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Crop Budgets and Cost & Return Studies for Organic Grain in Western New York

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Introduction

Organic products are increasingly sought after. They are praised by consumers for their environmental sustainability and health benefits (Yue et. al, 2009). The market for organic goods in the United States is expanding, hitting a record high of $43.4 billion in 2015 (OTA, 2016). Farmers are often attracted to organic systems for increased profits and a feeling of environmental stewardship (Peterson et. al, 2012).

In Western New York, markets are developing for organically produced food and feed grains as well as soybeans, typically for local use. Higher quality grains are in demand for bakery and brewery use. Those that don't meet quality standards for human consumption can be used in the production of organic livestock and related animal products, which is also a growing industry (Berry, 2011). Currently, much of the grain crop does not meet quality standards for human consumption. While some studies have dealt with organic grain production and transitioning to organic farming, such as on a long-term agroecological site in Iowa (Delate et. al, 2004), little information exists on the Western New York region (Gomez, 2015). Closing this information gap will make organic farming systems more efficient and help meet the demand for high quality grains for local food products.

In addition to quality standards, another problem that farmers face is profitability. To meet USDA regulations, cropland must be organically maintained for three years before being certifiably organic (USDA 2015). During the three-year time period, crops must be produced using organic methods, but organic price premiums may not be received, so profitability can be vastly reduced if crop yields suffer during the transition. In addition, farmers must document the management of their crops during the organic transition process to receive organic certification. Many farm operators may not be familiar with this type of record keeping and reporting, thus raising additional complications. The economic barriers encountered during the transition period can be a significant deterrent for farmers considering switching to an organic system. Conversely, information making the three-year transition period more profitable would be invaluable for farmers in the area.

More information needs to be gathered on farming conditions for organic grain production in the region. The emerging market for high quality organic grains has demand that are not being met due to the difficulties in scaling up local production. Efficient production practices during the three-year transition period may allow farmers make informed decisions to improve their farms' profitability. This study aims to better understand organic grain production in Western New York. A three-year corn-soybean-wheat/red clover rotation will be used, as it has been determined to increase both yields and profitability in organic systems. Two specific questions will be addressed in this report: 1) what is the cost associated with the three-year transitional period, and 2) under what circumstances will the farmers who shift to an organic cropping system be better off in comparison to those continuing with a conventional system. Gathering information from farmers about rotation costs and profitability will help inform decisions that growers must make on production practices. Increasing efficiency of production would raise quality and profitability of the product, thereby making organic grains more accessible to producers and consumers regionally.

Motives behind organic production

Organic products can receive a price premium compared to their conventional counterparts. Delate et al. (2004) reports on an economic comparison of crops on a long-term agroecological research (LTAR) site in Iowa, showing that returns for organic corn were $51 per acre greater than conventional corn, and soybean returns were $95 per acre greater than those in a conventional system. Delbridge et al. (2011) demonstrates that there were minor differences in yields between an organic system with mechanical weed removal and manure for fertilization, and conventional system with chemical weed removal and fertilization. The study also showed that organic systems with a 50% price premium can be far more profitable than conventional systems, and even with lower price premiums, can remain more profitable than conventional systems. This is consistent with other literature. Clark (2009) showed that organic grain systems, even with low organic premiums, can be more profitable than conventional systems, particularly in the production of corn and soybeans.

In addition to increased profitability, previous research shows environmental and sustainability concerns are also motivating factors for farming organically. According to Peterson et al. (2012) a majority of organic farmers are motivated by environmental reasons and lifestyle choices along with profit. Pimentel et al. (2005) showed that the crop yield from organic grain systems without chemical fertilizers is comparable to or exceeds those of conventional systems. They indicated that energy investment in the organic systems is about 30 percent less than in the conventional system. For example, fossil fuel use in the organic systems used are 28% to 32% lower. Soil carbon and nitrogen levels were similar at the beginning of the study, but when measured 20 years later, both levels were significantly higher in the organic system. Organic systems lacking adequate levels of soil nitrogen may benefit from additional nitrogen input. Singerman et al. (2012) found that carbon-equivalent emissions due to fertilizers from an organic system was 9 and 33 percent less than those of two conventional systems. These findings are extremely relevant to rising sentiments of sustainability and environmental stewardship.

