GROSS MARGINS OF THE WICST CASH-GRAIN SYSTEMS: 2003 and 2004

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INTRODUCTION

Profitability is one of the key factors that drive management decisions. Farming is no exception. Successful commodity farming, i.e. cash-grain production, is dependent upon producing and marketing large volumes of grain as efficiently as possible. Large acreage, large machinery, and large debts are all part of the business. However, growing interest in organic production uses another strategy: producing food/feed in an ecologically balanced way and usually on a smaller scale. In this approach, the idea is to promote natural or biological synergies that exist in crop rotations and through a combination of lower input costs and price premiums, more than compensate for reduced returns from lower yields, lower volume and higher labor inputs[2]. The economics of producing corn and soybeans under 3 different cropping system will be addressed in this paper.

MATERIALS AND METHODS

The WICST cash-grain systems are compared in this paper. The WICST forage system analyses can be found in 'WICST Forage Systems Comparison: Production, Milk Models and Gross Margins' of this technical report. To review, cropping system 1 (CS1) is continuous corn with a high input level. Cropping system 2 (CS2) is a no-till corn-soybean rotation with medium inputs. Cropping system 3 (CS3) is a 3-yr rotation of corn-soybean-winter wheat/red clover with low inputs (chemical free). Although managed organically, it is not 'certified organic' due to constraints of the trial. CS1 and CS2 are scaled up from 0.7-acre plot size to 1200-acre farms while CS3, being managed without chemicals, has been scaled up from 0.7-acre plots to 600-acre farm size. Reducing the size of a farm in the CS3 rotation was based on an informal survey of organic farmers and inspectors who reported few single-family organic grain farms surpassed 600 acres. The primary reason for this was that mechanical tillage sets an upper limit on the size of a farm entirely in row/annual crops, unless most of the work can be custom hired.

Gross margins were calculated using Agriculture Budgeting Calculation Software, (ABCS; Frank and Gregory, 2000). Gross margins represent the dollars available to cover the overhead costs of capital, land, labor and management. The way to interpret the adequacy of the gross margin is to estimate the amount of dollars needed per acre to cover those overhead costs. Project economists estimate that a cash grain farmer would need approximately $35-$40 per acre to cover labor and management, $80 to $140 per acre for rent, and approximately $40-$60 per acre to cover the depreciation and interest cost associated with machinery and drying facilities owned on the farm. This adds up to approximately $155 to $240 per acre (or on average ~ $200/acre) to be covered by gross margins. Therefore, we are considering the break-even point as ~ $200/acre.

Input and output prices for each system were recorded each year. Commodity corn and soybean prices for conventional grains are taken from WI Ag Statistical Service October price. To not

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[2] repeated mechanical tillage and hand weeding

inflate the potential premiums for the organic grains, organic feed grade prices were collected from various elevators marketing organic grains (Table 1) to livestock producers. Since WI Ag Statistics Service no longer tracks wheat prices, cash price at time of harvest was used. No storage or futures options are included in the analysis; grain is sold 'right off the combine'. Trucking was charged against CS1 and CS2 at $0.04/bu and against CS3 at $0.11/bu per 100 miles and because commodity grain elevators are closer and more widespread than organic grain elevators. Corn drying costs were at $0.03/point/bu down to 15% moisture.

Table 1. Price comparison: Conventional (CBOT) and organic feed-grade prices.*

	Conventional $/bu		Organic feed grade $/bu	
	2003	2004	2003	2004
corn	2.08	2.25	3.75	4.00
soybean	6.50	5.71	8.75	12.50
wheat	3.13	1.52	3.75	3.50

* organic prices quoted from Delong, Cashton, Sunrich, Clarkson, Peavy, Didion, American Health & Nutrition

In addition to grain prices, labor requirements are an important issue when comparing conventional and organic production systems. Table 2 shows the wage for a field worker according to National Agricultural Statistic Service's Lake Region (includes Wisconsin, Minnesota and Michigan) averaging April and October rates for the course of the trial. Labor costs were included for such things as handling/hauling grain in both conventional systems and hand weeding the organic soybeans, and other miscellaneous tasks. In the 8th WICST Technical Report (1999-2000) it was determined that CS3 had labor requirements (planting, rotary hoeing, cultivating, harvesting) in both the spring and fall that would make it very difficult for a family to manage a 1200-acre farm. As a result, we decided to reduced farm size to 600 acres, and to lessen the spring workload, we assigned rotary hoeing (after two hoeings) and cultivation (after one cultivation) to be custom hired. Since farm size was reduced from 1200 to 600 acres, it was decided that the operator could harvest soybeans and plant wheat himself instead of custom hiring it done. Neither 2003 nor 2004 actually used any custom hire because rotary hoeing and cultivation were minimal. Custom rates are typically based on survey results compiled by USDA WI Ag Stats 'Wisconsin's 200X Custom Rate Guide'.

Table 2. Field worker wage ($/hr) across years in the Lake Region of the Midwest.

