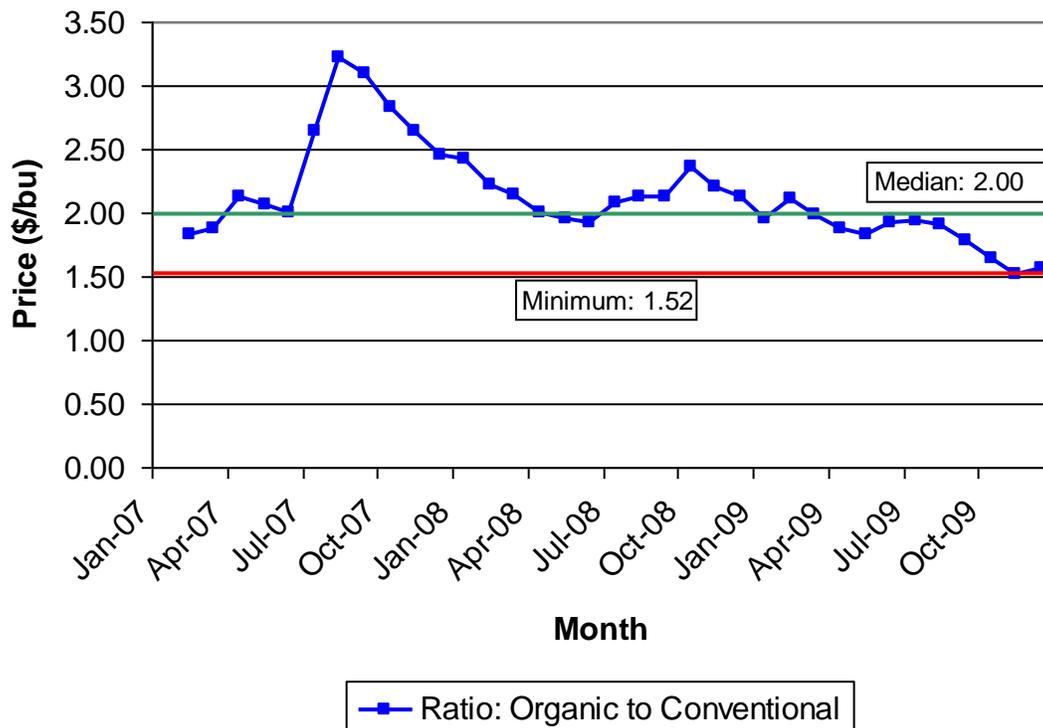Source: Figure developed by the Contractor based on data provided by AMS and NASS

Figure 4 Data.

Month	Ratio: Org to Conv.	Median	Minimum	Month	Ratio: Org to Conv.	Median	Minimum
Jan-07		2.00	1.52	Aug-08	2.12	2.00	1.52
Feb-07	1.83	2.00	1.52	Sep-08	2.12	2.00	1.52
Mar-07	1.87	2.00	1.52	Oct-08	2.36	2.00	1.52
Apr-07	2.12	2.00	1.52	Nov-08	2.20	2.00	1.52
May-07	2.06	2.00	1.52	Dec-08	2.13	2.00	1.52
Jun-07	2.00	2.00	1.52	Jan-09	1.95	2.00	1.52
Jul-07	2.64	2.00	1.52	Feb-09	2.12	2.00	1.52
Aug-07	3.22	2.00	1.52	Mar-09	1.98	2.00	1.52
Sep-07	3.10	2.00	1.52	Apr-09	1.87	2.00	1.52
Oct-07	2.83	2.00	1.52	May-09	1.84	2.00	1.52
Nov-07	2.65	2.00	1.52	Jun-09	1.92	2.00	1.52
Dec-07	2.45	2.00	1.52	Jul-09	1.93	2.00	1.52
Jan-08	2.42	2.00	1.52	Aug-09	1.91	2.00	1.52
Feb-08	2.22	2.00	1.52	Sep-09	1.78	2.00	1.52
Mar-08	2.14	2.00	1.52	Oct-09	1.64	2.00	1.52
Apr-08	2.00	2.00	1.52	Nov-09	1.52	2.00	1.52
May-08	1.95	2.00	1.52	Dec-09	1.56	2.00	1.52
Jun-08	1.92	2.00	1.52	Jan-10	1.60	2.00	1.52
Jul-08	2.08	2.00	1.52	Feb-10	1.59	2.00	1.52

Organic Crops: Final Development of Additional Price Elections

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Based on these relational assessments, the Contractor believes conventional prices can be adjusted to project organic prices. The Contractor considered four approaches to adjusting conventional prices to project organic prices: adding the median difference to the conventional price, adding the minimum difference to the conventional price, multiplying the conventional price by the median ratio, and multiplying the conventional price by the minimum ratio. The outcomes of these adjusted estimated prices relative to the reported conventional and organic prices are displayed in Figure 5.

Price elections obviously are an annual value not subject to the month-to-month variation of markets. However, since only two complete crop years of data are available, annual averages provide only one degree of freedom in the statistical sense. Thus, monthly data provide a more complete view of the behavior of price relationships than would a simple comparison of annual averages.

Organic Crops: Final Development of Additional Price Elections

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FIGURE 5. Organic Corn Price Projection Performance
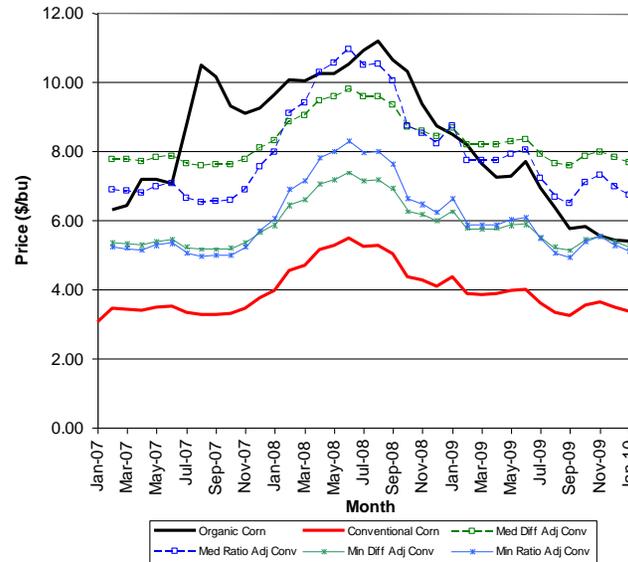
Source: Figure developed by the Contractor based on data provided by AMS and NASS

Figure 5 Data.

Corn	Organic	Conventional	Conventional Adjusted by Median Difference	Conventional Adjusted by Median Ratio	Conventional Adjusted by Min Difference	Conventional Adjusted by Min Ratio
Jan-07		3.05				
Feb-07	6.29	3.44	7.76	6.88	5.35	5.23
Mar-07	6.42	3.43	7.75	6.86	5.34	5.21
Apr-07	7.19	3.39	7.71	6.78	5.30	5.15
May-07	7.19	3.49	7.81	6.98	5.40	5.30
Jun-07	7.06	3.53	7.85	7.06	5.44	5.37
Jul-07	8.75	3.32	7.64	6.64	5.23	5.05
Aug-07	10.50	3.26	7.58	6.52	5.17	4.96
Sep-07	10.16	3.28	7.60	6.56	5.19	4.99
Oct-07	9.30	3.29	7.61	6.58	5.20	5.00
Nov-07	9.10	3.44	7.76	6.88	5.35	5.23
Dec-07	9.24	3.77	8.09	7.54	5.68	5.73
Jan-08	9.63	3.98	8.30	7.96	5.89	6.05
Feb-08	10.08	4.54	8.86	9.08	6.45	6.90
Mar-08	10.05	4.7	9.02	9.40	6.61	7.14
Apr-08	10.26	5.14	9.46	10.28	7.05	7.81
May-08	10.26	5.27	9.59	10.54	7.18	8.01
Jun-08	10.51	5.47	9.79	10.94	7.38	8.31
Jul-08	10.92	5.25	9.57	10.50	7.16	7.98
Aug-08	11.17	5.26	9.58	10.52	7.17	8.00
Sep-08	10.65	5.02	9.34	10.04	6.93	7.63
Oct-08	10.32	4.37	8.69	8.74	6.28	6.64
Nov-08	9.35	4.26	8.58	8.52	6.17	6.48
Dec-08	8.73	4.10	8.42	8.20	6.01	6.23
Jan-09	8.50	4.36	8.68	8.72	6.27	6.63
Feb-09	8.19	3.87	8.19	7.74	5.78	5.88
Mar-09	7.64	3.86	8.18	7.72	5.77	5.87
Apr-09	7.25	3.87	8.19	7.74	5.78	5.88
May-09	7.27	3.96	8.28	7.92	5.87	6.02
Jun-09	7.69	4.01	8.33	8.02	5.92	6.10
Jul-09	6.95	3.6	7.92	7.20	5.51	5.47
Aug-09	6.35	3.33	7.65	6.66	5.24	5.06
Sep-09	5.77	3.25	7.57	6.50	5.16	4.94
Oct-09	5.82	3.54	7.86	7.08	5.45	5.38
Nov-09	5.56	3.65	7.97	7.30	5.56	5.55
Dec-09	5.43	3.49	7.81	6.98	5.4	5.30
Jan-10	5.39	3.36	7.68	6.72	5.27	5.11
Feb-10	5.47	3.45	7.77	6.90	5.36	5.24

As the figure displays, the values based on the median values track the actual observed organic prices more closely than the values based on the minimum values. In this sense, the performance of median values, by definition, is superior to that of the minimum based adjustments. It is worth noting, however, that many of the values represented by the median estimates exceed the actual reported organic prices, in some cases substantially.[4] While the data series is much too short to obtain any sense of differences on an annual basis, this outcome provides a cautionary note.[5] Table 2 displays the summary performance statistics, as measured by the „error' or difference between the projected value and the actual reported value, of each of the adjustment procedures over the span of the available data displayed in the figure. A positive error value indicates that the actual reported value was higher than the projected value, and vice versa.

TABLE 2. Organic Corn Alternative Adjustment Performance Summary Statistics

	Median Difference Adjusted Error	Median Ratio Adjusted Error	Minimum Difference Adjusted Error	Minimum Ratio Adjusted Error
Average	0.00	0.36	2.41	2.26
Median	0.00	0.00	2.41	2.20
Maximum	2.92	3.98	5.33	5.54
Minimum	-2.41	-1.74	0.00	0.00
Sum of Squared Errors	77.36	70.55	291.90	255.79

Source: Figure developed by the Contractor based on data provided by AMS and NASS

A brief interpretation of these performance statistics is provided for each of the alternative adjustment procedures.

Median Difference Adjustment Procedure
This procedure adds the median difference between the prices to the conventional price for each observation. As the table displays, the median difference approach slightly overestimated the organic price on average, but (by definition) had a median error of zero. The approach has the smallest maximum error (underestimate) and the smallest sum of squared errors (an aggregate measure of projection performance), but had the largest minimum error (overestimate).

Median Ratio Adjustment Procedure
Under this procedure, each of the conventional prices is multiplied by the median ratio. This approach performed similarly to the median difference approach, with the lowest average error and (again by definition) a median error of zero, but displayed a large maximum error (underestimating the observed organic price by $3.98/bu in one instance) and an unacceptable overestimate as high as $1.74/bu. The sum of squared errors performance was similar to that of the median difference adjustment procedure.

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[4] The data series (only two complete and one partial marketing year) do not have sufficient length to measure any seasonality that may exist in the market for organic corn.
[5] It is worth noting that the price election may exceed the monthly price on occasion but remain at or below the average market price on a crop year basis.

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16

*Risk Management Agency
Contract No: AG-645S-C-09-0003*

Minimum Difference Adjustment Procedure

This procedure added the single smallest difference between the prices to the conventional price for each observation. As the table displays, this approach consistently underestimated the organic price with a median underestimate of $2.41/bu. While the reported organic price was underestimated by as much as $5.33/bu, the method never (by definition) overestimated the organic price. The overall performance of the estimates, (as measured by the sum of squared errors) was substantially inferior to either median adjustment procedure.

Minimum Ratio Adjustment Procedure

This procedure multiplied the minimum ratio of the prices by the conventional price for each observation. As the table displays, the minimum ratio approach consistently underestimated the organic price with a median underestimate of $2.20/bu. While the minimum ratio approach underestimated the reported organic price by as much as $5.54/bu, the largest underestimate of the approaches tested, it also never (by definition) overestimated the organic price. The overall performance of the minimum ratio approach was far superior to that of the minimum difference approach with a much smaller sum of squared errors.

As the reader will note, the analysis to this point have are based on comparisons of the AMS organic monthly cash price data to its closest conventional price analogue to facilitate numerous monthly comparisons. The ultimate objective of the organic price elections development, however, is to provide procedures for application to each subsequent crop year's price elections for conventional type corn. As each year is unique, a superior test of potential performance for each of the alternative price election determination approaches is to measure how they would have preformed in prior crop years. Starting in the 2010 crop year, and in subsequent crop years, RMA intends to use the base price for its revenue products as the price election for yield coverage for all crops for which revenue coverage is offered. As corn is among these crops, the corn revenue base price will also be the price election for corn yield coverage.

RMA provided the Contractor with the proposed CEPP which are expected to serve as the basis of the determination of base price elections under the Combo plan. For corn, the base price is calculated as the simple average of reported daily settlement prices for the trading dates February 1 through February 28 for the Chicago Board of Trade (CBOT) December Corn contract for most of the acreage, rounded to the nearest whole cent per bushel.[6] The Contractor calculated the base prices that would have been in effect for the crop years 2007, 2008, and 2009 for assessment of the procedures specified above. The base prices for these years and the data used to determine them are displayed in Table 3. Prices are reported to the quarter of a cent per bushel, consistent with CBOT procedures.

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[6] While all production areas use either the CBOT September or December corn contract as the basis of base price discovery, most of the southern United States use January 15 through February 14 as the price discovery period. Part of Texas (January 31 sales closing date) uses December 15 through January 14, and other parts of Texas (February 28 sales closing date) use January 1 through January 30. To prevent confusion, the examples use the dates and contracts applicable to the majority of corn production in the Midwest.