Consumer thoughts on organic products reflect similar environmental concerns. According to a survey by Yue et al. (2009), 67% of the respondents indicated that environmentally friendly produce is a concern when buying organic, while 83% said that "safe to eat" was important; 78% said that "good for health" motivated their purchases as well. Participants involved in environmental groups were more likely to buy organic. This shows that consumers inclined to buy organic produce believe the product is safer than conventional produce, potentially due to their negative views on chemical use.

Information concerning organic practices

In order for a farmer to make the decision to transition to organic, it is important to be knowledgeable about the subject. The USDA prohibits the use of most synthetic substances in organic farming, so alternative methods must be used for nutrient supply and pest control. Organic systems have shown potential in competition with conventional systems. Klonsky (2012) uses cover crops for nitrogen input, similar to many studies Crop yields for some organic vegetables are lower, so the system was dependent on organic price premiums to be as profitable as a conventionally managed system. This is consistent with other literature. A large attraction for organic systems are price premiums, and it is important to consider the reliance on these for the system to be profitable. Gareau (2004) conducted an analysis of plant nutrient management strategies, finding cover-crop and animal manure systems to be competitive with a conventional no-till system. The analysis also suggests that animal manure could be the most profitable practice when manure costs are low or available to a grower at no cost. Clark et al. (1999) shows that corn and tomatoes are more reliant on nitrogen in the soil, and have lower yields in organic systems. When considering an organic transition, nitrogen availability and weed management are generally considered to be the most important factors for yields and profits.

Conditions during transition

Although organic farming systems can be competitive with conventional systems, economic conditions during transition years can be difficult. During transition, USDA organic regulations must be followed, but organic premiums are not received, so profitability is reduced. Caldwell et al. (2014) utilized three different forms of organic management during and after transition from a conventional system. In the first year of transition, corn yields were 63% of the county average, but were competitive after certification. Soybean and spelt yields were comparable to county averages during and after transition. During the transition period, the net profit (i.e., sales minus farming cost, land rend and management labor cost) of the crops are negative, but after the transition period and with an organic price premium of 30%, profits were positive.

Archer et al. (2007) showed that organic corn, wheat and alfalfa yields are lower than conventional systems, while soybean yields were similar. Organic systems were not as profitable as conventional systems without an organic price premium, which is consistent with other literature. The study also expressed concern about weed growth. In Temple et al. (1994), tomato yields decreased during transition, but recovered after. Although inconsistent with other literature, corn yields stayed relatively stable during transition. Weed management caused variation in corn yields. Nitrogen fixation was an area of concern with reduced yields. It is apparent that a cover crop that can supply nitrogen, and input of additional nitrogen if necessary, is important in the success of organic nitrogen-dependent crops, such as corn, and the lack of starter fertilizer in organic farming makes nitrogen management even more important.

Differences in crop rotations and tillage practices have been shown to impact nitrogen availability and general soil health, which is particularly relevant due to the lack of fertility input options for organic production. Incorporating winter wheat into corn-soybean rotations can have a positive effect on soil health and sustainability. Van Eerd et. al (2015) show that soil quality is significantly improved in a soybean-winter wheat rotation and suggest that the inclusion of winter wheat improves soil health in southwestern Ontario. Congreves et. al (2016) also find that including winter wheat increases soil organic carbon levels, suggesting better system sustainability. More importantly, Gaudin et. al (2016) find that including winter wheat in a rotation increases the corn and soybean yields. They also find that the inclusion of red clover increased the yield effects of wheat in a rotation. These findings are consistent with our trial experiment conducted in Aurora research Farm in Western New York (See Cox et. al 2015a). Including winter wheat in the rotation could increase the following year's corn yield as much as 38% and 25% in comparison to a corn-corn rotation and a corn-soybean rotation, respectively.

In summary, an organic system emphasizing adequate nitrogen supply and limited weed growth or good weed management practices may be the most successful during the transitional period. Reduced profits during transition years can be unattractive to farmers, but organic systems are generally competitive or more profitable than conventional systems after transition when price premiums are available. The economic success of an organic system is often reliant on price premiums. A learning curve may be present during implementation of organic practices, leading to more variability in yields. This report focuses on the cost of transitioning from conventional to organic practices, with emphasis on the long-term profitability of transitioning to an organic cropping system.