1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
5.35	6.01	5.94	6.47	6.64	7.29	7.35	7.43	7.84	8.21	9.28	9.28	9.17

Still, gross margin analysis is a blunt tool to compare systems with different labor requirements because owner/operator labor is not charged as a production cost, but rather must be recovered in the gross margin. Table 3 shows the estimated labor/acre that is done by the operator himself or family member, and not covered in hired labor.

Table 3. Owner/Operator labor for cash grain systems.		
	2003	2004
System	Number of hours per acre	
CS1	**1.38**	**1.30**
CS2 corn	0.91	0.91
CS2 soybean	0.45	0.45
CS2 mean	**0.68**	**0.68**
CS3 corn	1.62	1.25
CS3 soybean	1.63	2.03
CS3 wheat	0.76	0.76
CS3 mean	**1.34**	**1.35**

RESULTS

Yields

Yields from the cash-grain systems are in Table 4. In 2003, corn yields were not different between CS1 and CS2 ($p<0.05$); however, CS3 corn yields were lower because they suffered from heavy weed competition as well as a later planting date. Soybean yields were slightly higher in CS2 ($p<0.05$) but both systems suffered from the dry summer weather that year. Heavy giant foxtail pressure in CS3 limited soybean yields to 33 bu/a. Wheat grain in 2003 was comparable with the trial average but straw yields were particularly low, partly due to the high cutting height to avoid contamination by the tall red clover beneath.

In 2004, CS1 and CS2 yields were not significantly different, both yielding very well in a cold growing season. However, CS3 corn was considered a failure. System 3 was replanted in mid-June because of poor initial emergence, but due to a cold growing season, grain did not reach blacklayer by the killing frost. It was decided to custom harvest as snaplage (ear + husk) because corn silage removal would result in an unusually heavy nutrient removal and no harvest would result in heavy infestation of volunteer corn in next year's soybeans. Soybean yields were also much better in CS2 vs. CS3 due to heavy weed pressure in CS3. And finally, the scab in wheat hurt yields and quality as the infected kernels were blown out the back of the combine. Straw yields continue to be very low.

Table 4. Crop yields from WICST cash-grain systems.		
	2003	**2004**
Corn (bu/acre)		
Continuous corn (CS1)	175.0	193.9
After sb (No-till system) (CS2)	176.5	189.0
Org. 3-crop (CS3)	110.0	-[2]
LSD (0.05)	*17.3*	*6.9*
Soybean (bu/acre)		
After corn (No-till system) (CS2)	35.6	49.8
Org. 3-crop system (CS3)	32.5	33.6
LSD (0.05)	*1.6*	*10.5*
Wheat		
Org. 3-crop (CS3) grain (bu/acre)	53.6	34.9
Org. 3-crop (CS3) straw (tons DM/a)	0.40	0.54

[2] Corn harvested as snaplage valued at $37/ton 'as fed' yielding on average 3.3 tons/acre, 'as fed'

Production Costs

The largest variable expenses incurred by the grain farmer are fertilizer, seed, pesticides and corn drying costs (Table 5). Continuous corn (CS1) incurs higher fertilizer costs than CS2 because of annual starter and nitrogen fertilizer inputs necessary for the production of corn; CS2 corn also enjoys legume credits from the soybean phase, which results in less N input needed. Furthermore, CS1's drying costs are higher than the other two systems since 100% of its acres are in corn vs. half or a third of the farm acreage in CS2 or CS3. For example, in 2003, CS1 farm wide drying costs averaged $54/a vs. $30/a for CS2 and only $11 for CS3. In 2004, corn moisture was very high at harvest, and with the high price of natural gas, drying costs were quite extraordinary at nearly $90/a for CS1. Although no pesticides are used in CS3, hand weeding is charged to the soybean phase and capped at $50/acre. The organic system (CS3) does incur higher trucking costs because organic markets are generally not as close as commodity markets and organic grain requires special tracking to maintain their identity. Diesel fuel usage serves as a proxy of operator labor. During the last two years, fuel has been highest for CS1 at around $14/acre. , Fuel costs are slightly higher for CS3 than CS2 because of repeated tillage in the former and no tillage in the latter but both are about half the cost of CS1. It is interesting to find that fuel cost isn't higher for CS3 with its heavy demand on mechanical weed control, but rotary hoeing and cultivation don't use as much horsepower than say, chisel plowing. Also, during the wheat phase, fuel costs are reduced significantly lowering the system average. The inputs costs for growing organic corn and beans are about half that of conventional corn and beans so even though organic yields are not as high as conventional ones, lower input costs result in similar or better gross margins. For example, in both 2003 and 2004, CS3 variable expenses were less than half that of CS1 and about 33% less than CS2.