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17

Risk Management Agency
Contract No: AG-645S-C-09-0003

W&A Crop Insurance Division
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TABLE 3. Corn Base Price Calculations for 2007, 2008, and 2009

December 2007 Corn		December 2008 Corn		December 2009 Corn	
Date	Close	Date	Close	Date	Close
2/1/2007	3.9250	2/1/2008	5.1900	2/2/2009	4.1600
2/2/2007	3.9725	2/4/2008	5.3300	2/3/2009	4.0650
2/5/2007	3.9500	2/5/2008	5.3250	2/4/2009	4.0150
2/6/2007	3.9150	2/6/2008	5.2575	2/5/2009	4.1500
2/7/2007	3.9100	2/7/2008	5.2250	2/6/2009	4.2000
2/8/2007	3.9650	2/8/2008	5.3000	2/9/2009	4.2100
2/9/2007	3.9925	2/11/2008	5.2525	2/10/2009	4.2050
2/12/2007	3.9850	2/12/2008	5.2025	2/11/2009	4.1000
2/13/2007	4.0300	2/13/2008	5.1925	2/12/2009	4.0750
2/14/2007	4.0125	2/14/2008	5.3225	2/13/2009	4.0600
2/15/2007	4.0450	2/15/2008	5.3800	2/17/2009	3.9000
2/16/2007	4.1325	2/19/2008	5.4500	2/18/2009	3.8750
2/20/2007	4.1325	2/20/2008	5.4800	2/19/2009	3.9450
2/21/2007	4.2300	2/21/2008	5.5300	2/20/2009	3.9100
2/22/2007	4.2775	2/22/2008	5.5025	2/23/2009	3.9150
2/23/2007	4.2075	2/25/2008	5.5725	2/24/2009	3.9425
2/26/2007	4.1800	2/26/2008	5.5650	2/25/2009	4.0425
2/27/2007	4.0950	2/27/2008	5.5350	2/26/2009	4.0200
2/28/2007	4.2000	2/28/2008	5.6550	2/27/2009	3.9050
Implied 2007 Base Price		Implied 2008 Base Price		Implied 2009 Base Price	
4.06	$/bu	5.38	$/bu	4.04	$/bu

Source: Table developed by the Contractor with data provided by the Chicago Board of Trade and procedures provided by RMA.

With these values, and the annual average reported prices for organic corn, performance was assessed for each of the alternative price calculation approaches.[7] Table 4 displays the base prices and annual average organic corn prices, as well as the organic corn prices estimated by each of the alternative approaches and the difference of each. For comparison, the conventional corn base price (which is the price that is currently used to value organic production) and its difference for each year is also reported.

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[7] As no market volume data are available for organic crops, the annual average organic price is calculated as the simple average of the monthly organic prices based on the AMS dataset.

Organic Crops: Final Development of Additional Price Elections

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TABLE 4. Organic Corn Price Election Performance

		2007	2008	2009	Sum of Absolute Errors
Conventional Base Price		4.06	5.38	4.04	
Organic Annual Average Price		8.29	10.16	6.87	
Median Difference Adjustment	Projected	8.38	9.70	8.36	2.04
	Error	-0.09	0.46	-1.49	
Median Ratio Adjustment	Projected	8.12	10.76	8.08	1.98
	Error	0.17	-0.60	-1.21	
Minimum Difference Adjustment	Projected	5.97	7.29	5.95	6.11
	Error	2.32	2.87	0.92	
Minimum Ratio Adjustment	Projected	6.17	8.18	6.14	4.83
	Error	2.12	1.98	0.73	
Conventional Price (No Adjustment)	Projected	4.06	5.38	4.04	11.84
	Error	4.23	4.78	2.83	

Source: Table developed by the Contractor with data provided by AMS, the Chicago Board of Trade, and procedures provided by RMA.

As displayed in the table, the median ratio adjustment offered the smallest sum of absolute errors over this three year period, but also had two instances when it overestimated the observed annual organic price. The minimum difference approach, which did not perform particularly well in projecting prices (largest sum of absolute errors), never overestimated actual observed organic prices, making it a conservative approach that would prevent potential for overestimation. It is important to note the current approach (simply using the conventional price) performed poorly, with the error observed in every year larger than the largest error observed in any year for any of the alternative approaches considered. In this context, even the conservative minimum difference approach represents an improvement over the status quo.

The Contractor recommends a minimum ratio adjustment as the starting point for organic price elections for corn. As data accumulate, it may be possible to recognize an appropriate time limit on this approach (e.g., five years or seven years minimum ratio). Under current data constraints, it is not possible to establish what such a time frame might be. Furthermore, as data accumulate, it may be possible to expand the discovery process to evaluate quarterly prices, rolling quarterly prices, or even aggregate annual prices. However, it is not anticipated that such consideration can be made in the next three years.

The results of this relationship can be applied to a base price election derived using any method. However, due to the need for uniform collection procedures and an on-going data stream, the ratio will best be derived from the AMS data series until and unless an alternative data source becomes available. Therefore, the recommended price election for organic corn is the base price for conventional corn multiplied by 1.52 (rounded appropriately). As this approach is based on a very brief temporal dataset, the Contractor strongly recommends the organic price election for corn be carefully monitored, with the ultimate objective of obtaining sufficient data to support the independent determination of organic corn price elections based on organic corn price data.

Organic Crops: Final Development of Additional Price Elections

W&A Crop Insurance Division
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SECTION IV. ORGANIC PRICING FOR SOYBEANS

The majority of soybeans grown in the United States are produced from Genetically Modified Organism (GMO) seed, which automatically disqualifies production from consideration under the National Organic Program (NOP) standards. Of the non-GMO soybeans produced domestically, most are food-grade specialty varieties grown primarily with conventional practices. The volume of feed-grade organic soybeans, which constitute a small share of the overall soybean market, is substantially larger than the food-grade organic soybean market, and is the focus of this pricing research. It is worth noting the food-grade organic soybeans can command very large price premiums, even relative to the already premium-priced feed grade organic soybeans. However, much of the food-grade organic soybean production is grown under contract and the relevant pricing data are largely proprietary. If these data were to become available at a future date, similar methods to those discussed in this document might be applied for price election development for food-grade organic soybeans[8].

The Contractor obtained organic soybean price data from a number of sources, including bi-weekly data collected by the USDA AMS, a public-private partnership dataset collected by Rodale Institute under contract with RMA, and a number of smaller datasets provided by organic advocacy organizations and producer groups. As was discussed previously, few datasets meet the data standards outlined in the contract (see Organic Crops Pricing Report).

Based on extensive assessment of these datasets (see the Organic Crops Pricing Report for additional information), only the AMS dataset was found to meet most data standards (see Organic Crops Pricing Report). AMS gathers price data and establishes market prices based on its survey methodology. Consequently, there is no reporting of volume sold at a price. However, the frequency of the AMS reporting provides a snapshot of relative price levels that can support inferences about annual tendencies.

AMS reports prices for both food-grade and feed-grade soybeans. Based on numerous and substantial gaps in the food-grade soybean dataset and the overall thinness of the markets for a variety of food-grade soybeans, this analysis and price election research focused on feed-grade soybeans. Only feed-grade soybean data are used in this analysis. Although the data available for food-grade soybeans were very thin, both our discussions with AMS and our assessment of the data indicated that food-grade soybeans consistently sold at a substantial premium to feed-grade soybeans. As a result, the contractor recommends that the organic price calculated in this analysis be applied to both feed-grade and food grade soybeans. This recommendation recognizes that separate actuarial structures incorporating individual types are not likely at this time. This still would provide a substantial improvement over the current pricing (applying conventional corn pricing). Further, the contractor recommends that AMS pricing data for food-grade soybeans be monitored on an ongoing basis, with consideration of applying a similar analysis for the development of a separate organic food-grade price when data are sufficient to identify separate actuarial structures for the specific types.

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[8] For the 2010 crop year, RMA introduced contract pricing for specialty types of soybeans, some of which are food grade. Under this program, the production is valued based on the price in the grower's contract. This program could provide a useful test of the potential for applying contract priced for food-grade soybean types which ultimately could have some valuable applications to organic soybeans of both feed-grade and food-grade types.

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20

*Risk Management Agency
Contract No: AG-645S-C-09-0003*

For analysis purposes, bi-weekly price observations in the AMS dataset were aggregated to a monthly basis by calculating the simple average of all observations from each calendar month during a year. Several gaps were present in the 2008 market year due to periods in which no data were reported to AMS. The reader will note there have been no gaps in market data for the last 20 consecutive reporting periods (out of a total of 33). This likely reflects increasing market volume. Figure 6 displays the AMS organic soybean price data for the entire term of the series to date.

FIGURE 6. AMS Organic Soybean Price Data
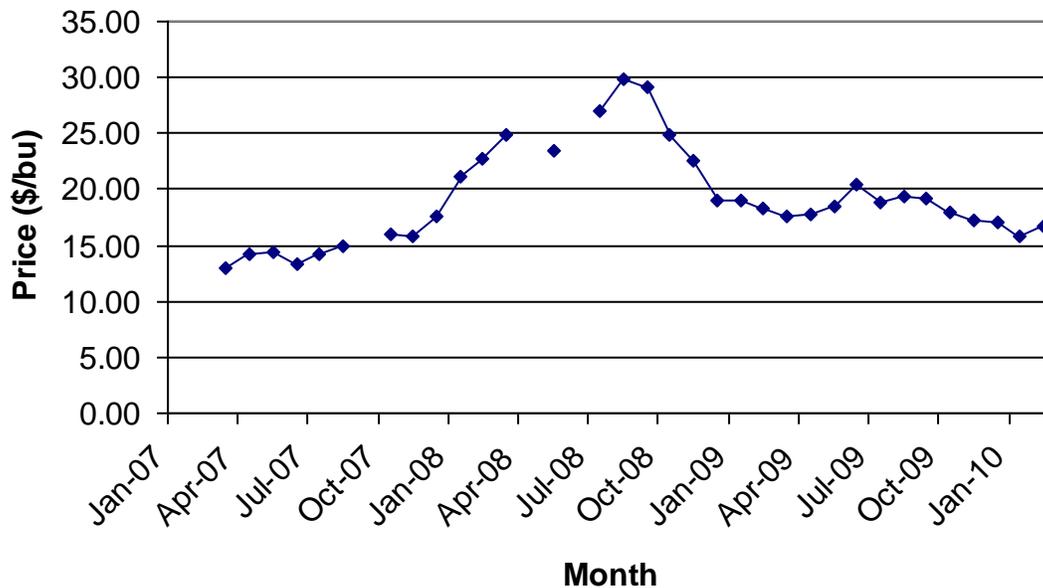
Month

Figure 6 Data.

Month	Organic Price	Month	Organic Price
Jan-07		Aug-08	29.87
Feb-07		Sep-08	29.16
Mar-07	12.91	Oct-08	24.92
Apr-07	14.27	Nov-08	22.48
May-07	14.41	Dec-08	19.09
Jun-07	13.36	Jan-09	18.98
Jul-07	14.27	Feb-09	18.24
Aug-07	14.91	Mar-09	17.67
Sep-07		Apr-09	17.83
Oct-07	16.02	May-09	18.44
Nov-07	15.82	Jun-09	20.47
Dec-07	17.62	Jul-09	18.92
Jan-08	21.17	Aug-09	19.45
Feb-08	22.75	Sep-09	19.1
Mar-08	24.96	Oct-09	17.94
Apr-08		Nov-09	17.19
May-08	23.37	Dec-09	17.03
Jun-08		Jan-10	15.77
Jul-08	27.02	Feb-10	16.66

There are many excellent sources of highly detailed and rigorous conventional soybean price data. Given the many options available, it is important to consider the most appropriate conventional price series for comparison to the AMS data. As the AMS data are based on actual producer sales, direct comparison of time series prices to commodity futures prices for conventional soybeans would not be fully appropriate. In addition, futures prices pertain to certain specified months each year. Basis considerations (the differences between prevailing local cash prices and futures contract settlement prices) suggest comparison to conventional soybean producer prices received would offer a better "apples to apples" assessment, consistent with the comparisons made in the analysis of organic corn prices. For this comparison, the Contractor obtained NASS Prices Received by Producers data for each of the months for which AMS organic soybean price data were available.[9] Figure 7 displays the AMS organic soybean prices relative to the NASS Prices Received by Producers conventional soybean prices.

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[9] NASS Agricultural prices report: http://usda.mannlib.cornell.edu/usda/current/AgriPric/AgriPric-09-29-2009.pdf.

FIGURE 7. Organic and Conventional Soybean Prices
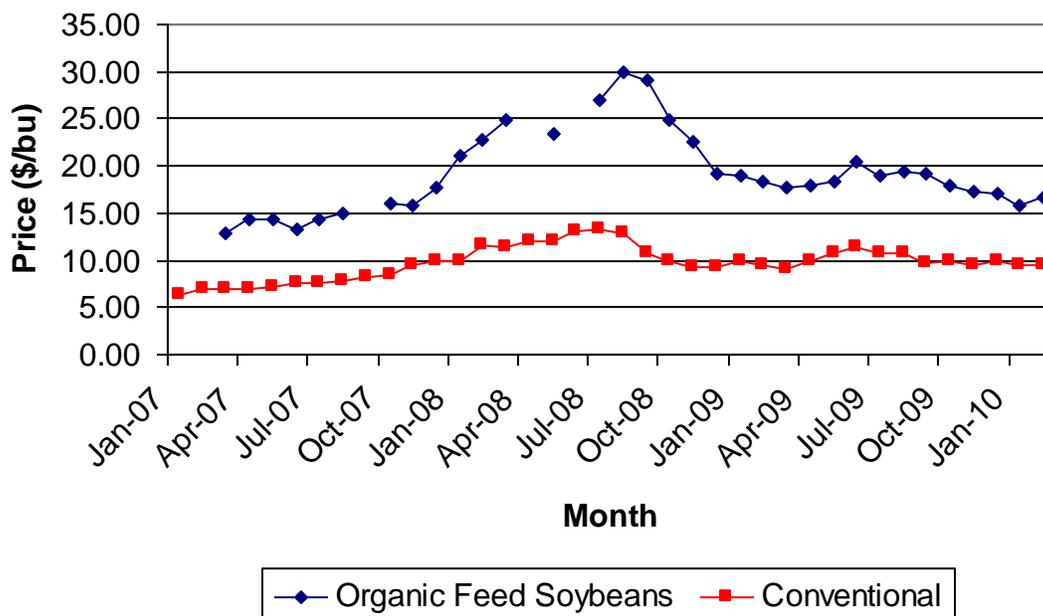
Source: Figure developed by the Contractor based on data provided by AMS and NASS

Figure 7 Data.