Methods

The methods used to construct cost estimates focus on 1) management practices and associated costs from the trial experiments on the Aurora Research Farm and 2) interviews with a panel comprised of grower representatives. The report and data from the trail experiment were shared with us by the Cornell professors who conducted the experiment. After the 2016 growing season, we met with several organic and conventional farmers and extension specialists. The farmers provided their estimates of production costs, and the time required to perform various operations. They also reported on management strategies for weed/pest control and the price premiums received for organic crops. Crops were analyzed for two continuous 3-year periods. The first period is organic system's transitional period with no crop price premiums, and the second is after organic transition with access to price premiums.

A conventional corn-soybean rotation and an alternate organic corn-soybean-winter wheat/red clover rotation were analyzed in this 6-year cost study. In the corn-soybean-winter wheat/red clover rotation, corn is planted in May of year 1 and harvested in October or November, with fields lying fallow in the winter. Soybeans are planted in May of year 2 and harvested in September, directly followed by planting wheat. Clover is planted over wheat in March of year 3, when wheat is 12 inches in height. Wheat is harvested in July and clover continues to grow until corn is planted in May of year 4. The organic rotation plan is chosen for its ability to maximize yields of corn, soybean and wheat during the transitioning period. For the conventional cropping system, the two-year corn-soybean rotation plan is analyzed as it is the most common rotation plan for conventional farmers in western New York (Cox and Caldwell, 2017). An economic analysis is conducted to compare the profitability of the organic cropping system to the conventional one. The receipts, production expenses, opportunity costs and profit for each crop during this 6-year period were estimated to analyze when shifting to organic cropping system leave growers better off.

Revenue

Revenue was determined by multiplying crop price and crop yield. The yield data was collected from the trail experiment conducted in the Aurora Research Farm in 2015. Estimates of the price premium received by growers from year 4 to year 6 was provided by the farmer panel. The price for conventional crops was collected from NASS USDA (available at https://www.nass.usda.gov/Statistics_by_State/New_York/Publications/Annual_Statistical_Bulletin/2016/2015-2016%20NY%20Annual%20Bulletin.pdf)

Farming Cost

Crop management strategies for organic cropping system (corn-soybean-wheat/clover rotation) were implemented based on Cornell Field Crops recommended practices (Cox et. al 2015a, Cox et. al 2015b, Cox et. al 2016). The costs associated with the practices, such as applying chicken manure and organic starters as fertilizer as well as conducting field and row cultivation for weed management, used in the research were estimated. We used the Pennsylvania 2016 machinery custom contract rate (available at https://www.nass.usda.gov/Statistics_by_State/Pennsylvania/Publications/Machinery_Custom_Rates/2016%20Custom%20Rates.pdf) to estimate the machinery and labor costs of operational practices, including soil preparation, planting, manure application, cultivating, spraying and harvesting. The grower panel indicated that the Pennsylvania custom contract rate as a standard reference for contracts with neighbors or companies. For the organic cropping system, material costs including seed costs and organic fertilizers were provided by the researchers conducting the trial experiment. For the conventional system, material costs including seed and chemicals for pests and weeds were derived from USDA Agricultural Resource Management Survey data, growers' responses as well as Cornell Field Crops Guide. Total expenses were calculated by summing material costs and operational costs. Net cash returns were calculated by subtracting total farm expenses from crop revenues.

Opportunity cost

To calculate final profits for the two cropping systems, costs of land rent and owners' management labor were subtracted from net cash returns. Two components are considered here: land rent and owners' labor input, which are labeled as opportunity cost. This cost was estimated by the growers' panel of the time they devoted to each crop on a per acre basis.

Profit

A difference in profit (labeled as net profit) between the organic and conventional system was calculated each year, using income gained from shifting to organic cropping as the benchmark. This net profit measure was used to compare economic viability across the 6-year study period. We then calculated the present value of net profits using a 1.25% discount rate for each year. This approach allows one to determine if accumulated profit of the organic system will exceed the opportunity cost of transitioning from the conventional system, thus making the organic system more advantageous.

