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Costs in the Organic Grain Supply Chain

This document is partially based on the results of a producer, marketer and processor survey that was administered as part of the marketing study being conducted by the Project on Organic Agriculture in the Department of Agricultural Economics. The objective of the study is to examine the issues, opportunities and challenges in organic grain marketing and to provide insight to the organic grain sector on what can be done to improve the organic marketing system for the benefit of all participants. These papers are designed to provide sector participants with a brief summary of this information. This document is one of a series that will contribute to the complete marketing study.

1. Introduction

Organic grain production, marketing and handling differs from conventional grain production, marketing and handling, but there are many similarities as well. Exactly how costs differ between these two systems has not been fully studied. Although a few studies have examined the cost of organic grain production, there are other important costs, such as marketing, handling and certification that have not been examined to date. The purpose of this paper is to assess costs in the organic grain supply chain and to compare them to corresponding costs in the conventional grain supply chain. The cost of the conventional supply chain can serve as a useful point of reference in order to see if and where organic costs are relatively higher or lower.

First, the costs of organic production, marketing, certification, transportation and handling are evaluated, using information from a variety of different sources. The responses of organic producers, marketers and processors to questions about the cost of organic production and marketing are then reviewed, using results from recent surveys. The implications of the results conclude the paper.

2. Approach to the Study

It is expected that many supply chain functions will incur greater costs for organic grains than for conventional grains for two main reasons. First, organic supply chains have not attained the same economies of size as conventional grain supply chains, and therefore the average cost (cost per tonne) will be greater. Second, organic certification requires more strict handling and record-keeping.

The difference between organic and conventional production costs is a complicated issue. On the one hand, the production of organic grain requires less costly inputs such as inorganic fertilizer and pesticides. On the other hand, organic producers often incorporate a green manure crop into their rotation, which is plowed down in order to increase nitrogen levels in the soil. The green manure crop is an additional expense for organic producers that must also be considered. In general organic production also requires more field operations and thus uses more fuel than direct seeding conventional systems.

There is also a distinction between cost *per acre* and cost *per tonne* that must be made. The cost of growing organic spring wheat or flax is likely lower than conventional on a per-acre basis, but not necessarily on a per-tonne basis. If yields are low, a low cost of production per acre can result in a high cost per tonne, since the cost is spread over fewer tonnes. Given the lower yields of organic flax compared to conventional flax, the cost of producing flax per tonne is higher than it is for conventional flax.

3. Production Costs

Crop production costs for both organic and conventional crops in the dark brown soil zone in 2005 are given in Table 1. Six crops are considered: organic flax, spring wheat and peas, and direct seeded (conventional) flax, spring wheat and peas. Production costs for an organic green manure crop are also given. The crop budgets are derived using information from several sources listed below:

The Saskatchewan Agriculture and Food (SAF) *Crop Planning Guide 2005*, *Dark Brown Soil Zone* was used for the values of:

- Conventional yields and prices
- Conventional seeding rates and seed costs
- Conventional fertilizer and chemical costs
- Conventional crop insurance premiums
- Utilities and miscellaneous costs
- Property taxes
- Insurance and licenses
- Land investment costs
- Value of machinery investment for the green manure crop (taken from tillage fallow)

The Statistics Canada 2001 *Census of Agriculture* (adjusted for inflation to 2004 prices) was used for the values of:

- Machinery fuel costs
- Machinery repair costs
- Custom work and hired labor costs
- Building repair costs
- Value of machinery investment for wheat and flax

The *Census of Agriculture* data provided separate information for organic and conventional farms. The organic yields and prices are taken from the *Organic Crops Price Survey*, undertaken by the Saskatchewan Research Council (SRC). The organic seeding rates and seed costs are taken discussion with organic farmers, seed producers and seed cleaners. The organic crop insurance premiums were taken from Saskatchewan Crop Insurance Corporation (SCIC). The method of calculating investment and depreciation costs was taken from the SAF *Crop Planning Guide*.

There are several factors that drive the cost differences between organic and conventional production:

- Organic seeding rates and seed prices are higher
- Crop insurance premiums are higher for organic
  This occurs for two main reasons. First, the insured value of organic spring wheat and flax tends to be higher per acre, which leads to a higher insurance premium per acre. Second, SCIC considers organic production to be more risky than conventional crop production (based on historical claims), which leads to higher crop insurance premiums for organic crops.
- The presence of green manure costs in organic
- The absence of synthetic fertilizer and pesticide costs in organic
- Organic farms have lower machinery investment values per acre than conventional ($135/acre vs. $180/acre)

The entire list of organic production cost assumptions are provided at the bottom of Table 1 and in Appendix A, at the end of this paper.