Month	Organic Price	Conventional Price	Month	Organic Price	Conventional Price
Jan-07		6.37	Aug-08	29.87	12.8
Feb-07		6.87	Sep-08	29.16	10.7
Mar-07	12.91	6.95	Oct-08	24.92	9.94
Apr-07	14.27	6.88	Nov-08	22.48	9.38
May-07	14.41	7.12	Dec-08	19.09	9.24
Jun-07	13.36	7.51	Jan-09	18.98	9.97
Jul-07	14.27	7.56	Feb-09	18.24	9.55
Aug-07	14.91	7.72	Mar-09	17.67	9.12
Sep-07		8.15	Apr-09	17.83	9.89
Oct-07	16.02	8.36	May-09	18.44	10.7
Nov-07	15.82	9.42	Jun-09	20.47	11.4
Dec-07	17.62	10.00	Jul-09	18.92	10.8
Jan-08	21.17	9.95	Aug-09	19.45	10.8
Feb-08	22.75	11.7	Sep-09	19.1	9.75
Mar-08	24.96	11.4	Oct-09	17.94	9.94
Apr-08		12	Nov-09	17.19	9.53
May-08	23.37	12.1	Dec-09	17.03	9.96
Jun-08		13.1	Jan-10	15.77	9.39
Jul-08	27.02	13.3	Feb-10	16.66	9.4

Consistent with the recommendation for organic corn, the Contractor recommends price elections for organic soybeans be developed in conjunction with price elections for conventional soybeans. This guidance is based on two primary concerns. First, based on the lack of long-term data for organic prices (the AMS series was initiated in February 2007) and the lack of available data related to stocks, planting intentions, supply, or demand for organic soybeans, consideration

of relationships between the available data for organic soybeans and the data available for conventional soybeans is likely to provide much more reliable conclusions. Second, as discussed in the analysis of organic corn, organic soybeans and conventional soybeans are substitutes and thus their prices are linked, if imperfectly, by the degree to which one can be substituted for the other.

In the review of the relationship between organic and conventional soybeans, or indeed any of the evaluated organic crops, organic production consistently receives a premium (which is often substantial) over conventional prices. The literature review, however, revealed little published information assessing the relationships between conventional and organic pricing. Based on the limited data available (and their limited capacity to support more complex modeling), the Contractor considered two simple relationship measures between conventional and organic soybean prices; difference (the organic price less the reported conventional price) and the ratio (the organic price divided by the conventional price).

The Contractor calculated the differences and ratios of all observations in the conventional and organic datasets (consisting of 33 monthly observations between February 2007 and February 2010, with three reporting periods for which no data were available). Summary statistics for the "difference" and "ratio" datasets are displayed in Table 5.

TABLE 5. Organic and Conventional Soybean Price Relationship Summary Statistics

	Difference	Ratio
Average	9.39	1.96
Median	8.12	1.91
Maximum	18.46	2.73
Minimum	5.85	1.68
Standard Deviation	3.14	0.65
Coefficient of Variation	0.33	0.33
Count	33	33

Source: Table developed by the Contractor based on data provided by AMS and NASS

As the summary statistics display, the median premium for organic production is $8.12/bu, or 1.91 times the conventional price over the term of the available data. As average appears to be unduly influenced by a few high observations and mode is meaningless (no two values are repeated in the observation set), the median appears to be the most reasonable measure of relationship central tendency.

The maximum and minimum measures demonstrate the volatility of the organic premium and the potential for volatility in thin markets. As this relationship will be used in development of organic price elections and data are thin, a level of conservatism is warranted. As such, the minimum price difference and ratio over the term of the data provide a useful baseline in considering development of organic prices. The smallest difference and ratio between organic and conventional prices can be considered a "floor" premium for organic production, at least over the term of this dataset. If conventional prices were adjusted upward based on the lowest

premium observed in the dataset, the potential for over-insurance is effectively curtailed; perhaps an advisable step in this data poor environment. In the development of organic price elections, it is important to acknowledge that historically, organic producers have had to insure under conventional prices, which offered no recognition of the premium prices received for organic production. Even price elections that scale conventional prices up by the minimum differences and ratios observed provide estimates that substantially more closely approximate actual realized organic price values.

The price difference data series is displayed in Figure 8. For the convenience of the reader, the median price difference and minimum price difference are displayed on the figure.

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25

Risk Management Agency
Contract No: AG-645S-C-09-0003

Organic Crops: Final Development of Additional Price Elections

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FIGURE 8. Soybean Price Difference Data Series
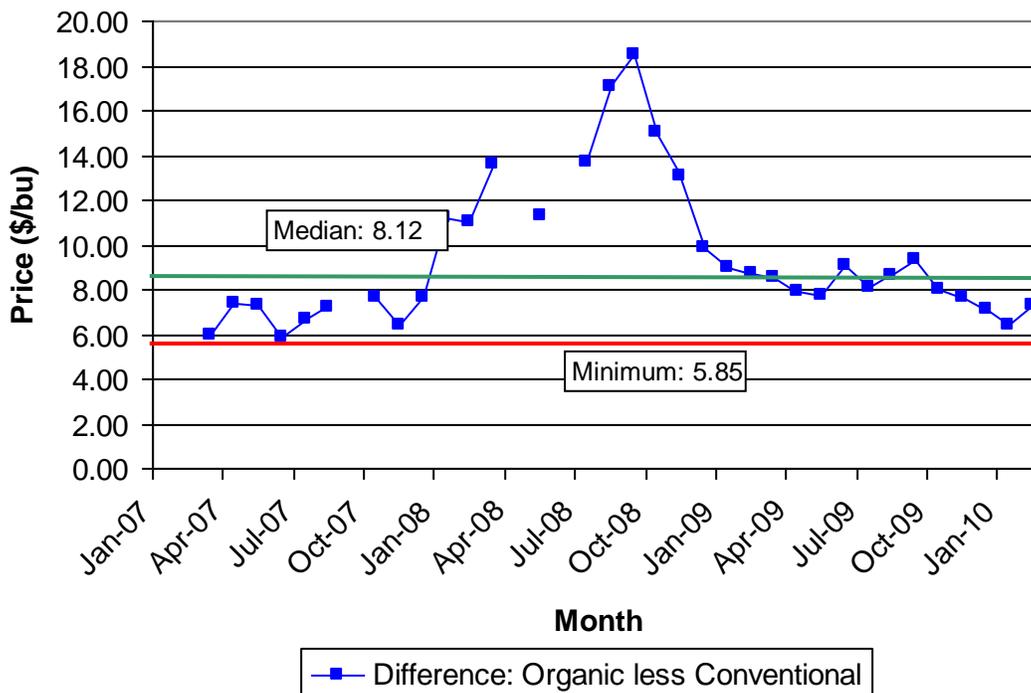
Source: Figure developed by the Contractor based on data provided by AMS and NASS

Figure 8 Data.

Month	Difference: Org less Conv.	Median	Minimum	Month	Difference: Org less Conv.	Median	Minimum
Jan-07		8.12	5.85	Aug-08	17.07	8.12	5.85
Feb-07		8.12	5.85	Sep-08	18.46	8.12	5.85
Mar-07	5.96	8.12	5.85	Oct-08	14.98	8.12	5.85
Apr-07	7.39	8.12	5.85	Nov-08	13.10	8.12	5.85
May-07	7.29	8.12	5.85	Dec-08	9.85	8.12	5.85
Jun-07	5.85	8.12	5.85	Jan-09	9.01	8.12	5.85
Jul-07	6.71	8.12	5.85	Feb-09	8.69	8.12	5.85
Aug-07	7.19	8.12	5.85	Mar-09	8.55	8.12	5.85
Sep-07		8.12	5.85	Apr-09	7.94	8.12	5.85
Oct-07	7.66	8.12	5.85	May-09	7.74	8.12	5.85
Nov-07	6.40	8.12	5.85	Jun-09	9.07	8.12	5.85
Dec-07	7.62	8.12	5.85	Jul-09	8.12	8.12	5.85
Jan-08	11.22	8.12	5.85	Aug-09	8.65	8.12	5.85
Feb-08	11.05	8.12	5.85	Sep-09	19.10	8.12	5.85
Mar-08	13.56	8.12	5.85	Oct-09	17.94	8.12	5.85
Apr-08		8.12	5.85	Nov-09	17.19	8.12	5.85
May-08	11.27	8.12	5.85	Dec-09	17.03	8.12	5.85
Jun-08		8.12	5.85	Jan-10	15.77	8.12	5.85
Jul-08	13.72	8.12	5.85	Feb-10	16.66	8.12	5.85

Premiums for organic production increased substantially in the 2007 crop year in a low-volume market. Over most of the period, premiums ranged between $6.00/bu and $16.00/bu., and increased substantially during the marketing year for the 2007 crop. The price ratio data series is

displayed in Figure 9. For the convenience of the reader, the median price ratio and minimum price ratio are displayed on the figure.
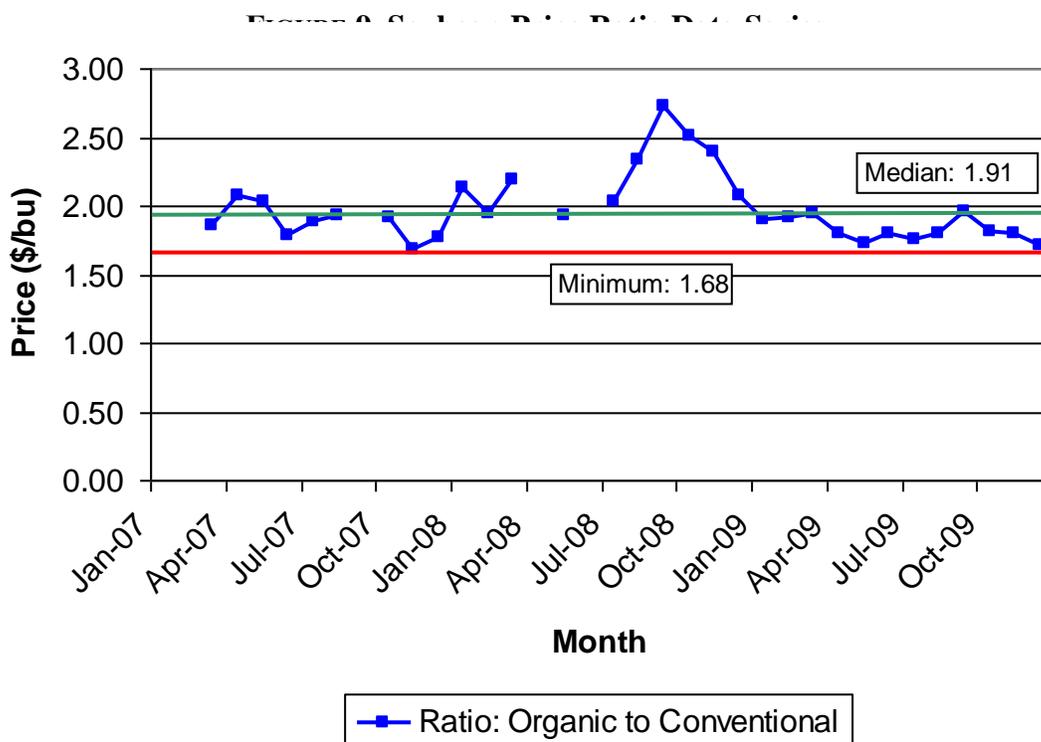
Source: Figure developed by the Contractor based on data provided by AMS and NASS

Figure 9 Data.

Month	Ratio: Org to Conv.	Median	Minimum	Month	Ratio: Org to Conv.	Median	Minimum
Jan-07		1.91	1.68	Aug-08	2.33	1.91	1.68
Feb-07		1.91	1.68	Sep-08	2.73	1.91	1.68
Mar-07	1.86	1.91	1.68	Oct-08	2.51	1.91	1.68
Apr-07	2.07	1.91	1.68	Nov-08	2.40	1.91	1.68
May-07	2.02	1.91	1.68	Dec-08	2.07	1.91	1.68
Jun-07	1.78	1.91	1.68	Jan-09	1.90	1.91	1.68
Jul-07	1.89	1.91	1.68	Feb-09	1.91	1.91	1.68
Aug-07	1.93	1.91	1.68	Mar-09	1.94	1.91	1.68
Sep-07		1.91	1.68	Apr-09	1.80	1.91	1.68
Oct-07	1.92	1.91	1.68	May-09	1.72	1.91	1.68
Nov-07	1.68	1.91	1.68	Jun-09	1.80	1.91	1.68
Dec-07	1.76	1.91	1.68	Jul-09	1.75	1.91	1.68
Jan-08	2.13	1.91	1.68	Aug-09	1.80	1.91	1.68
Feb-08	1.94	1.91	1.68	Sep-09	19.1	1.91	1.68
Mar-08	2.19	1.91	1.68	Oct-09	17.94	1.91	1.68
Apr-08		1.91	1.68	Nov-09	17.19	1.91	1.68
May-08	1.93	1.91	1.68	Dec-09	17.03	1.91	1.68
Jun-08		1.91	1.68	Jan-10	15.77	1.91	1.68
Jul-08	2.03	1.91	1.68	Feb-10	16.66	1.91	1.68

Based on these relational assessments, conventional prices can be adjusted to project organic prices. Consistent with the analyses applied in organic corn, the Contractor considered four approaches to adjusting conventional prices to project organic soybean prices: by adding the median difference, by adding the minimum difference, by multiplying the conventional price by the median ratio, and multiplying the conventional price by the minimum ratio. The outcomes of these adjusted "projected" prices relative to the reported conventional and organic prices are displayed in Figure 10.