Finally, a sensitivity analysis was conducted to account for changes in profitability due to differences in market and growing conditions. If, for example, price premiums decrease by 10 or 20 percent due to an increased supply of organic crops, it will take a longer time for conventional farmers shifting to organic system to be better off by recovering additional crop income. Similarly, a decrease in crop yields would increase the time for accumulative profit to equalize, while an increase in crop yields would reduce said time. Changes in these factors were taken into account to anticipate how accumulative profits across the 6-year period may be affected.

Results

This section focuses on per acre net returns during the 6-year study period for these two systems. The transitional/organic system and the conventional system are discussed separately. For the organic system, from year 1 to year 3, the crops are called transitional corn, transitional soybeans and transitional winter wheat/clover. Starting from year 4, crops can be sold in the organic market.

- Transitional/organic system

Annual growing cost and revenue on a per acre basis for transitional corn is presented in Appendix 1. In this year, the corn is grown organically, including applying chicken manure and organic starters as fertilizer as well as conducting field and row cultivation for weed management. However, the crop cannot be s in the organic market. Here we assume that yields for transitional corn is the same with organic corn, while the price for transitional corn is the same as conventional corn. Total growing cost for a typical year is estimated to be $463 per acre. The most costly operations are the pre-harvest machinery and labor cost including plowing, disking and harrowing, field and row cultivation, sowing corn seeds and applying manure. These costs are estimated to be $135 per acre. The manure cost is estimated to be $118 per acre which is the second largest source of cost. From the trial experiment conducted by the Aurora Research Farm in Western NY, the corn yield varied significantly depending on the previous crop (Cox et. al 2015a). The common rotation plan in Western New York for conventional farmers is a corn-soybean rotation. In our rotation plan, corn is the entry crop during the transitional period, with conventional corn or conventional soybeans in the prior crop year. We took the average corn yield between corn following soybeans and corn following corn in this study as the entry point corn yield. The revenue from the typical transitional corn is estimated to be $564. Therefore, net cash receipts are estimated to be $121, and the net profit after taking land rent, a management labor cost into account is $-4.59 for year 1.

Annual growing cost and revenue on a per acre basis for transitional soybeans is presented in Appendix 2. In year 2, soybeans are planted following corn in year 1. Similarly, the soybeans are grown using organic practices, including row cultivation for weed management.[1] As with transitional corn, the soybean crop cannot be sold in the organic market. The yield of transitional soybeans are assumed to be the same as the organic soybeans, but the price is the same as conventional soybeans. Total growing cost for a typical year is estimated to be $239 per acre. The pre-harvest machinery and labor costs, including plowing, disking and harrowing, field and row cultivation, sowing corn seeds and manure application, are estimated to be $124 per acre. The yield for transitional soybeans following corn was about 40 bushels per acre from the trial experiment. The revenue from transitional soybeans are estimated to be $382 per acre. Therefore, net cash receipts is $143, and the net profit after the land rent and management labor cost is $5.39 per acre.

The annual revenue and growing cost for transitional winter wheat and red clover is presented in Appendix 3. The winter wheat seed is sowed in year 2 after the soybean harvest and is then harvested in the summer of year 3. The red clover, as a cover crop, is frost seeded around the March of year 3 and continues to grow throughout the year. Similar to corn and soybeans, the winter wheat is grown organically but cannot be sold in the organic market. The yield of transitional winter wheat is assumed to be the same as organic wheat, but the price is the same as conventional winter wheat. Total growing cost for a typical year is estimated to be $314 per acre due to less weed management pressure. The pre-harvest machinery and labor costs including plowing, sowing wheat and clover seeds and manure application are estimated to be $81 per acre. The yield of transitional winter wheat following soybeans was about 61 bushels per acre from the trial experiment. The revenue from transitional wheat is estimated to be $317 dollars per acre. Therefore, net cash receipt is $3, and the net profit after land rent and management

[1] The soybean did not use any of the manure in the trial experiment.

labor cost is estimated to be negative at -$110.93 per acre.