Overall, the cost of production per acre for organic flax, spring wheat and peas is lower compared to conventional spring wheat and flax, even after including the green manure cost. Most of the cost savings in the organic budgets are due to the absence of synthetic fertilizer or chemical expenses.

The results of the production cost comparison have been presented on a per-acre and per-tonne basis. Converting the total production costs from per-acre to per-tonne provides a value that can be easily compared to the farmgate price and other costs down the supply chain. Based on organic yields from the *Organic Crops Price Survey* (SRC, multiple years), the costs per tonne of organic flax, spring wheat and pea production were higher than conventional flax, spring wheat and peas. This result highlights the fact that organic crops may be cheaper to produce on a per-acre basis but not on a per-tonne basis, since organic yields are lower in the case of some crops. However, the higher prices for organic grains compensate for higher production costs on a per-tonne basis.

Table 1: Crop Production Costs ($/Acre), Dark Brown Soil Zone 2005 (Sask.), Organic and Conventional

Expenses per Acre	Green Manure (Clover)	Crop					
		Flax		Feed Peas		Spring Wheat	
		Organic	Conv. Direct-seeded	Organic	Conv. Direct-seeded	Organic	Conv. Direct-seeded
Variable Expenses per acre							
Seed	8.00	20.23	8.75	31.68	14.40	12.53	7.58
Fertilizer			22.90		6.18		26.80
Chemical/Innoculant			27.43	3.60	27.62		23.28
Machinery Operating – Fuel	5.90	10.76	10.13	10.76	10.13	10.76	10.13
- Repair	3.40	10.51	9.40	10.51	9.40	10.51	9.40
Custom Work and Hired Labour	0.00	3.15	5.17	3.15	5.17	3.15	5.17
Crop Insurance Premium	0.00	12.84	6.52	7.99	6.01	6.93	3.85
Utilities and Miscellaneous	4.85	4.85	4.85	4.85	4.85	4.85	4.85
Interest on Variable Expenses	1.76	1.65	2.52	1.92	2.22	1.29	2.41
Total Variable Expenses (A)	**23.91**	**64.01**	**97.67**	**74.47**	**85.98**	**50.02**	**93.47**
Other Expenses per acre							
Building Repair	2.40	2.12	1.66	2.12	1.66	2.12	1.66
Property Taxes	4.97	4.97	4.97	4.97	4.97	4.97	4.97
Insurance and Licenses	1.90	1.90	1.90	1.90	1.90	1.90	1.90
Machinery Depreciation	6.80	12.09	17.69	15.59	21.19	12.09	17.69
Building Depreciation	1.20	1.20	1.20	1.20	1.20	1.20	1.20
Machinery Investment	3.26	5.80	8.49	7.48	10.17	5.80	8.49
Building Investment	1.15	1.15	1.15	1.15	1.15	1.15	1.15
Land Investment	15.30	15.30	15.30	15.30	15.30	15.30	15.30
Total Other Expenses (B)	**36.99**	**44.53**	**52.37**	**49.71**	**57.55**	**44.53**	**52.37**
Labour and Management (C)*							
Total Expenses (A + B)=(D)	**60.90**	**108.54**	**150.04**	**124.19**	**143.53**	**94.56**	**145.84**
Total Cost of Organic Rotation**	Clover + Flax + Peas + Wheat			**$388.19/acre**			
Total Cost of Conventional Rotation	Flax + Wheat + Peas + Wheat			**$585.25/acre**			
Estimated Yield (bu/ac)***		9.3	20.3	6.8	31.7	17.7	30.1
Estimated Total Expenses per bushel		11.67	7.39	18.26	4.52	5.34	4.85
Estimated Total Expenses per tonne		445.38	275.51	670.99	168.89	205.00	180.69

* These budgets do not include an estimate for owner/operator labour and management. This value varies greatly and depends on both the farm manager's needs as well as the ability of the farm business to generate income. Farm managers need to determine their own actual labour and management cost and add it to total expenses.
**The total cost of the organic rotation includes a green manure expense (see first column) and it is assumed that clover is grown as a green manure crop once every four years. The cost of the green manure crop depends on the type of green manure used and can vary from farm to farm. The total cost of the conventional, direct-seeded rotation includes four crop-years.
*** These budgets do not include an estimate of total revenue. The reader is invited to use their own estimated yield and price and calculate the returns for their own farm. See the *Organic Crop Planning Guide* for information on organic costs, revenues and returns.
Source: SAF, Statistics Canada, SRC, Personal communication, Author's calculations

4. Buying, Selling and Record-Keeping

Marketing (Buying and Selling) Costs

Marketing is a very important task for organic producers. As such, organic producers spend significant time and resources searching for prices and buyers, as well as negotiating, coordinating, and monitoring their transactions. In addition, producers must complete forms as part of the audit trail when they sell their organic grains.