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28

*Risk Management Agency
Contract No: AG-645S-C-09-0003*

FIGURE 10. Organic Soybean Price Projection Performance
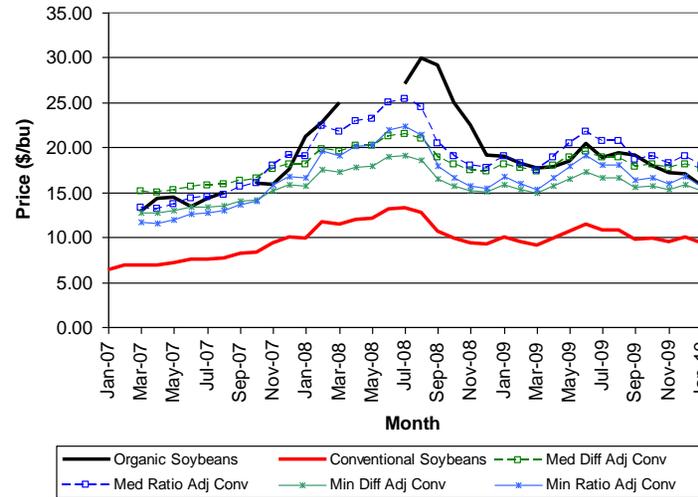
Source: Figure developed by the Contractor based on data provided by AMS and NASS

Figure 10 Data.

Month	Organic	Conventional	Conventional Adjusted by Median Difference	Conventional Adjusted by Median Ratio	Conventional Adjusted by Min Difference	Conventional Adjusted by Min Ratio
Jan-07		6.37				
Feb-07		6.87				
Mar-07	12.91	6.95	15.07	13.27	12.80	11.68
Apr-07	14.27	6.88	15.00	13.14	12.73	11.56
May-07	14.41	7.12	15.24	13.60	12.97	11.96
Jun-07	13.36	7.51	15.63	14.34	13.36	12.62
Jul-07	14.27	7.56	15.68	14.44	13.41	12.70
Aug-07	14.91	7.72	15.84	14.75	13.57	12.97
Sep-07		8.15	16.27	15.57		
Oct-07	16.02	8.36	16.48	15.97	14.21	14.04
Nov-07	15.82	9.42	17.54	17.99	15.27	15.83
Dec-07	17.62	10.00	18.12	19.10	15.85	16.80
Jan-08	21.17	9.95	18.07	19.00	15.80	16.72
Feb-08	22.75	11.70	19.82	22.35	17.55	19.66
Mar-08	24.96	11.40	19.52	21.77	17.25	19.15
Apr-08		12.00	20.12	22.92		
May-08	23.37	12.10	20.22	23.11	17.95	20.33
Jun-08		13.10	21.22	25.02		
Jul-08	27.02	13.30	21.42	25.40	19.15	22.34
Aug-08	29.87	12.80	20.92	24.45	18.65	21.50
Sep-08	29.16	10.70	18.82	20.44	16.55	17.98
Oct-08	24.92	9.94	18.06	18.99	15.79	16.70
Nov-08	22.48	9.38	17.50	17.92	15.23	15.76
Dec-08	19.09	9.24	17.36	17.65	15.09	15.52
Jan-09	18.98	9.97	18.09	19.04	15.82	16.75
Feb-09	18.24	9.55	17.67	18.24	15.40	16.04
Mar-09	17.67	9.12	17.24	17.42	14.97	15.32
Apr-09	17.83	9.89	18.01	18.89	15.74	16.62
May-09	18.44	10.70	18.82	20.44	16.55	17.98
Jun-09	20.47	11.40	19.52	21.77	17.25	19.15
Jul-09	18.92	10.80	18.92	20.63	16.65	18.14
Aug-09	19.45	10.80	18.92	20.63	16.65	18.14
Sep-09	19.1	9.75	17.87	18.62	15.60	16.38
Oct-09	17.94	9.94	18.06	18.99	15.79	16.70
Nov-09	17.19	9.53	17.65	18.20	15.38	16.01
Dec-09	17.03	9.96	18.08	19.02	15.81	16.73
Jan-10	15.77	9.39	17.51	17.93	15.24	15.78
Feb-10	16.66	9.40	17.52	17.95	15.25	15.79

The simulated organic prices based on the median values track the actual observed organic prices more closely than the simulated prices based on the minimum values. In this sense, the performance of median values, by definition, is superior to that of the minimum based adjustments. It is worth noting, however, that many of the values represented by the median estimates exceed the actual reported organic prices, in some cases substantially.[10] While the data series is much too short to obtain any sense of differences on an annual basis, this outcome provides a cautionary note.[11] Table 6 displays the summary performance statistics, as measured by the „error' or difference between the projected value and the actual reported value, of each of the adjustment procedures over the span of the available data displayed in the figure.

TABLE 6. Organic Soybean Alternative Adjustment Performance Summary Statistics

	Median Difference Adjusted Error	Median Ratio Adjusted Error	Minimum Difference Adjusted Error	Minimum Ratio Adjusted Error
Average	1.27	0.50	3.54	2.75
Median	0.00	0.00	2.27	1.98
Maximum	10.34	8.72	12.61	11.18
Minimum	-2.27	-2.17	0.00	0.00
Sum of Squared Errors	377.51	215.12	737.59	473.13

Source: Table developed by the Contractor based on data provided by AMS and NASS

A brief interpretation of these performance statistics is provided for each of the alternative adjustment procedures.

Median Difference Adjustment Procedure
This procedure added the median difference between the prices to the conventional price for each observation. As the table displays, the median difference approach, like all the approaches tested, underestimated the organic price on average, but (by definition) had a median error of zero. The median difference adjusted approach had a moderate maximum error (underestimate) and the moderate sum of squared errors (an aggregate measure of projection performance), but unacceptably had the largest minimum error (overestimate).

Median Ratio Adjustment Procedure
This procedure multiplied the median ratio to the conventional price for each observation. The median ratio adjusted approach displayed superior performance over most of the criteria considered, with the lowest average error, a median error of zero (again by definition), and the smallest maximum error. The median ratio approach had a minimum error (overestimate) as high as $2.17/bu. The sum of squared errors performance was the best tested by a considerable margin.

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[10] The data series (only two complete and one partial marketing year) do not have sufficient length to measure any seasonality that may exist in the market for organic corn.
[11] It is worth noting that the price election may exceed the monthly price on occasion but remain at or below the average market price on a crop year basis.

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30

*Risk Management Agency
Contract No: AG-645S-C-09-0003*

Minimum Difference Adjustment Procedure
This procedure added the single smallest difference to the conventional price for each observation. As displayed in the table, the minimum difference approach consistently underestimated the organic price with a median underestimate of $2.27/bu. While this approach underestimated the reported organic price by as much as $12.61/bu., it never (by definition) overestimated the organic price. The overall performance of the minimum difference adjustment, (as measured by sum of squared errors) was the poorest of the approaches tested.

Minimum Ratio Adjustment Procedure
This procedure multiplied the minimum ratio of the reported prices by the conventional price for each observation. As displayed in the table, the minimum ratio approach consistently underestimated the organic price with a median underestimate of $1.98/bu. While the minimum ratio approach underestimated the reported organic price by as much as $11.18/bu (37 percent) in a single outlier observation, it also never (by definition) overestimated the organic price. The overall performance of the minimum ratio approach was far superior to that of the minimum difference approach with a much smaller sum of squared errors.

As the reader will note, the analysis to this point have been made based on comparisons of the AMS organic monthly cash price data to its closest conventional price analogue to facilitate numerous monthly comparison observations, consistent with analysis performed for corn. The ultimate objective of the organic price elections development, however, is to provide procedures for application to each subsequent crop year's price election for conventional soybeans. As each year is unique, a superior test of potential performance for each of the alternative price election determination approaches is to measure how they would have preformed in past crop years. Starting in the 2010 crop year, and in subsequent crop years, RMA intends to use the base price for its revenue products as the price election for yield coverage for all crops for which revenue coverage is offered. As soybean is among these crops, the soybean revenue base price will also be the price election for soybean yield coverage.

RMA provided the Contractor with the proposed CEPP, which are expected to serve as the basis for the determination of base prices (and thus price elections) under the Combo plan. These provisions dictate the calculation methods for determining base prices. For most of the soybean acreage, the base price is calculated as the average of reported daily settlement prices for the trading dates February 1 through February 28 for the CBOT November or January soybeans contract, rounded to the nearest whole cent per bushel.[12] The Contractor calculated the base prices that would have been in effect for the crop years 2007, 2008, and 2009 for assessment of alternative calculation approaches using these procedures. The base prices for these years and the data used to determine them are displayed in Table 7. Prices are reported to the quarter of a cent per bushel, consistent with CBOT procedures.

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[12] While all production areas use the CBOT November or January soybean contract as the basis of base price discovery, different states use different base price discovery periods based on sales closing dates. For the January 31 sales closing date (parts of Texas) December 15 through January 14 are used, for the February 28 sales closing date (much of the South) January 15 through February 14 are used. For the majority of the production region, (March 15 sales closing dates) February 1 through 28 are used. For simplicity in demonstration, the examples use the February 1 through 28 dates with the January CBOT soybeans contracts.

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31

*Risk Management Agency
Contract No: AG-645S-C-09-0003*

Organic Crops: Final Development of Additional Price Elections

W&A Crop Insurance Division
A Division of Watts and Associates Inc.

TABLE 7. Soybean Base Price Calculations for 2007, 2008, and 2009

January 2008 Soybeans		January 2009 Soybeans		January 2010 Soybeans	
Date	Close	Date	Close	Date	Close
2/1/2007	7.7850	2/1/2008	12.5700	2/2/2009	9.3400
2/2/2007	7.9250	2/4/2008	13.0000	2/3/2009	9.0350
2/5/2007	7.9700	2/5/2008	12.9600	2/4/2009	8.9800
2/6/2007	7.9700	2/6/2008	12.8050	2/5/2009	9.2175
2/7/2007	7.9500	2/7/2008	12.8300	2/6/2009	9.5500
2/8/2007	8.0000	2/8/2008	12.9050	2/9/2009	9.5200
2/9/2007	8.0300	2/11/2008	12.9000	2/10/2009	9.4400
2/12/2007	8.0250	2/12/2008	12.7600	2/11/2009	9.2500
2/13/2007	8.1100	2/13/2008	12.7800	2/12/2009	9.0900
2/14/2007	8.0700	2/14/2008	13.0700	2/13/2009	9.0200
2/15/2007	8.1400	2/15/2008	13.2325	2/17/2009	8.6325
2/16/2007	8.2050	2/19/2008	13.6500	2/18/2009	8.4525
2/20/2007	8.2700	2/20/2008	13.7300	2/19/2009	8.5300
2/21/2007	8.3700	2/21/2008	13.8550	2/20/2009	8.3700
2/22/2007	8.4300	2/22/2008	13.9700	2/23/2009	8.5000
2/23/2007	8.3450	2/25/2008	14.2275	2/24/2009	8.4800
2/26/2007	8.3700	2/26/2008	14.3650	2/25/2009	8.4700
2/27/2007	8.2200	2/27/2008	14.1225	2/26/2009	8.4600
2/28/2007	8.2950	2/28/2008	14.3350	2/27/2009	8.4000
Implied 2007 Base Price		Implied 2008 Base Price		Implied 2009 Base Price	
8.13	$/bu	13.37	$/bu	8.88	$/bu

Source: Table developed by the Contractor with data provided by the Chicago Board of Trade and procedures provided by RMA.

With these values, and the annual average reported prices for organic soybean, performance was assessed for each of the alternative price calculation approaches.[13] Table 8 displays the base prices and annual average organic soybean prices, as well as the organic soybean prices estimated by each of the alternative approaches and the error of each. For comparison, the conventional soybean base price (which is the price that is currently used to value organic production) and its „error' for each year is also reported.

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[13] As no market volume data are available for organic crops, the annual average organic price is calculated as the simple average of the monthly organic prices based on the AMS dataset. This approach was used in both the organic corn and organic soybean annual average price determinations.

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32

*Risk Management Agency
Contract No: AG-645S-C-09-0003*

TABLE 8. Organic Soybean Price Election Performance

		2007	2008	2009	Sum of Absolute Errors
Conventional Base Price		8.13	13.37	8.88	
Organic Annual Average Price		14.84	24.48	18.44	
Median Difference Adjustment	Projected	16.25	21.49	17.00	5.84
	Error	-1.41	2.99	1.44	
Median Ratio Adjustment	Projected	15.53	25.54	16.96	3.23
	Error	-0.69	-1.06	1.48	
Minimum Difference Adjustment	Projected	13.98	19.22	14.73	9.83
	Error	0.86	5.26	3.71	
Minimum Ratio Adjustment	Projected	13.66	22.46	14.92	6.72
	Error	1.18	2.02	3.52	
Conventional Price (No Adjustment)	Projected	8.13	13.37	8.88	27.38
	Error	6.71	11.11	9.56	

Source: Table developed by the Contractor with data provided by AMS, the Chicago Board of Trade, and procedures provided by RMA.

As the table displays, the median ratio adjustment had the smallest errors over this three year period, but also had two instances when it overestimated the actual observed annual organic price. Neither the minimum difference approach nor the minimum ratio approach ever overestimated the actual observed organic price, but the minimum ratio adjustment had superior performance in terms of sum of absolute errors. Based on its performance, minimum ratio adjustment is a conservative approach that would prevent potential for overestimation. It is important to note the current approach (simply using the conventional price) performed poorly, with the error observed in every year larger than the largest error observed in any year for any of the approaches considered. In this context, even the conservative minimum difference approach represents an improvement over the status quo.

The Contractor recommends a minimum ratio adjustment as the starting point for organic price elections for soybeans. The results of this relationship can be applied to a base price election derived using any method. However, due to the need for uniform collection procedures and on-going data stream, the ratio will best be derived from the AMS data series until and unless an alternative data source becomes available. Therefore, the recommended price election for organic soybeans is the base price for conventional soybeans multiplied by 1.68 (rounded appropriately). As this approach is based on a very brief temporal dataset, the Contractor strongly recommends the organic price election for soybeans be carefully monitored, with the ultimate objective of obtaining sufficient data to support the independent determination of organic soybean price elections based on organic soybean price data.