From year 4 to year 6, the crops could be sold in the organic market and farmers can receive price premiums. The organic corn yield following winter wheat is estimated to be 135 bushels per acre in year 4, with the premium price estimated by the organic grower panel, the revenue for organic corn is estimated to be $1,620 (Appendix 4). The annual farming cost for organic corn is estimated to be $463. The cash receipt is therefore $1,157 per acre. The net profit after the land rent and management labor cost is estimated to be $1,031 per acre.

In year 5, organic soybeans are planted and harvested. The annual growing cost for organic soybeans is estimated to be $239 (Appendix 5). The yield for a typical growing season in Western New York using the recommended practices was about 40 bushels. The revenue for organic soybeans is estimated to be $800 per acre. Net cash receipts are estimated to be $561, and net profit is estimated to be $423 per acre.

After the soybean harvest, the organic winter wheat is sowed in year 5. The winter wheat is harvested in of year 6. Annual growing cost for organic winter wheat and clover is estimated to be $314 (Appendix 6), similar to year 3. The wheat yield for a typical growing season in Western New York using the recommended trial practices was about 61 bushels. The revenue for organic winter wheat is estimated to be $817 per acre. Net cash receipts are estimated to be $504, and net profit is estimated to be $389 per acre.

- Conventional system

The most common rotation plan for conventional farmers is a corn-soybean rotation, so the six-year crop budget for the conventional system focuses on this specific rotation plan. In year 1, corn is planted and harvested. In year 2, soybeans are planted and harvested. In year 3 and year 5, the crops are corn again. Similarly, the crops are soybeans in year 4 and 6.

The annual growing cost for conventional corn on a per acre basis is presented in Appendix 7. The farming cost, including materials, machine and labor costs, is estimated to be $428. The estimated cash profit for the conventional farmers is about $443 per acre. The net profit after land rent and management labor cost is about $332 per acre.

The annual growing cost for conventional soybeans is presented in Appendix 8. The cost of farming, including seed, fertilizer, chemicals, planting, harvesting machinery and labor cost, is estimated to be $275 per care. The estimated cash profit for conventional farmers is about $152 per acre. The net profit after the land rent and management cost is about $40.87 per acre.

The six-year net profit comparison between these two cropping systems is presented in Table 1. For the organic system, during the three-year transitional period, the net profit tends to be negative. However, the net profit is very considerable starting year 4 once the crops can be sold in the organic market. To further understand when the conventional farmers shifting to the organic system would be better off in comparison to them continuing with the conventional system, the difference of the net profit between these two systems is calculated, and the present value of the net profit differences is calculated each year using the 1.25% discount rate. Then the accumulative profit is estimated in a 6-year period. The estimation results show that the accumulative profit in year 3 is $-804 per acre. However, the results show that the profit generated by organic corn production (i.e., $1,031) offsets the opportunity cost for growing conventional soybean conventional system (i.e., $41) in year 4 as well as the accumulative profit loss from the previous three years (i.e., $-804). The accumulative profit in year 4 is therefore $150 per acre, and the accumulative profit on year 6 could reach to $564 per acre. The farmers shifting to organic system will be actually better off starting year 4 once their crops could be sold in the organic market.

Table 1. Net profit from organic and conventional cropping systems

Profit	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Organic system	-5	5	-111	1,031	423	389
Conventional system	332	41	332	41	332	41
Profit differential	-337	-36	-443	991	91	348
Discount rate	1.25%					
Net present value	-337	-35	-432	954	87	327
Accumulated profit	-337	-372	-804	150	237	564

Sensitivity analysis

Several sensitivity analyses of the organic system under various scenarios are also analyzed in this study because the profit for the organic farming system varies widely due to factors such as the yield and the price premium. The yield in our baseline case may be optimal and slightly higher than the county average. As a result, we conduct several analyses allowing the yield to be lowered by 10% and 20%. Table 2 presents the profit comparisons between the conventional system and the transitional-organic system for a six-year period when the yield from the organic system is lowered by 10% and 20% for all crops, or if the price premium is lowered by 10% and 20% for all crops.

Scenario 1, price premium for organic crops lowered by 10% from year 4 to 6, yield fixed

If the price premium for organic crops is lowered by 10% for all crops, the results presented in Table 2 show that the net present value of the profit differences between the two systems from year 4 to 6 will be reduced. Under this scenario, the organic farmers are expected to be better off in year 5. The accumulative profit is $5 per acre in year 5.