The organic producer survey, undertaken by the University of Saskatchewan Project on Organic Agriculture, found that producer marketing costs averaged $406 per sale for spring wheat and $386 per sale for Flax. The producer survey also found that the average sale quantity was 76 tonnes for organic spring wheat and 18 tonnes for organic flax. Using these sale quantities, the marketing cost per tonne equals $5.34/tonne for organic spring wheat and $21.44/tonne for organic flax. Marketing costs are thus very significant costs on a per-tonne basis. Data on conventional producer marketing costs is not available, so a comparison between organic and conventional marketing costs cannot be made. However, the search costs are expected to be lower for transactions of conventional grain because more market information is available on conventional commodities, making search costs lower for conventional crops. In addition, conventional crops such as flax and lentils have higher yields, providing more tonnes to sell and lower marketing costs on a per-tonne basis.

The marketing study also surveyed the marketing costs of organic grain company marketers and processors. The average time spent by marketers on some of their spring wheat marketing costs is given in Table 2. Marketers and processors spend less time and resources per transaction compared to organic producers. This occurs because marketers and processors complete many more transactions than producers, and have captured economics of size in marketing. Assuming that the average sale quantity is 76 tonnes for organic spring wheat (taken from the producer survey), marketing costs amount to $1.55/tonne for grain company marketers and $0.35/tonne for processors. Data on conventional marketer and processor marketing costs is not available, making it difficult to compare.

Record-Keeping

Certified organic production, handling and processing requires producers, marketers and processors to be certified by a recognized certification body. Certification provides proof to end-users that products have been produced in accordance with recognized organic practices. Farmers and companies keep records that are used to maintain their certification status and create an audit trail that follows all organic grain shipments. Farmers and companies must also pay a fee in order to be certified organic. Marketers and processors were asked in the surveys to estimate the amount of time they spend completing the audit trail (See Table 2). Results indicate that marketers spend an average of 60 minutes per sale, while processors spend an average of 40 minutes per sale.

Organic producers are required to maintain precise records of their fields, field operations and storage practices in order to maintain their certification status. This record-keeping is far more sophisticated and time-consuming compared to the record-keeping process used by a typical conventional producer.

Certification Fees

The fees charged by the Organic Crop Improvement Association (OCIA) are given in Table 3. For a typical farm, with sales of $100,000, the total fee, including one inspection, totals $905/year, or $1/acre, assuming a farm size of about 900 acres.

Table 2: Marketing Time and Costs for Processors and Grain Company Marketers, Organic Spring Wheat

Cost Type	Marketer (buying from producers)	Marketer (selling to processors)	Processor (buying from producer or marketer)
	Minutes per sale		
Completing Producer Direct Sale with the CWB	47	N/A	15
Coordinate Transportation	80	30	18
Complete Audit Trail	68	33	38
Negotiation	109	43	8
Monitoring	30	33	28
Total Minutes per Sale	**334**	**139**	**107**
$ per transaction (assuming $15/hour time value)	**$83.50**	**$34.75**	**$26.75**
$ per tonne (assuming 76 tonnes/transaction)	**$1.09**	**$0.46**	**$0.35**

Source: Organic Marketer and Processor Survey by the Project on Organic Agriculture, University of Saskatchewan

Table 3: Certification Fees, OCIA Chapter Associates

Type of Cost	Price per Year
Certification fees (One Certificate)	$125.00
Verification fees (3 verification programs)	$75.00
User Fees (based on sales):	
Up to $1,499,999	0.6% x Sales
$1,500,000 and up	$9,000 + 0.1% x Sales
Membership fee	$5.00
Inspection	$50-$150/visit (dependent upon location)