SECTION V. ORGANIC PRICING FOR COTTON

The U.S. harvest of organic cotton represents a small fraction of total global organic cotton production, with Turkey, China, and India producing the majority of the crop.[14] Nonetheless, the pricing data the Contractor obtained for organic cotton production in the United States are particularly detailed and complete, given the small overall scale of the domestic organic cotton market. The Contractor obtained the full production and marketing dataset of the Texas Organic Cotton Marketing Cooperative (TOCMC), the largest marketer of organic cotton in North America, typically handling between 50 and 75 percent of the total U.S. organic cotton production, and as much at 85 percent of the production in some years.[15] Unlike the price data available for organic corn and soybeans, which are based on AMS bi-weekly surveys of spot market prices, the data available for organic cotton are derived from many years of actual sales records from this large marketing cooperative. These records represent actual sales and report the volume of organic cotton sold, the location of the sale, and in addition the date and price.

In 2007, U.S. producers planted organic cotton on a total of 8,510 acres and harvested 14,025 bales of cotton. Both represented substantial increases over 2006 production, but 2008 and 2009 production values appear to show more moderate production expansion. Although the total number of bales of organic cotton harvested each year varies substantially, the production marketed by TOCMC represents the majority of U.S. organic cotton production. All the cotton reported in this series was sold into the open market at prices negotiated collectively by the cooperative with each of its clients (primarily high-end domestic clothing manufacturers). The Contractor's research found other organic cotton is primarily produced by a small pool of independent, vertically integrated, producer/processors. Some of these producers process the cotton into yarn, which is then used to produce textiles for production of T-shirts sold by the producer. No pricing data for cotton lint could be obtained from these sources.

Matching conventional cotton price data by producer are not available from TOCMC producers, as most organic cotton member-producers have committed all their cotton acreage to organic practices. However, the pricing structure in the market for conventional cotton (including both the historical RMA price elections and back-casts of base prices that would have been in place under the methodology proposed of the forthcoming "Combo" product) can be used to develop such a series. Since the organic cotton series is longer and more complete than most others and structured to match prices to quantity sold, the data for cotton meet all requirements set under Section 5.4.2.1 of the contract.

TOCMC, the cooperative providing the data, is highly interested in obtaining an appropriate price election for its members. TOCMC has been extraordinarily helpful in providing data, offering background on organic cotton markets, and providing independent contacts who have affirmed the veracity of the information provided. All data provided can be validated through purchase and sales agreements between the cooperative and producers and buyers, respectively.

Proprietary Data Source and Related Issues:
All organic cotton pricing data used in this pricing evaluation were provided by TOCMC. Data for future years and maintenance of organic cotton pricing can be obtained by contacting

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[14] Organic Trade Association, 2008, Organic Cotton Facts, http://www.ota.com/organic/mt/organic_cotton.html, accessed April, 2009.
[15] Interview: Kelly Pepper, Manager, Texas Organic Cotton Marketing Cooperative, Lubbock Texas.

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                                          34   *Risk Management Agency*
                                                                  Contract No: AG-645S-C-09-0003

Organic Crops: Final Development of Additional Price Elections

W&A CROP INSURANCE DIVISION
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TOCMC (Kelly Pepper is the manager and primary contact) at the office phone number (806-748-8336) or by email at: info@texasorganic.com. The data includes a summary of the settlement of each of the individual marketing pools, based on temporal sales volume throughout the marketing year, and a summary of total "progress payments" made throughout the year. The value of the cotton received by producers is the sum of the value of the Commodity Credit Corporation (CCC) payment and each of the (generally three) progress payments. TOCMC also provided breakdowns of dividends paid on annual production volume under two categories: „Cash Dividends' and „Stock Dividends.' As each of these dividends are based on the performance of the marketing cooperative and could be regarded as post-harvest value added, these are specifically excluded from the determination of producer annual value received. These data represent only organic upland cotton production in the state of Texas, and cannot be interpolated to larger geographic areas or other types. As a result, the organic cotton prices established under these recommendations can only be applied to organic upland cotton in the state of Texas.

USDA does not report organic cotton prices. TOCMC is the only entity identified in an extensive search that captures organic cotton price data, and is believed to be the only source of such information. As a result, the Contractor had no alternative to making these data the basis of the pricing analysis. As is discussed at length in the Organic Crop Pricing Research Report, the organic cotton dataset met all standards listed by RMA for data sufficiency.

As all of the data available are derived from a single proprietary source, a number of issues must be considered relevant to its application in a Federal crop insurance program. Foremost among these are the veracity of the data (Are the data an accurate and reliable representation of producer pricing?), the future accessibility of the data (Will TOCMC continue to voluntarily provide its pricing information in the future?) and the validation of the data (Are the reported values tamper-resistant and can they be substantiated?). Although these issues were explored in detail in the Organic Crop Pricing Research Report, these questions go to the heart of the potential offer of an organic price election for cotton and warrant a brief review.

The question of TOCMC data veracity can be addressed through consideration of the way the reported data are derived. The annual value reported from TOCMC data is a weighted average for the net price received by producers, adjusted to exclude any patronage funds, dividends, or post-harvest value added. The information that was provided to the Contractor was a copy of the annual settlement statement provided to producers. As a result, we believe that the reported data do indeed represent a very accurate and reliable measure of producer value received.

Data accessibility concerns appear to be a matter of incentives. The contractor has repeatedly made it clear to the TOCMC that the potential availability of organic cotton pricing is highly dependent on the reliable and consistent availability of pricing data. The cooperative's members have a strong vested interest in the availability of more effective risk management tools and understand the importance of providing accurate data to support the insurance offer. As producers understand the importance of making this data available to operating and sustaining a program, they have a strong incentive to provide data on an ongoing basis. Were the data ever to become unavailable, we would recommend that the organic cotton price offer be removed until the data become available again.

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35

*Risk Management Agency
Contract No: AG-645S-C-09-0003*

Data validation is a serious concern, and one that was discussed in detail with TOCMC in the development process. In response to our concerns, the cooperative provided individual settlement sheets from each producer in the cooperative (about 30) for a sample year under the terms of a confidentiality agreement. These data, which included receipts for sales, were then used to validate the annual price reported by TOCMC for that year. It is the contractor's belief that the data reported are valid and that individual producer settlement sheets can be used to validate the information in future years if warranted. There may be some potential for manipulation of prices by the cooperative, but doing so would require coordinated complicity by many individual members, alteration of sales receipts, and in a general sense fraud in their own internal accounting. In addition, as this is not a revenue based insurance offer, the cooperative has little incentive to manipulate prices.

Overall, a high measure of concern about basing an insurance offer on such a small, proprietary, and regional data source is warranted. The Contractor believes the circumstances in this particular instance are such that offering the program on a pilot basis is appropriate, but strongly encourages detailed monitoring of the data and the program performance.

Only CCC payments and total progress payments are considered in the determination of annual prices received for organic cotton. All data reported for the crop years 1994 through 2007 are included in raw form in Appendix A to support independent replication of reported values. Based on the long marketing period for organic cotton (and indeed most cotton) values for the 2008 crop year are expected to become available in February 2010. Figure 11 displays the annual prices for organic cotton for the years 1998 through 2007.

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36

Risk Management Agency
Contract No: AG-645S-C-09-0003

FIGURE 11. Organic Cotton Producer Prices
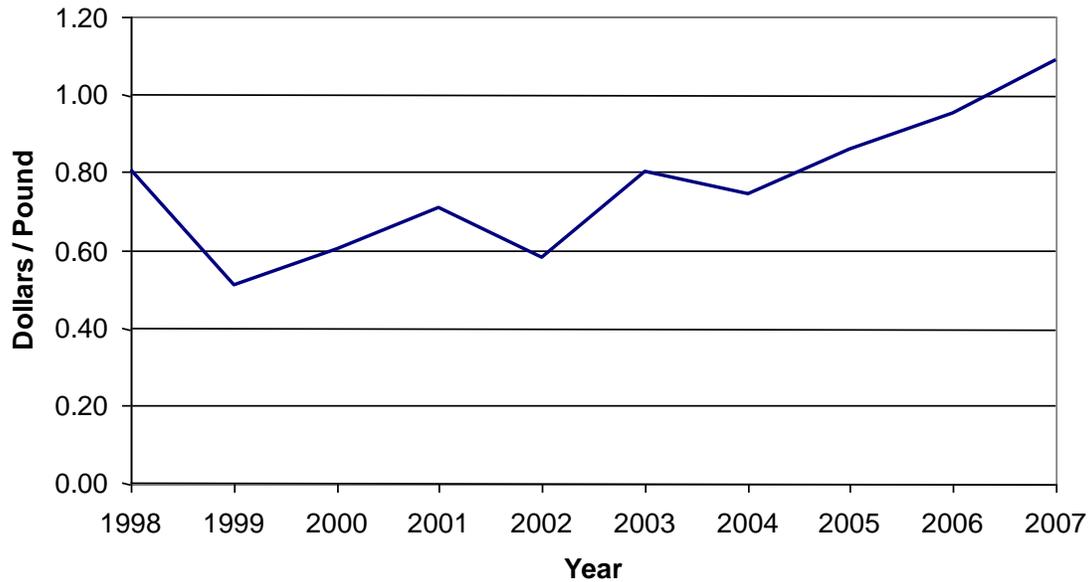
Figure 11 Data.

Year	Organic Price
1998	0.81
1999	0.51
2000	0.60
2001	0.71
2002	0.58
2003	0.80
2004	0.75
2005	0.86
2006	0.95
2007	1.09

The development of organic prices for cotton is not made in a vacuum, but rather is conducted as a complement to price election development and maintenance for conventional cotton. Under the new proposed "Combo" product, price elections for yield-based insurance will be the same as base prices established for the "revenue" product. For most of the cotton production area, this will be calculated as the simple average of daily settlement prices of the December NYBOT cotton contract for the market dates January 15 through February 14. Table 9 displays the base price election that would be determined under this procedure for the years 1998 through 2009.

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37

*Risk Management Agency
Contract No: AG-645S-C-09-0003*

TABLE 9. Conventional Cotton Price Election "Backcast" Determination 1998 through 2009

December 1998 Cotton		December 1999 Cotton		December 2000 Cotton		December 2001 Cotton	
Date	Close	Date	Close	Date	Close	Date	Close
1/15/1998	71.78	1/15/1999	63.54	1/18/2000	59.13	1/16/2001	63.42
1/16/1998	71.81	1/19/1999	63.41	1/19/2000	61.20	1/17/2001	62.85
1/20/1998	72.13	1/20/1999	63.50	1/20/2000	61.00	1/18/2001	62.24
1/21/1998	72.05	1/21/1999	63.70	1/21/2000	59.66	1/19/2001	61.90
1/22/1998	71.59	1/22/1999	63.15	1/24/2000	59.65	1/22/2001	61.30
1/23/1998	71.00	1/25/1999	61.76	1/25/2000	60.94	1/23/2001	60.80
1/26/1998	71.00	1/26/1999	61.92	1/26/2000	60.70	1/24/2001	61.51
1/27/1998	71.11	1/27/1999	62.04	1/27/2000	60.98	1/25/2001	61.30
1/28/1998	71.85	1/28/1999	63.14	1/28/2000	60.99	1/26/2001	61.25
1/29/1998	71.87	1/29/1999	63.21	1/31/2000	60.80	1/29/2001	60.56
1/30/1998	72.17	2/1/1999	63.14	2/1/2000	60.60	1/30/2001	61.20
2/2/1998	73.12	2/2/1999	62.98	2/2/2000	60.68	1/31/2001	60.68
2/3/1998	73.00	2/3/1999	62.70	2/3/2000	60.42	2/1/2001	60.25
2/4/1998	72.72	2/4/1999	61.84	2/4/2000	60.41	2/2/2001	60.55
2/5/1998	72.70	2/5/1999	61.56	2/7/2000	60.45	2/5/2001	60.50
2/6/1998	72.39	2/8/1999	61.98	2/8/2000	60.00	2/6/2001	60.40
2/9/1998	73.08	2/9/1999	60.99	2/9/2000	60.35	2/7/2001	59.58
2/10/1998	73.32	2/10/1999	60.50	2/10/2000	61.50	2/8/2001	59.25
2/11/1998	73.00	2/11/1999	59.88	2/11/2000	61.50	2/9/2001	58.70
2/12/1998	72.93	2/12/1999	59.75	2/14/2000	61.72	2/12/2001	58.70
2/13/1998	72.41					2/13/2001	58.67
						2/14/2001	59.47
Implied 1998 Base Price		Implied 1999 Base Price		Implied 2000 Base Price		Implied 2001 Base Price	
0.72	$/lb	0.62	$/lb	0.61	$/lb	0.61	$/lb
December 2002 Cotton		December 2003 Cotton		December 2004 Cotton		December 2005 Cotton	
Date	Close	Date	Close	Date	Close	Date	Close
1/15/2002	43.31	1/15/2003	58.30	1/15/2004	69.45	1/18/2005	51.20
1/16/2002	43.71	1/16/2003	58.38	1/16/2004	69.36	1/19/2005	52.43
1/17/2002	43.98	1/17/2003	57.63	1/20/2004	69.10	1/20/2005	52.30
1/18/2002	43.50	1/21/2003	57.48	1/21/2004	69.40	1/21/2005	51.40
1/22/2002	43.04	1/22/2003	57.20	1/22/2004	69.62	1/24/2005	51.20
1/23/2002	42.95	1/23/2003	57.75	1/23/2004	69.73	1/25/2005	51.80
1/24/2002	42.36	1/24/2003	57.90	1/26/2004	69.65	1/26/2005	51.95
1/25/2002	42.90	1/27/2003	58.40	1/27/2004	69.05	1/27/2005	49.58
1/28/2002	42.48	1/28/2003	58.13	1/28/2004	67.50	1/28/2005	48.82
1/29/2002	42.60	1/29/2003	58.35	1/29/2004	67.30	1/31/2005	49.25
1/30/2002	41.90	1/30/2003	58.65	1/30/2004	68.10	2/1/2005	49.35
1/31/2002	41.70	1/31/2003	59.60	2/2/2004	67.35	2/2/2005	50.00
2/1/2002	43.15	2/3/2003	59.48	2/3/2004	67.70	2/3/2005	49.13
2/4/2002	43.24	2/4/2003	59.05	2/4/2004	67.75	2/4/2005	49.00
2/5/2002	43.02	2/5/2003	59.00	2/5/2004	67.30	2/7/2005	49.07
2/6/2002	43.20	2/6/2003	58.70	2/6/2004	67.51	2/8/2005	48.82
2/7/2002	44.04	2/7/2003	57.70	2/9/2004	66.65	2/9/2005	48.95
2/8/2002	44.34	2/10/2003	58.50	2/10/2004	65.32	2/10/2005	50.33
2/11/2002	43.74	2/11/2003	60.00	2/11/2004	65.28	2/11/2005	50.30
2/12/2002	44.53	2/12/2003	59.73	2/12/2004	66.69	2/14/2005	51.05
2/13/2002	42.27	2/13/2003	59.40	2/13/2004	65.70		
2/14/2002	42.80	2/14/2003	59.77				