Scenario 2, price premium for organic crops lowered by 20% from year 4 to 6, yield fixed

If the price premium for organic crops is further lowered by 20% from year 4 to 6 for all crops, the net present value of the profit differences between these two systems are further reduced. It takes an even longer time for transitional farmers to be better off. The estimation results show that the farmers are expected to be better off in year 7 and the accumulative profit is estimated to be $588 per acre in year 7.

Scenario 3, yield for organic crops lowered by 10%, price fixed

As discussed above, the baseline yield from the trial experiment in Aurora research farm might be optimal and higher than the county average because the scholars conducting the experiment tend to be experienced and knowledgeable about organic production. If yield for all organic crops are lowered by 10%, the net present value of the profit difference between these two systems is estimated to decrease and the farmers are expected to be better off in year 6. The accumulative profit in year 6 is estimated to be $149 per acre.

Scenario 4, yield for organic crops lowered by 20%, price fixed

The learning curve for conventional farmers to transit to organic cropping systems is different for different farmers. For farmers with an even steeper learning curve, the yield could be even lower than the baseline yield. If the yield for all the crops is lowered by 20%, it is estimated to take 7 years for farmers to be better off after transiting to the organic cropping system. The accumulative profit in year 7 is estimated to be $392 per acre.

Table 2. Sensitivity Analysis

Scenarios	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Scenario 1, price lowered by 10%, yield fixed							
Net present value of net profit	-337	-35	-432	798	11	251	798
Accumulative profit	-337	-372	-804	-6	5	255	1053
Scenario 2, price lowered by 20%, yield fixed							
Net present value of net profit	-337	-35	-432	642	-66	174	642
Accumulative profit	-337	-372	-804	-162	-228	-54	588
Scenario 3, yield lowered by 10%, price fixed							
Net present value of net profit	-387	-72	-462	806	11	252	806
Accumulative profit	-387	-459	-921	-114	-103	149	955
Scenario 4, yield lowered by 20%, price fixed							
Net present value of net profit	-437	-109	-491	658	-64	177	658
Accumulative profit	-437	-546	-1037	-379	-443	-266	392

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Appendix

Appendix 1. Crop budget for transitional corn

Farm Revenue			$564
Yield per acre/bu		103	
Price for Corn		$5.48	
Expense Assumptions			
Farming Expenses			$444
Seeds and Fertilizer			$96
Corn Seed Cost		$73.6	
Crop insurance		$22.0	
Misc. expenses		$0.0	
Manure			$118
Starter chicken manure before planting		$73	
Chicken Manure		$45	
Preharvest	Times	Cost/acre	$135
Plowing	1	$20.9	$21
Disking and Harrowing	1	$20.9	$21
Corn Cultivation*	4	$15.8	$63
Corn Planting		$18.9	$19
Corn manure application	1	$11.2	$11
After Harvest Cost			$96
Corn Combining		$32.7	$33
Corn Drying/Bu.		$0.4	$38.11
Corn Hauling/Bu.		$0.2	$22.66
Corn Handling/bu		$0.0	$2.06
Opportunity Cost			
Land and management labor			$125
Rent/Acre			$100
Labor			$25.2
Hours		2.1	
Rate per acre		$12	
Income Statement			
Revenues			
Sales			$564
COGS			$444
Return over farming cost			121
Gross Margin			21.37%
Return over land, labor and management			($4.59)

* The Pennsylvania custom contract rate for different cultivation methods such as field cultivation and row cultivation are the same, as a result, we used the same rate for all the cultivations to manage weed problem.