Table 5. Variable costs of the cash-grain cropping systems on WICST, 2003 & 2004.							
Year	**Crop Phase**	**Fertilizer**	**Seed**	**Corn Drying**	**Herbicide & Insect.**	**Diesel fuel**	**Total Var. Expenses[1]**
		----------$/acre----------					
2003	**CS1 – corn**	**29.65**	**54.00**	**54.06**	**31.13**	**13.89**	**227.42**
	CS2- corn	32.94	54.00	59.54	32.07	9.68	235.82
	CS2-sb	0	45.00	0	15.55	5.84	95.21
	CS2-average	**16.47**	**49.50**	**29.77**	**23.81**	**7.76**	**165.52**
	CS3- corn	0	47.30	33.78	0	9.70	136.78
	CS3-sb	0	24.81	0	0	9.94	72.48
	CS3-wheat/rc	0	72.24	0	0	4.30	106.34
	CS3-average	**0**	**48.11**	**11.26**	**0**	**7.98**	**105.20**
2004	**CS1 – corn**	**47.88**	**48.60**	**88.54**	**28.25**	**15.81**	**276.84**
	CS2- corn	55.85	48.60	91.71	16.35	11.16	272.98
	CS2-sb	0	30.00	0	15.22	6.73	78.97
	CS2-average	**27.93**	**39.30**	**45.86**	**15.79**	**8.95**	**175.98**
	CS3- corn	0	80.41	--[2]	0	10.40	165.60
	CS3-sb	0	33.27	0	0	13.56	125.35
	CS3-wheat/rc	0	54.64	0	0	5.19	79.10
	CS3-average	**0**	**56.11**	**0**	**0**	**9.72**	**123.35**

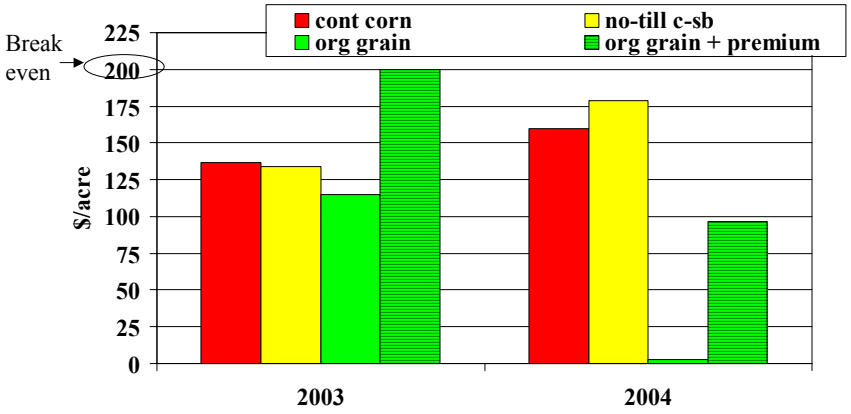
[1] Total variable expenses includes other items than just those in the table (e.g., scouting, trucking, repair & maintenance, etc.)
[2] Corn harvested as snaplage

Gross Margins

Gross margins without government payment were all below the break-even mark of $200/acre in both 2003 and 2004 (Fig. 1). Low commodity prices and mediocre soybean yields due to mid-summer drought were to blame in 2003. However, adding an organic feed grade premium in 2003 to CS3 boosted profits up to the break-even level. Custom rates for snaplage processing in 2004 were quite high at $52/acre. As the Fig. 1 shows, the failed corn stand along with scab problems on the wheat severely impacted gross margins for CS3. No organic premium was given to the snaplage and the already low yielding wheat was heavily docked for damaged kernels. 2004 was the first time in the history of the trial that the corn crop has failed and the

wheat was a disaster in CS3. On a real farm, an alternative crop would likely have been planted instead of replanting corn in late June of such a cold and wet spring.

Fig. 1. Gross margins of the cash-grain systems 2003 and 2004



*Government payments not included in analysis

Organic feed grade premiums have been holding steady for the last 6 years (Table 6) and look to stay there as organic dairy farms increase the market for organic feed.

Table 6. Organic prices for crops sold directly from the field -feed grade for c, sb, w.

Year	corn	soybean	wheat
	----------$/bu----------		
1999	3.75	9.00	5.00
2000	3.67	8.00	4.50
2001	3.67	7.50	4.50
2002	3.67	7.50	4.50
2003	3.75	8.75	3.75
2004	4.00	12.50	3.50

prices quoted by Delong, Cashton, Sunrich, Clarkson, Peavy, Didion, American Health & Nutrition

CONCLUSIONS

Generally speaking, 2003 and 2004 were difficult years for profitable grain production. While production was high for conventional systems, especially in 2004, prices were low and variable costs were high. In the organic grain system, production was modest in 2003 and largely a failure in 2004, but low input prices and feed premiums resulted in the system having highest gross margins in 2003 and modest margins in 2004. In appears due to the expansion of the organic livestock market in the upper Midwest, that feed grade premiums will remain good for the near future and the harder to attain food grade premiums will be excellent. This coupled with

lower costs, will make organic grain production competitive with conventional production. However, improved weed control will be necessary to maintain good yields and increase gross margins.

CITATIONS

Frank, G., and R. Gregory. 2000. ABCS CD, v. 7.1. Center for Dairy Profitability, Dairy Sci. Dept. UW-Madison.

National Agricultural Statistic Service's Lake Region

WI Agricultural Statistics 2004. USDA.