TABLE 9. Conventional Cotton Price Election "Backcast" Determination 1998 through 2009

Implied 2002 Base Price		Implied 2003 Base Price		Implied 2004 Base Price		Implied 2005 Base Price	
0.43	$/lb	0.59	$/lb	0.68	$/lb	0.50	$/lb
December 2006 Cotton		December 2007 Cotton		December 2008 Cotton		December 2009 Cotton	
Date	Close	Date	Close	Date	Close	Date	Close
1/17/2006	59.81	1/16/2007	59.88	1/15/2008	79.88	1/15/2009	53.50
1/18/2006	58.79	1/17/2007	60.15	1/16/2008	79.43	1/16/2009	54.50
1/19/2006	59.60	1/18/2007	60.00	1/17/2008	79.99	1/20/2009	52.45
1/20/2006	59.98	1/19/2007	60.02	1/18/2008	78.76	1/21/2009	52.71
1/23/2006	60.21	1/22/2007	59.95	1/22/2008	77.85	1/22/2009	54.03
1/24/2006	60.25	1/23/2007	60.67	1/23/2008	74.85	1/23/2009	55.11
1/25/2006	60.53	1/24/2007	60.22	1/24/2008	76.62	1/26/2009	56.70
1/26/2006	60.89	1/25/2007	60.11	1/25/2008	75.88	1/27/2009	56.64
1/27/2006	60.09	1/26/2007	59.82	1/28/2008	76.60	1/28/2009	56.27
1/30/2006	59.96	1/29/2007	59.35	1/29/2008	76.40	1/29/2009	55.97
1/31/2006	60.50	1/30/2007	59.26	1/30/2008	77.05	1/30/2009	55.45
2/1/2006	60.50	1/31/2007	59.61	1/31/2008	76.45	2/2/2009	56.03
2/2/2006	61.50	2/1/2007	59.23	2/1/2008	76.80	2/3/2009	55.41
2/3/2006	61.44	2/2/2007	59.49	2/4/2008	77.45	2/4/2009	56.16
2/6/2006	61.50	2/5/2007	60.05	2/5/2008	76.60	2/5/2009	55.58
2/7/2006	59.83	2/6/2007	58.70	2/6/2008	77.00	2/6/2009	55.70
2/8/2006	60.90	2/7/2007	58.24	2/7/2008	76.65	2/9/2009	55.84
2/9/2006	61.00	2/8/2007	57.43	2/8/2008	77.50	2/10/2009	53.60
2/10/2006	60.55	2/9/2007	58.00	2/11/2008	75.77	2/11/2009	52.91
2/13/2006	60.05	2/12/2007	57.40	2/12/2008	75.56	2/12/2009	52.35
2/14/2006	60.80	2/13/2007	57.28	2/13/2008	75.34	2/13/2009	51.10
		2/14/2007	56.59	2/14/2008	77.03		
Implied 2006 Base Price		Implied 2007 Base Price		Implied 2008 Base Price		Implied 2009 Base Price	
0.60	$/lb	0.59	$/lb	0.77	$/lb	0.55	$/lb

Source: The Contractor based on data provided by NYBOT and a methodology provided by RMA

In addition to back-cast base prices, actual price elections for historical crop years are available on the RMA website at www.rma.usda.gov under the "tools and calculators" widget through the prices inquiry system.[16] Figure 12 displays the reported organic cotton prices, the back-cast conventional cotton prices, and the historical price elections for the years 1998 through 2009.

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[16] RMA Reports five different price elections for cotton each year. To facilitate comparison, the price elections reported in the figure and subsequent table were those in effect for the northern Texas region from which the organic cotton price data were also reported.

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39

Risk Management Agency
Contract No: AG-645S-C-09-0003

Organic Crops: Final Development of Additional Price Elections

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FIGURE 12. Organic and Conventional Cotton Prices 1998 through 2009
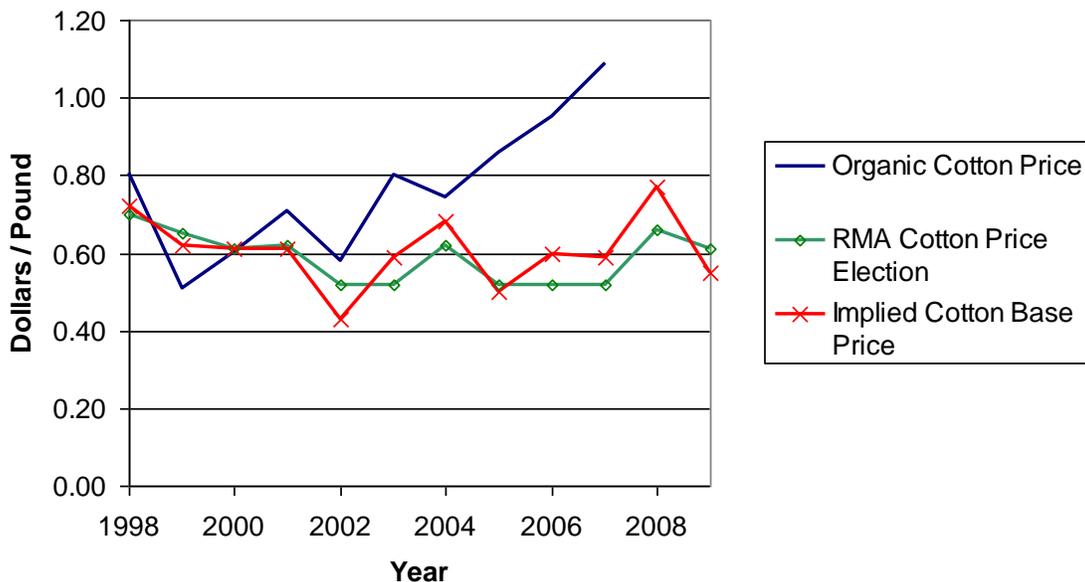
RMA

Figure 12 Data.

Year	Organic Cotton Price	RMA Cotton Price Election	Implied Cotton Base Price
1998	0.81	0.70	0.72
1999	0.51	0.65	0.62
2000	0.60	0.61	0.61
2001	0.71	0.62	0.61
2002	0.58	0.52	0.43
2003	0.80	0.52	0.59
2004	0.75	0.62	0.68
2005	0.86	0.52	0.50
2006	0.95	0.52	0.60
2007	1.09	0.52	0.59
2008		0.66	0.77
2009		0.61	0.55

Consistent with analyses performed for organic corn and soybeans, the Contractor considered various measures of relationships between organic and conventional cotton prices, including differences in prices and ratios. Table 10 displays organic and conventional prices and their relationships for the years 1998 through 2009.

Organic Crops: Final Development of Additional Price Elections

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TABLE 10. Organic and Conventional Cotton Price Relationships

Year	RMA Cotton Price Election	Organic Cotton Price	Implied Cotton Base Price	Organic Cotton to Implied Base Price	
				Difference	Ratio
		Dollars per lb			
1998	0.70	0.81	0.72	0.09	1.15
1999	0.65	0.51	0.62	-0.11	0.79
2000	0.61	0.60	0.61	-0.01	0.99
2001	0.62	0.71	0.61	0.10	1.14
2002	0.52	0.58	0.43	0.15	1.11
2003	0.52	0.80	0.59	0.21	1.54
2004	0.62	0.75	0.68	0.06	1.20
2005	0.52	0.86	0.50	0.36	1.65
2006	0.52	0.95	0.60	0.35	1.83
2007	0.52	1.09	0.59	0.50	2.10
2008	0.66		0.77		
2009	0.61		0.55		
Mean	0.59	0.77	0.61	0.17	1.35
Median	0.61	0.77	0.61	0.12	1.18
Maximum	0.70	1.09	0.77	0.50	2.10
Minimum	0.52	0.51	0.43	-0.11	0.79
Standard Deviation	0.06	0.17	0.09	0.18	0.39

Source: Table developed by the Contractor based on data provided by TOCMC, NYBOT, RMA, and a methodology provided by RMA

In the 1999 and 2000 crop years, the prices received by producers for organic cotton briefly dipped below the conventional base prices. However, the price election and the implied base price both substantially exceeded the actual price received by producers in those years. The organic price still exceeded the season average price received by producers as reported by NASS. The analysis for cotton differs from corn and soybeans, where the organic price was always higher than the conventional price because the comparisons were based on monthly actual prices, not on the implied base price election. The difference in the analytical approach is founded in adequacy of data: only two complete crop years were available for corn and soybeans whereas ten are available for organic cotton. Hence, the basis of comparison for cotton is the implied base price that will be established under the Combo policy. For corn and soybeans, the difference in monthly market prices served as a proxy for the difference in the organic price to the base price election.

The general tendency of organic cotton prices is consistent with that for other organic markets (considerable premiums for organic production). For cotton, both the minimum difference and minimum ratio approaches as applied to corn and soybeans would result in a price election lower than the conventional price election, and are not considered in this analysis. Instead, median difference and ratio are used to consider the application of a relational approach to organic cotton

pricing. Figures 13 and 14 display the observed organic prices and conventional prices adjusted by the median difference and the median ratio, respectively, for the years 1998 through 2009.

FIGURE 13. Cotton Median Price Difference Model
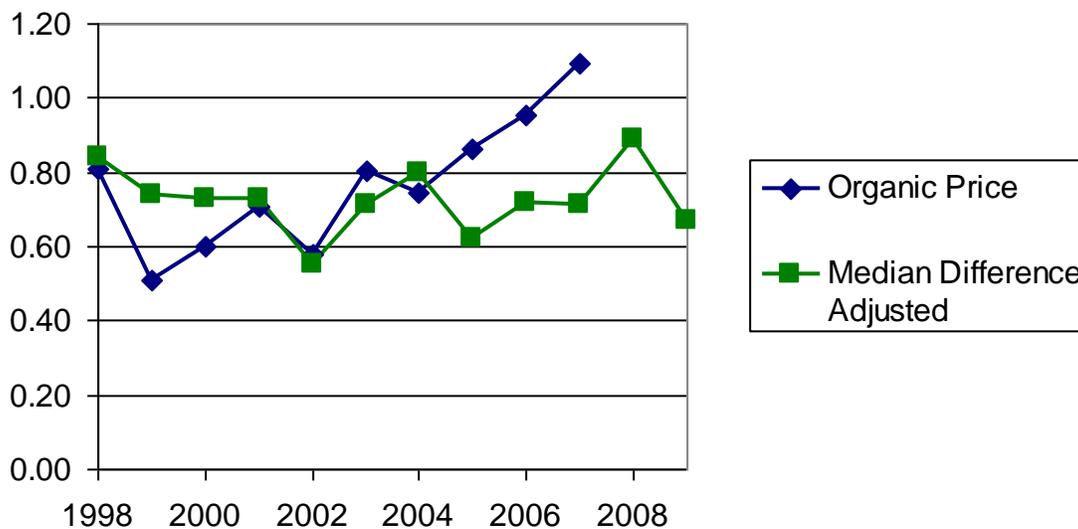
RMA

Figure 13 Data.

Year	Organic Price	Median Difference Adjusted
1998	0.81	0.84
1999	0.51	0.74
2000	0.60	0.73
2001	0.71	0.73
2002	0.58	0.55
2003	0.80	0.71
2004	0.75	0.80
2005	0.86	0.62
2006	0.95	0.72
2007	1.09	0.71
2008		0.89
2009		0.67

FIGURE 14. Cotton Median Price Ratio Model
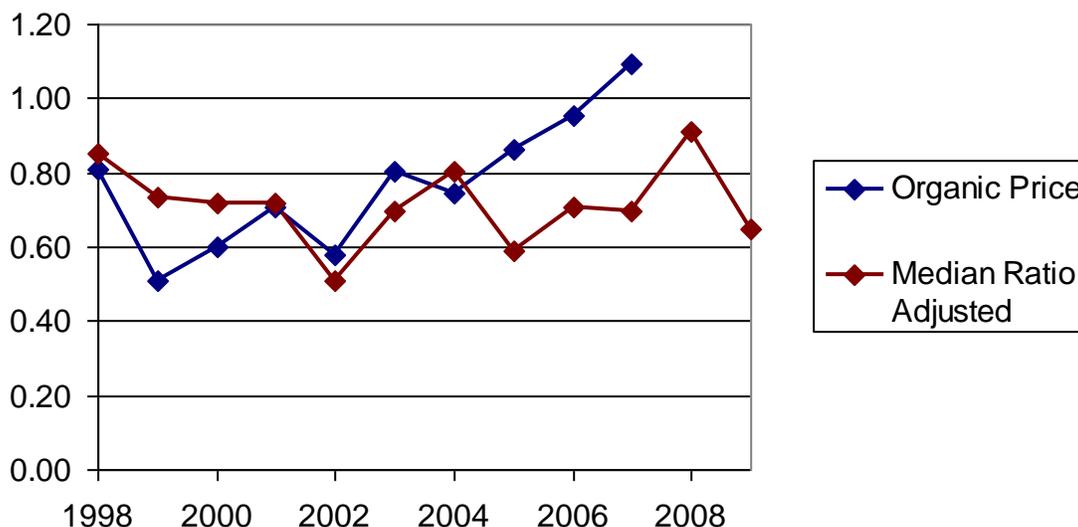
Figure 14 Data.