Appendix 2. Crop budget for transitional soybeans

Farm Revenue			$382
Yield per acre/bu		40	
Price for soybeans		$9.55	
Expense Assumptions			
Farming Expenses			$239
Seeds and Fertilizer			$73
Soybean Seed		50.95	
Crop insurance		$22.0	
Misc. expenses		$0.0	
Manure	time	cost	$0
Chicken Manure	0	$0	$0
Granulated Chicken Manure	0	$34	$0
Preharvest	times	cost	$124
Plowing	1	$20.9	$21
Disking and Harrowing	1	$20.9	$21
Soybean Cultivation	4	$15.8	$63
Soybean Planting		$18.9	$19
Soybean manure application	0	$19.9	$0
After Harvest Cost			$43
soybean Combining		$33.0	$33
soybean Hauling/Bu.		$0.2	$9
soybean Handling/bu		$0.0	$1
Opportunity Cost			
Land and management labor			$137
Rent/Acre			$100
Labor			$37.2
Hours		3.1	
Rate per acre		$12	

Income Statement

Revenues	
Sales	$382
COGS	$239
Return over farming cost	143
Gross Margin	37.32%
Return over land, labor and management	$5.35

Appendix 3. Crop budget for transitional winter wheat and red clover

Farm Revenue			$317
Yield per acre/bu		61	
Price for wheat		$5.2	
Expense Assumptions			
Farming Expenses			$314
Seeds and Fertilizer			$135
wheat Seeds Cost		$83.0	
Clover Seeds Cost		$30.0	
Crop insurance		$22.0	
Misc. expenses		$0.0	
Manure	Times	Cost/acre	$51
Starter Fertilizer	1	$34	$34
Chicken Manure	1	$17	$17
Preharvest	Times	Cost/acre	$81
Plowing	1	$20.9	$21
Disking and Harrowing	0	$20.9	$0
wheat Planting		$21.5	$22
Clover Planting (Spreading)		$19.0	$19
wheat Cultivation	0	$15.8	$0
wheat manure application	1	$19.9	$20
After Harvest Cost			$47
wheat Combining		$32	$32
wheat Hauling/Bu.		$0.2	$13
wheat Handling/bu		$0.0	$1
Opportunity Cost			
Land and management labor			$114
Rent/Acre			$100
Labor			$14.4
Hours		1.2	
Rate per acre		$12	

Income Statement	
Revenues	
Sales	$317
COGS	$314
Return over farming cost	3
Gross Margin	1.09%
Return over land, labor and management	($110.93)

Appendix 4. Crop budget for organic corn

Farm Revenue			$1,620
Yield per acre/bu		135	
Price for Corn		$5.48	
Expense Assumptions			
Farming Expenses			$463
Seeds and Fertilizer			$96
Corn Seed Cost		$73.6	
Crop insurance		$22.0	
Misc. expenses		$0.0	
Manure			$118
Starter chicken manure before planting		$73	
Chicken Manure		$45	
Preharvest	Times	Cost/acre	$135
Plowing	1	$20.9	$21
Disking and Harrowing	1	$20.9	$21
Corn Cultivation	4	$15.8	$63
Corn Planting		$18.9	$19
Corn manure application	1	$11.2	$11
After Harvest Cost			$115
Corn Combining		$32.7	$33
Corn Drying/Bu.		$0.4	$49.95
Corn Hauling/Bu.		$0.2	$29.70
Corn Handling/bu		$0.0	$2.70
Opportunity Cost			
Land and management labor			$125
Rent/Acre			$100
Labor			$25.2
Hours		2.1	
Rate per acre		$12	

Income Statement

Revenues	
Sales	$1,620
COGS	$463
Return over farming cost	1,157
Gross Margin	71.40%
Return over land, labor and management	$1,031

Appendix 5. Crop budget for organic soybeans

Farm Revenue			$800
Yield per acre/bu		40	
Price for soybeans		$20	
Expense Assumptions			
Farming Expenses			$239
Seeds and Fertilizer			$73
Soybean Seed		50.95	
Crop insurance		$22.0	
Misc. expenses		$0.0	
Manure	time	cost	$0
Chicken Manure	0	$0	$0
Granulated Chicken Manure	0	$34	$0
Preharvest	times	cost	$124
Plowing	1	$20.9	$21
Disking and Harrowing	1	$20.9	$21
Soybean Cultivation	4	$15.8	$63
Soybean Planting		$18.9	$19
Soybean manure application	0	$19.9	$0
After Harvest Cost			$43
soybean Combining		$33.0	$33
soybean Hauling/Bu.		$0.2	$9
soybean Handling/bu		$0.0	$1
Opportunity Cost			
Land and management labor			$137
Rent/Acre			$100
Labor			$37.2
Hours		3.1	
Rate per acre		$12	