Source: OCIA 2004

5. Transportation Costs

The costs of transportation for organic grains are generally higher than conventional grains for trucking, rail and marine transportation. Trucking costs can be higher for organic for two reasons. First, organic producers tend to sell fewer tonnes per sale compared to conventional producers, especially for crops such as organic flax and organic lentils. This results in greater trucking costs per tonne because the trucks are not running full. Some buyers try to solve this problem by picking up organic grain from several producers on the same load, but this is still not as efficient as transporting 30-40 tonnes from one farm, which is enough to fill a large truck. Second, organic grains tend to be trucked further compared to conventional grains because there are fewer organic elevators and handling facilities. The average trucking distance to conventional elevators is between 22km and 40km (Transport Canada 1999). In contrast, the marketing study producer survey found that organic producers transport organic spring wheat an average of 253km on trucks before it reaches the buyer or marketer location. In the case of organic flax, the average transportation distance was 341km, including transportation to the cleaner on the way to the buyer.[1] The combination of transporting partial loads and transporting longer distances leads to higher costs for the organic grain supply chain. Although some organic grain is processed within Saskatchewan and the prairies, much of it is exported to the U.S. or overseas. Much of this trade occurs via intermodal containers shipped on rail and on marine vessels. The cost of transporting a 20 tonne container from Saskatoon to a port in the EU is about

[1] Organic flax is usually trucked to a fee-for-service cleaning facility to be cleaned, then it is hauled to the buyer or to a location where it is loaded on a rail car. This contrasts with organic wheat, which is usually cleaned and loaded onto a rail car at the same elevator location. The separation of cleaner and buyer usually results in a longer hauls by truck.

CAD$125/tonne[2]. In contrast, much of the conventional wheat produced on the prairies is shipped in bulk rail cars and vessels. Surprisingly, container shipments are currently very competitive with bulk shipments, as the cost to move grain in bulk from Saskatoon to the St. Lawrence Seaway is about CAD$86/tonne (Canada Grains Council 2003) and bulk ocean freight from the St. Lawrence to the EU is about CAD$60/tonne. Conventional flax and specialty crops are often shipped overseas in containers.

6. Handling, Storage and Cleaning Costs

The organic grain supply chain is characterized by fewer, smaller elevators and rail loading facilities than is the conventional grain supply chain. Smaller facilities lead to greater elevation, storage and handling costs per tonne, since smaller facilities cannot capture the same economies of size as larger grain elevators. In addition, storage costs are likely greater for organic grains because of the need to segregate organic grains. Some organic grain buyers maintain segregation between grains from different producers, which can be more expensive than storing grain from several producers in one bin. Cleaning costs are also greater for organic grains due to the use of smaller facilities, especially compared to cleaning costs for conventional grains that are cleaned at high-capacity export terminals.

7. Cost Perceptions

A survey was undertaken as part of the University of Saskatchewan Project on Organic Agriculture that attempted to find out what producers, marketers and processors of organic grain in Saskatchewan think their costs are, compared to the costs of the conventional system. Questionnaires were mailed to 90 organic grain producers randomly picked from across Saskatchewan. The sample included producers from 4 Certification Bodies (OCIA, Pro-Cert, COCC and SOCA[3]). The sample yielded 49 producer respondents that answered the questions relating to organic costs. Six grain marketing companies and 8 grain processing companies also answered questions about organic costs.

The purpose of questioning organic producers, marketers and processors about their costs is to evaluate their perceptions. Respondents were provided with a list of several different functions. For each function, the respondents were asked to estimate the percentage difference in the cost of that function for organic compared to conventional.

Producers were asked about 6 costs:

- Production
- Farm Storage
- Grain Cleaning
- Selling
- Transportation from Farm
- Record-Keeping

Marketers were asked about 9 costs:

- Transportation from Farm
- Elevation and Handling
- Other Storage (at marketer location)
- Cleaning at Elevator
- Cleaning at Contracted Cleaning Facility
- Transportation from Cleaner to Customer
- Buying
- Selling
- Record-Keeping

The responses of producers, marketers and processors on the costs of spring wheat and flax are given in Table 4. Almost all of the functions were considered to be more expensive per tonne for organic than for conventional. The survey responses are as follows:

[2] Calculated assuming USD$1900 for a 20 metric tonne container, and a 0.75 USD to CAD exchange rate.
[3] OCIA – Organic Crop Improvement Association
COCC – Canadian Organic Certification Cooperative
SOCA – Saskatchewan Organic Certification Association