Year	Organic Price	Median Ratio Adjusted
1998	0.81	0.85
1999	0.51	0.73
2000	0.60	0.72
2001	0.71	0.72
2002	0.58	0.51
2003	0.80	0.70
2004	0.75	0.80
2005	0.86	0.59
2006	0.95	0.71
2007	1.09	0.70
2008		0.91
2009		0.65

As both these relational models display, the potential for overestimating observed values through the application of median relationships (whether proportional or additive) are, by definition 50 percent. This may be inconsistent with the desired conservatism that would be suggested by the uncertainty and volatility expresses in the available data.

The Contractor also considered the actual pricing data as a basis of estimating the price rather than a relational adjustment as was used for corn and soybeans. Rather than considering only relational measures, the organic cotton data may contain sufficient high confidence historical observations over a sufficient period of time to support stand-alone analysis. Given the high measure of autocorrelation in many thin markets, the Contractor considered the "forecasting" ability of a one-period autoregressive model, i.e., simply applying the most recent available organic price observation as the price election for the future crop year. Based on the long marketing period of organic cotton, the most recent observation available for development of

price elections is two years prior to the applicable crop year (i.e. 2007 data would be used for making projections for the 2009). Figure 15 displays this model.

FIGURE 15. Cotton Most Recent Observation Model

Source: Figure developed by the Contractor based on data provided by TOUMC, NYBOT, and a methodology provided by RMA.
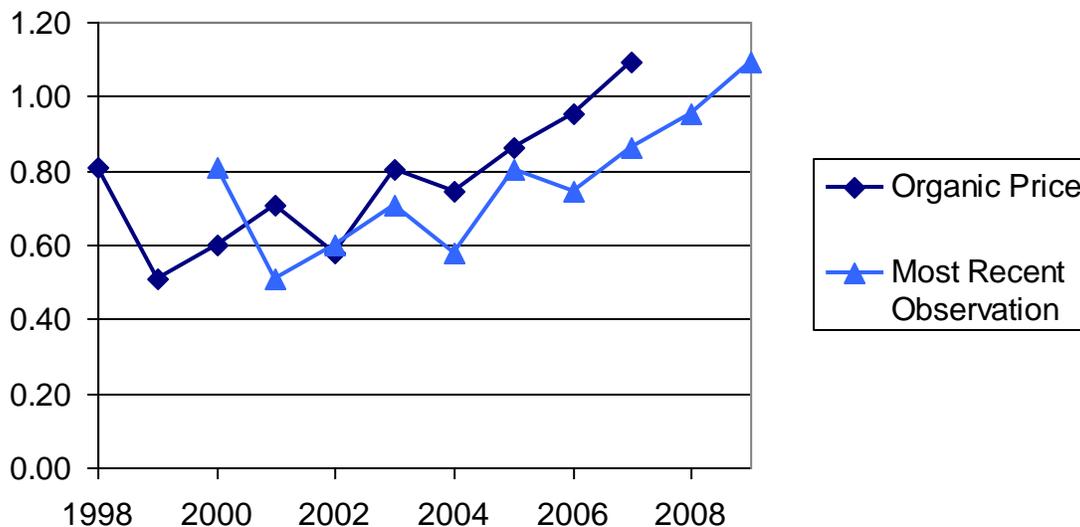
Figure 15 Data.

Year	Organic Price	Most Recent Observation
1998	0.81	
1999	0.51	
2000	0.60	0.81
2001	0.71	0.51
2002	0.58	0.60
2003	0.80	0.71
2004	0.75	0.58
2005	0.86	0.80
2006	0.95	0.75
2007	1.09	0.86
2008		0.95
2009		1.09

The most recent observation, particularly in the case of organic cotton prices (which display a strong trend) consistently underestimates prices over the sample period, but also provides a highly volatile measure of pricing. The Contractor also considered a more stable model based on the simple average of observations of the previous three crop years. This model is displayed in Figure 16.

Organic Crops: Final Development of Additional Price Elections

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FIGURE 16. Cotton Three Year Average Model
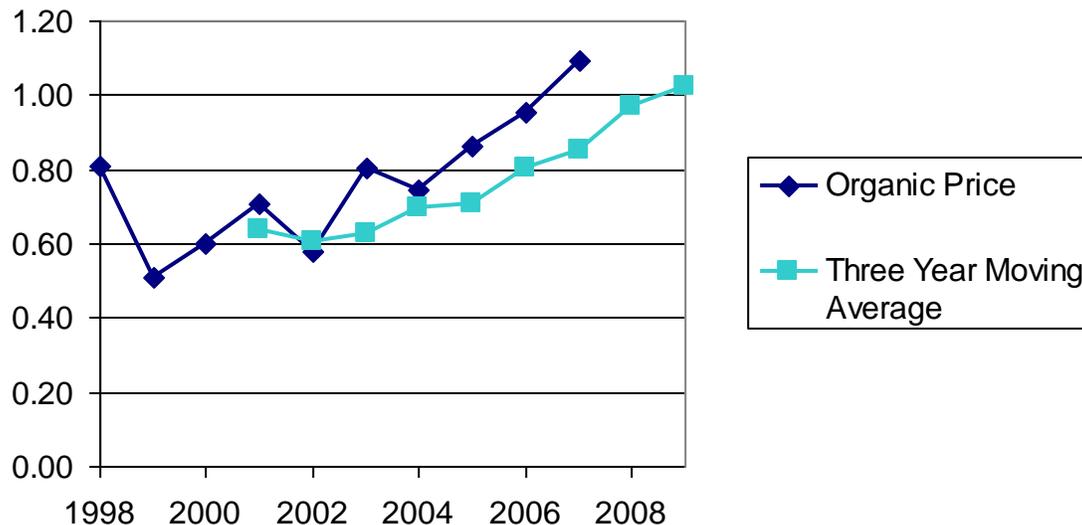
Figure 16 Data.

Year	Organic Price	Three Year Moving Average
1998	0.81	
1999	0.51	
2000	0.60	
2001	0.71	0.64
2002	0.58	0.61
2003	0.80	0.63
2004	0.75	0.70
2005	0.86	0.71
2006	0.95	0.80
2007	1.09	0.85
2008		0.97
2009		1.02

Based on the strong trend observed in the dataset, the three year moving average model consistently underestimated the actual observed value, but provided a stable estimate of prices. The Contractor also developed a simple least squares regression on the available data, calculating the slope of the regression line to be $0.044/lb. per year with an intercept of $0.523/lb and an unadjusted R^2 of 0.56. Figure 17 displays the trend adjusted model.

FIGURE 17. Cotton Trend-Adjusted Model
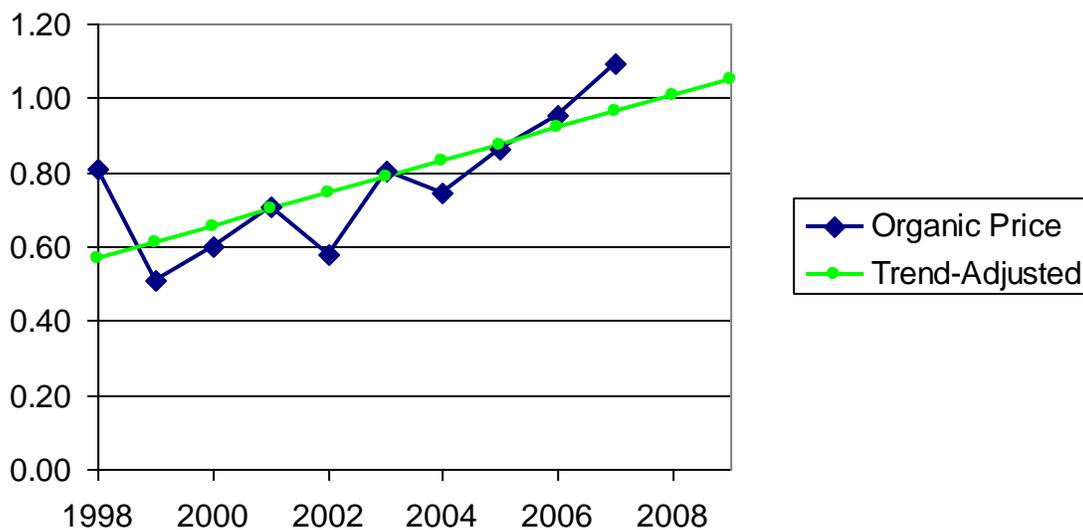
Figure 17 Data.

Year	Organic Price	Trend-Adjusted
1998	0.81	0.57
1999	0.51	0.61
2000	0.60	0.66
2001	0.71	0.70
2002	0.58	0.74
2003	0.80	0.79
2004	0.75	0.83
2005	0.86	0.88
2006	0.95	0.92
2007	1.09	0.96
2008		1.01
2009		1.05

As displayed in the figure, the linear trend for prices in the available sample period implies a steep increase in organic cotton prices each year. In addition, it ignores current market information that affects the base price election. That is, it increases without regard to information that indicates the market price for cotton should be reduced relative to prior years. To facilitate comparison, Figure 18 displays the outputs of each of the models tested.

FIGURE 18. Cotton Organic Price Projection Models
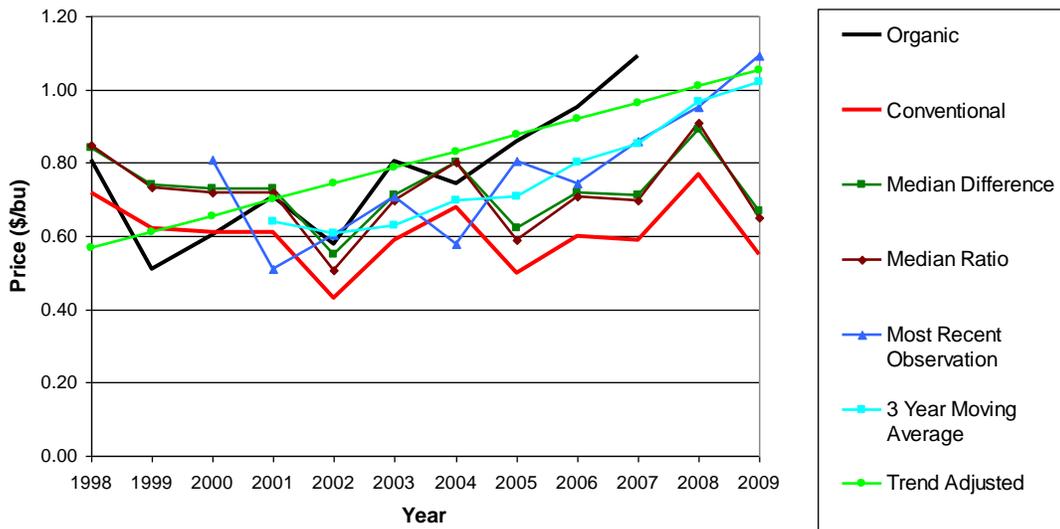
Source: Figure developed by the Contractor based on data provided by TOCMC, NYBOT, and a methodology provided by RMA

Figure 18 Data.

Year	Organic	Conventional	Median Difference	Median Ratio	Most Recent Observation	3 Year Moving Average	Trend Adjusted
1998	0.81	0.72	0.84	0.85			0.57
1999	0.51	0.62	0.74	0.73			0.61
2000	0.60	0.61	0.73	0.72	0.81		0.66
2001	0.71	0.61	0.73	0.72	0.51	0.64	0.70
2002	0.58	0.43	0.55	0.51	0.60	0.61	0.74
2003	0.80	0.59	0.71	0.70	0.71	0.63	0.79
2004	0.75	0.68	0.80	0.80	0.58	0.70	0.83
2005	0.86	0.50	0.62	0.59	0.80	0.71	0.88
2006	0.95	0.60	0.72	0.71	0.75	0.80	0.92
2007	1.09	0.59	0.71	0.70	0.86	0.85	0.96
2008		0.77	0.89	0.91	0.95	0.97	1.01
2009		0.55	0.67	0.65	1.09	1.02	1.05

As displayed in the figure, there are considerable differences in the prices projected by each of the potential models from year to year. As graphical information is difficult to quantify, Table 11 displays the summary statistics for the errors (calculated as the actual observed organic price less the projected price) for each model.

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TABLE 11. Organic Cotton Model Performance Summary Statistics

	Conventional	Median Difference	Median Ratio	Most Recent Observation	3 Year Moving Average	Trend Adjusted
Average	0.17	0.05	0.06	0.09	0.11	0.00
Median	0.12	0.00	0.03	0.13	0.15	0.00
Maximum	0.50	0.38	0.39	0.23	0.24	0.24
Minimum	-0.11	-0.23	-0.22	-0.21	-0.03	-0.17
Sum of Squared Errors	0.59	0.27	0.31	0.18	0.14	0.05

Source: Table developed by the Contractor based on data provided in previous tables and figures.

As displayed in the table, each of the models underestimates the actual reported price for organic cotton when measured by the average and median differences. Unfortunately, each of the models also overestimates the actual reported price at least once during the ten years. Interestingly, each of the relational models (difference and ratio) perform considerably worse than the absolute models, but it is important to remember that all model performance measures are within the time period of the data. Research indicates such measures are likely to overstate future performance.

By most measures, the trend adjusted model displayed superior performance, including a sum of squared errors that was (by definition) the lowest tested. Disconcertingly, this model projects swiftly annually increasing prices for organic, which represents the available data well, but is likely not sustainable in the long term and creates a strong potential for overestimating actual organic prices in future years. Additionally, as noted earlier, it ignores market information included in the determination of the base price.

Based on the performance criterion, its strong stabilizing effect, the long lag time in data availability, and the low potential for substantially overestimating actual organic cotton prices, the Contractor recommends RMA adopt a three year average of the most recently reported historical prices as the price election for organic cotton. While this model also suffers from the deficiency of not fully incorporating the market information that results in the base price election, it does ultimately react to that information. Accordingly, the Contractor recommends this model be used only as a starting point in the decision-making process. Market information indicating a substantial change in cotton markets embodied in the base price election should considered also.