Income Statement

Revenues	
Sales	$800
COGS	$239
Return over farming cost	561
Gross Margin	70.07%
Return over land, labor and management	$423.35

Appendix 6. Crop budget for organic winter wheat and red clover

Farm Revenue			$817
Yield per acre/bu		61	
Price for wheat		$13.4	
Expense Assumptions			
Farming Expenses			$314
Seeds and Fertilizer			$135
wheat Seeds Cost		$83.0	
Clover Seeds Cost		$30.0	
Crop insurance		$22.0	
Misc. expenses		$0.0	
Manure	Times	Cost/acre	$51
Starter Fertilizer	1	$34	$34
Chicken Manure	1	$17	$17
Preharvest	Times	Cost/acre	$81
Plowing	1	$20.9	$21
Disking and Harrowing	0	$20.9	$0
wheat Planting		$21.5	$22
Clover Planting (Spreading)		$19.0	$19
wheat Cultivation	0	$15.8	$0
wheat manure application	1	$19.9	$20
After Harvest Cost			$47
wheat Combining		$32	$32
wheat Hauling/Bu.		$0.2	$13
wheat Handling/bu		$0.0	$1
Opportunity Cost			
Land and management labor			$114
Rent/Acre			$100
Labor			$14.4
Hours		1.2	
Rate per acre		$12	

Income Statement	
Revenues	
Sales	$817
COGS	$314
Return over farming cost	504
Gross Margin	61.62%
Return over land, labor and management	$389.27

Appendix 7. Crop budget for conventional corn

Farm Revenue			$871
Yield per acre/bu		159	
Price for Corn		$5.48	
Expense Assumptions			
Farming Expenses			$428
Seeds and Fertilizer			$138
Corn Seeds Cost		$116.0	
Crop insurance		$22.0	
Misc. expenses		$0.0	
Fertilizer			$96
Starter fertilizer 10:20:20		$55	
Nitrogen (30% UAN Solution)		$14	
Weed control Chemicals		$27	
Preharvest	times	cost	$65
Plowing	1	$20.9	$21
Disking and Harrowing	0	$20.9	$0
Corn Planting		$21.5	$22
Corn fertilizer application	1	$11.0	$11
Corn Chemical application	1	$11.2	$11
After Harvest Cost			$130
Corn Combining		$32.7	$33
Corn Drying/Bu.		$0.4	$59
Corn Hauling/Bu.		$0.2	$35
Corn Handling/bu		$0.0	$3
Opportunity Cost			
Land and management labor			$110.8
Rent/Acre			$100
Labor			$10.8
Hours		0.9	
Rate per acre		$12	
Income Statement			
Revenues			
Sales			$871
COGS			$428
Return over farming cost			443
Gross Margin			50.85%
Return over land, labor and management			$332.24

Appendix 8. Crop budget for conventional soybeans

	times	cost	
Farm Revenue			$427
Farmer receipts			
Yield per acre/bu		44.7	
Price for Corn		$9.55	
Expense Assumptions			
Farming Expenses			$275
Seeds and Fertlizer			$84
Soybean Seed		$62.1	
Crop insurance		$22.0	
Misc. expenses		$0.0	
Fertilizer			$62
Potash and Phosphorus		$40	
Weed control and pest control Chemicals		$22	
Preharvest	times	cost	$86
Plowing	1	$20.9	$21
Disking and Harrowing	1	$20.9	$21
Soybean Planting		$21.5	$22
Soybean fertilizer application	1	$11.0	$11
Soybean Chemical application	1	$11.2	$11
After Harvest Cost			$44
Soybean Combining		$33.0	$33
Soybean Hauling/Bu.		$0.2	$10
Soybean Handling/bu		$0.0	$1
Opportunity Cost			
Land and management labor			
Rent/Acre			$100
Labor			$10.8
Hours		0.9	
Rate per acre		$12	
Income Statement			
Revenues			
Sales			$427
COGS			$275
Return over farming cost			152
Gross Margin			35.53%
Return over land, labor and management			$40.87

OTHER A.E.M. EXTENSION BULLETINS

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