Table 4: Perceptions of Organic Costs, Relative to Conventional Costs

Cost	Percentage difference in cost *per tonne* organic compared to conventional					
	Producer		Marketer		Processor	
	Wheat	Flax	Wheat	Flax	Wheat	Flax
1) Production	-0.54	-10.57				
2) Farm storage	10.02	1.98				
3) Record-Keeping	32.75	30.72	10.00	11.67	28.33	28.33
4) Transportation from farm	-0.59	-2.78	10.00	3.33	30.00	26.67
5) Elevation and handling			2.50	5.00	1.67	1.67
6) Other storage			18.75	23.33	0.00	1.67
7) Cleaning at elevator *or*	31.18	18.16	2.50	5.00	0.00	0.00
8) Cleaning at contracted cleaning facility			10.00	11.67	8.33	8.33
9) Transportation from cleaner to customer			3.75	3.33	1.67	5.00
10) Buying			33.75	35.00	1.67	1.67
11) Selling	27.06	19.37	33.75	35.00	1.67	1.67

Source: Organic Producer, Marketer and Processor Surveys by the Project on Organic Agriculture, University of Saskatchewan

- Producers claim that production and transportation of organic grain was lower per tonne than for conventional grain.
- Marketers and processors claim that transportation from the farm was far more expensive compared to conventional grain.
- Record-keeping is considered to be more expensive for organic grains by all groups.
- Marketers and processors believe that elevation and handing, cleaning at an elevator or at a contracted cleaning facility, and transportation from cleaner to customer are only slightly more expensive for organic grains.
- Producers believe that cleaning is more expensive than do marketers and processors.
- Marketers think that storage is much costlier for organics, while processors did not.
- Marketers also think that buying and selling is much more expensive for organic grains.
- While producers agree that marketing their organic spring wheat and flax is more expensive compared to conventional, processors do not.

8. Conclusion

This paper has analyzed the differences in costs between organic and conventional grain supply chains. Numerical comparisons were used wherever data existed, and descriptive comparisons were used elsewhere. Overall, the paper has shown that the costs to produce and market organic grains are generally higher than for conventional grains. These differences are driven by two main forces. First, the per-tonne production, handling, record-keeping and certification costs that are required for certified organic grains are higher than the conventional grain supply chain costs. Second, the lack of economies of size in organic grain transportation, handling and cleaning result in higher costs relative to some conventional grains.

Organic spring wheat and flax are less costly to produce on a per-acre basis but more costly on a per-tonne basis. This analysis conflicts the results of the producer survey, which suggests that producers think that organic wheat costs about the same to produce as conventional wheat, and organic flax is cheaper to produce than conventional flax.

Marketing organic grain is a cost for producers, marketers and processors. Marketing costs are larger on a per-tonne basis for organic producers than for organic marketers or processors. Producers do not have economies of size in marketing that are available to marketers and processors. Record-keeping costs, which are present at all levels of the organic grain supply chain, are higher than conventional record-keeping costs. Organic certification is also an extra cost that producers, marketers and processors must pay.

Transportation costs are generally greater for organic grains than for conventional grains. The small number of organic cleaning facilities and organic elevators results in long trucking distances and thus high trucking costs. The problem of not selling enough to fill a truck further increases the costs of transportation. The use of containers to ship instead of bulk rail cars and bulk ship loads is also an increased cost over conventional grain transportation for some grains. Organic grains typically are handled through smaller facilities that have higher costs of handling, storage and cleaning.

Overall, there are many costs that are greater for the organic grain supply chain than for the conventional grain supply chain. While some of these costs are a necessary part of producing an "organic" product, many of these costs could be lowered by achieving economies of size. Transportation costs are one cost that can be decreased most easily. For example, trucking could be lowered by ensuring that producers grow enough to fill a truck. Marketing costs could also be lowered by streamlining the processes of searching for prices and for buyers. Costs will decrease as the organic sector expands over time and can take advantage of economies of size and new techniques that lower costs for the supply chain.

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Appendix A – Organic Production Cost Assumptions

Organic Flax
Seeding rate = 40 lbs/ac (0.67 bu/ac)
Seed price = $28.70/bu
Seed cleaning cost = $1.50/bu

Organic Peas
Seeding rate = 3 bu/ac
Seed price = $10.21/bu
Seed cleaning cost = $0.35/bu

Organic Wheat
Seeding rate = 1.5 bu/ac
Seed price = $8.00/bu
Seed cleaning cost = $0.35/bu

Organic Green Manure – Sweet Clover
Seeding rate = 8 lbs/ac
Seed price = $1.00/lb (including cleaning cost)

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An electronic version of this paper is available at http://organic.usask.ca.