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48

Risk Management Agency
Contract No: AG-645S-C-09-0003

SECTION VI. RECOMMENDATIONS

The Contractor was charged with developing price election determination methods for organic feed-grade corn, feed-grade soybeans, and cotton based on the findings of previous research. Currently, each of these organic commodities is insurable at the price elections established for conventional production. While this approach was certainly reasonable given the near total lack of organic price data available when the offer of organic coverage was initiated, subsequent organic price data collected by AMS, NASS, and other entities provide evidence for consistent premiums paid for organic production. For each of the selected crops, the Contractor considered a number of alternative approaches, assessed the performance of each in historical scenarios, and determined a method which offered a conservative, but broadly representative value for organic commodities.

For both organic feed-grade corn and organic feed-grade soybeans, the Contractor determined a valuation model based on the minimum ratio of the aggregated monthly organic price to monthly conventional price over the available data period. This resulted in what the Contractor believes to be a conservative, but representative price for organic production. The Contractor recommends this minimum ratio model be implemented on a pilot basis. While the ratios were developed using the price derived from feed-grade corn and soybeans, the Contractor believes evidence premiums paid for both food-grade corn and soybeans are even greater. Therefore, these price elections should be applied to an organic type without discriminating between food and feed-grade production. Further, the Contractor recommended these price elections be monitored carefully, with the objective of replacing this relationship-based price election with an approach based entirely on independent organic price data as more lengthy datasets become available in future years.

The data for organic cotton met all the standards included in the research and development contract. The data were collected from a source representing sales of between 50 and 75 percent of the cotton grown organically each year. The Contractor tested five alternative approaches to assessing price elections for organic cotton, including two based on relationships between organic and conventional cotton prices and three based on analysis of the available organic cotton data series. Based on these assessments, the Contractor recommended the organic cotton price election be determined as the simple average of the observed organic cotton prices in the most recent three crop years on a pilot basis, and should apply only to organic upland cotton in the state of Texas. This price election method should also be carefully monitored and RMA pricing personnel should be granted the flexibility to make ad hoc adjustments to the determined price election if information should become available that the market for the coming crop year is expected to represent a marked departure from previous years' historical data.

Appendix A

Organic Cotton Raw Pricing Data

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Contract No: AG-645S-C-09-0003*

Organic Crops: Final Development of Additional Price Elections

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This appendix provides excerpts of the pertinent organic cotton price data used in determining annual prices for organic cotton for the years 1998 through 2007. These data are annual summaries of payment calculations for producer-members in the Texas Organic Cotton Marketing Cooperative (TOCMC). Insurable prices include all payments made for cotton but exclude any dividends or post-harvest value added as a result of marketing. Data for a given crop year are available by request from TOCMC in February of the calendar year that falls two years after the given crop was planted.

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TABLE A1. TOCMC Organic Cotton Price Data for 1998

TEXAS ORGANIC COTTON MARKETING COOPERATIVE

1998 Crop

Insurable Price		(Average CCC Loan Proceeds + Average Total Progress Payments)						0.807
Payments Received by Producers								
	Date	Avg./Total	Pool 1	Pool 2	Pool 3	Pool 4	Pool 5	Trans
Bales		4,325	1	609	1,589	452	385	1,289
Pounds		2,131,508	484	297,667	782,767	222,551	194,069	633,970
CCC Loan Proceeds	01/15/99	0.493	0.540	0.530	0.500	0.480	0.470	0.480
Progress Payment #1	04/14/99	0.199	0.310	0.230	0.190	0.180	0.170	0.210
Progress Payment #2	07/15/99	0.070	0.070	0.070	0.070	0.070	0.070	0.070
Progress Payment #3	10/13/99	0.045	0.080	0.070	0.060	0.050	0.020	0.020
Total Progress Payments		0.314	0.460	0.370	0.320	0.300	0.260	0.300
Total Payments		0.807	1.000	0.900	0.820	0.780	0.730	0.780

Organic Crops: Final Development of Additional Price Elections

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TABLE A2. TOCMC Organic Cotton Price Data for 1999

TEXAS ORGANIC COTTON MARKETING COOPERATIVE

1999 Crop

Insurable Price	(Average CCC Loan Proceeds + Average Total Progress Payments)						0.511

Payments Received by Producers

	Date	Avg./Total	Pool 1	Pool 2	Pool 3	Pool 4	Pool 5	Trans
Bales		6,326	2	815	1,366	843	721	2,579
Pounds		3,087,223	945	398,734	668,856	410,299	346,330	1,262,059
CCC Loan Proceeds	01/15/00	0.493	0.547	0.537	0.510	0.481	0.469	0.481
Progress Payment #1	06/06/00	0.018	0.230	0.099	0.005	0.007	0.007	0.007
Progress Payment #2								
Progress Payment #3								
Total Progress Payments		0.018	0.230	0.099	0.005	0.007	0.007	0.007
Total Payments		0.511	0.777	0.636	0.515	0.488	0.475	0.488

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TABLE A3. TOCMC Organic Cotton Price Data for 2000

TEXAS ORGANIC COTTON MARKETING COOPERATIVE

2000 Crop

| Insurable Price | (Average CCC Loan Proceeds + Average Total Progress Payments) | | | | | | | | 0.602 | | |

Payments Received by Producers

	Date	Avg./Total	Pool 1	Pool 2	Pool 3	Pool 4	Pool 5	Trans 1	Trans 2	Trans 3	Trans 4	Trans 5
Bales		3,140	0	385	355	423	433	0	753	257	296	238
Pounds		1,544,637	0	188,010	173,330	208,016	210,402	0	371,421	126,595	148,603	118,260
CCC Loan Proceeds	01/15/01	0.469		0.526	0.481	0.448	0.413		0.522	0.449	0.420	0.419
Progress Payment #1	07/12/01	0.133		0.310	0.160	0.110	0.060		0.160	0.110	0.060	0.010
Progress Payment #2												
Progress Payment #3												
Total Progress Payments		0.133	0.000	0.310	0.160	0.110	0.060	0.000	0.160	0.110	0.060	0.010
Total Payments		0.602	0.000	0.836	0.641	0.558	0.473	0.000	0.682	0.559	0.480	0.429

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TABLE A4. TOCMC Organic Cotton Price Data for 2001

TEXAS ORGANIC COTTON MARKETING COOPERATIVE

2001 Crop

| Insurable Price | | (Average CCC Loan Proceeds + Average Total Progress Payments) | | | | | | | | | | 0.707 |

Payments Received by Producers

	Date	Avg./Total	Pool 1	Pool 2	Pool 3	Pool 4	Pool 5	Trans 1	Trans 2	Trans 3	Trans 4	Trans 5
Bales		4,989	69	1,306	1,176	357	415	142	1,178	278	27	41
Pounds		2,450,830	34,531	641,790	581,200	169,167	208,611	69,646	579,202	133,849	12,836	19,998
CCC Loan Proceeds	01/15/02	0.510	0.554	0.537	0.490	0.454	0.444	0.555	0.539	0.504	0.427	0.417
Progress Payment #1	06/24/02	0.099	0.185	0.160	0.085	0.060	0.035	0.110	0.085	0.060	0.035	0.010
Progress Payment #2	07/25/02	0.099	0.185	0.160	0.085	0.060	0.035	0.110	0.085	0.060	0.035	0.010
Progress Payment #3												
Total Progress Payments		0.197	0.370	0.320	0.170	0.120	0.070	0.220	0.170	0.120	0.070	0.020
Total Payments		0.707	0.924	0.857	0.660	0.574	0.514	0.775	0.709	0.624	0.497	0.437

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TABLE A5. TOCMC Organic Cotton Price Data for 2002

TEXAS ORGANIC COTTON MARKETING COOPERATIVE

2002 Crop

| Insurable Price | (Average CCC Loan Proceeds + Average Total Progress Payments) | | | | | | | | 0.578 | |

Payments Received by Producers										
	Date	Avg./Total	Pool 1	Pool 2	Pool 3	Pool 4	Pool 5	Trans 2	Trans 3	Trans 4-5
Bales		5,971	131	2,305	2,419	270	477	74	256	39
Pounds		2,932,351	62,759	1,129,183	1,188,942	133,134	237,116	36,288	125,962	18,967
CCC Loan Proceeds	01/15/03	0.514	0.560	0.530	0.510	0.500	0.460	0.540	0.520	0.480
Progress Payment #1	06/30/03	0.064	0.150	0.090	0.060	0.030	0.000	0.030	0.000	0.000
Progress Payment #2										
Progress Payment #3										
Total Progress Payments		0.064	0.150	0.090	0.060	0.030	0.000	0.030	0.000	0.000
Total Payments		0.578	0.710	0.620	0.570	0.530	0.460	0.570	0.520	0.480

TABLE A6. TOCMC Organic Cotton Price Data for 2003

TEXAS ORGANIC COTTON MARKETING COOPERATIVE

2003 Crop

Insurable Price	(Average CCC Loan Proceeds + Average Total Progress Payments)	0.803

Payments Received by Producers

	Date	Avg./Total	Pool 1	Pool 2	Pool 3	Pool 4	Pool 5	
Bales		2,461	557	1,202	526	97	79	
Pounds		1,224,158	276,462	598,307	262,127	48,105	39,157	
CCC Loan Proceeds	01/15/04	0.542	0.564	0.554	0.508	0.503	0.504	
Progress Payment #1	07/15/04	0.261	0.400	0.250	0.200	0.100	0.050	
Progress Payment #2								
Progress Payment #3								
Total Progress Payments		0.261	0.400	0.250	0.200	0.100	0.050	0.000
Total Payments		0.803	0.964	0.804	0.708	0.603	0.554	

TABLE A7. TOCMC Organic Cotton Price Data for 2004

TEXAS ORGANIC COTTON MARKETING COOPERATIVE

2004 Crop

Insurable Price	(Average CCC Loan Proceeds + Average Total Progress Payments)						0.745

	Date	Avg./Total	Pool 1	Pool 2	Pool 3	Pool 4	Pool 5	
Payments Received by Producers								
Bales		5,334	86	2,560	1,732	427	529	
Pounds		2,640,500	42,861	1,266,420	861,592	208,984	260,643	
CCC Loan Proceeds	01/15/05	0.516	0.570	0.535	0.511	0.471	0.466	
Progress Payment #1	07/29/05	0.229	0.450	0.300	0.200	0.100	0.050	
Progress Payment #2								
Progress Payment #3								
Total Progress Payments		0.229	0.450	0.300	0.200	0.100	0.050	0.000
Total Payments		0.745	1.020	0.835	0.711	0.571	0.516	

Organic Crops: Final Development of Additional Price Elections

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TABLE A8. TOCMC Organic Cotton Price Data for 2005

TEXAS ORGANIC COTTON MARKETING COOPERATIVE
2005 Crop

Insurable Price	(Average CCC Loan Proceeds + Average Total Progress Payments)						0.860

			Payments Received by Producers				
	Date	Avg./Total	Pool 1	Pool 2	Pool 3	Pool 4	Pool 5	Trans
Bales		8,377	1,244	5,930	704	211	157	131
Pounds		4,145,895	614,600	2,928,699	352,648	104,248	79,246	66,454
CCC Loan Proceeds	01/15/06	0.558	0.577	0.563	0.528	0.509	0.471	0.535
Progress Payment #1	06/15/06	0.302	0.450	0.300	0.200	0.100	0.050	0.150
Progress Payment #2								
Progress Payment #3								
Total Progress Payments		0.302	0.450	0.300	0.200	0.100	0.050	0.150
Total Payments		0.860	1.027	0.863	0.728	0.609	0.521	

Organic Crops: Final Development of Additional Price Elections

W&A CROP INSURANCE DIVISION
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TABLE A9. TOCMC Organic Cotton Price Data for 2006

TEXAS ORGANIC COTTON MARKETING COOPERATIVE

2006 Crop

Insurable Price	(Average CCC Loan Proceeds + Average Total Progress Payments)							0.952

		Payments Received by Producers						
	Date	Avg./Total	Pool 1	Pool 2	Pool 3	Pool 4	Pool 5	Trans
Bales		5,940	563	2,763	996	391	968	259
Pounds		2,951,388	276,943	1,377,718	499,557	193,680	475,560	127,930
CCC Loan Proceeds	01/15/07	0.550	0.588	0.571	0.542	0.543	0.492	0.515
Progress Payment #1	39,282.000	0.337	0.550	0.400	0.300	0.200	0.150	0.250
Progress Payment #2	39,374.000	0.065	0.065	0.065	0.065	0.065	0.065	0.065
Progress Payment #3								
Total Progress Payments		0.402	0.615	0.465	0.365	0.265	0.215	0.315
Total Payments		0.952	1.203	1.036	0.907	0.808	0.707	

W&A Crop Insurance Division
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TABLE A10. TOCMC Organic Cotton Price Data for 2007

TEXAS ORGANIC COTTON MARKETING COOPERATIVE

2007 Crop

Insurable Price	(Average CCC Loan Proceeds + Average Total Progress Payments)							1.091	

Payments Received by Producers

	Date	Avg./Total	Pool 1	Pool 2	Pool 3	Pool 4	Pool 5	Trans 1-3	Trans 4	Trans 5
Bales		14,878	3,606	7,343	852	144	361	2,171	87	314
Pounds		7,336,854	1,758,420	3,637,363	427,150	69,493	176,568	1,069,543	43,775	154,542
CCC Loan Proceeds	02/01/08	0.571	0.590	0.574	0.541	0.498	0.462	0.577	0.523	0.519
Progress Payment #1	06/11/08	0.386	0.530	0.430	0.330	0.230	0.130	0.130	0.080	0.080
Progress Payment #2	10/29/08	0.114	0.071	0.094	0.117	0.140	0.163	0.240	0.213	0.136
Progress Payment #3	02/17/09	0.019	0.027	0.021	0.015	0.009	0.002	0.009	0.002	(0.004)
Total Progress Payments		0.519	0.628	0.544	0.461	0.378	0.295	0.378	0.295	0.212
Total Payments		1.091	1.217	1.119	1.002	0.876	0.757			