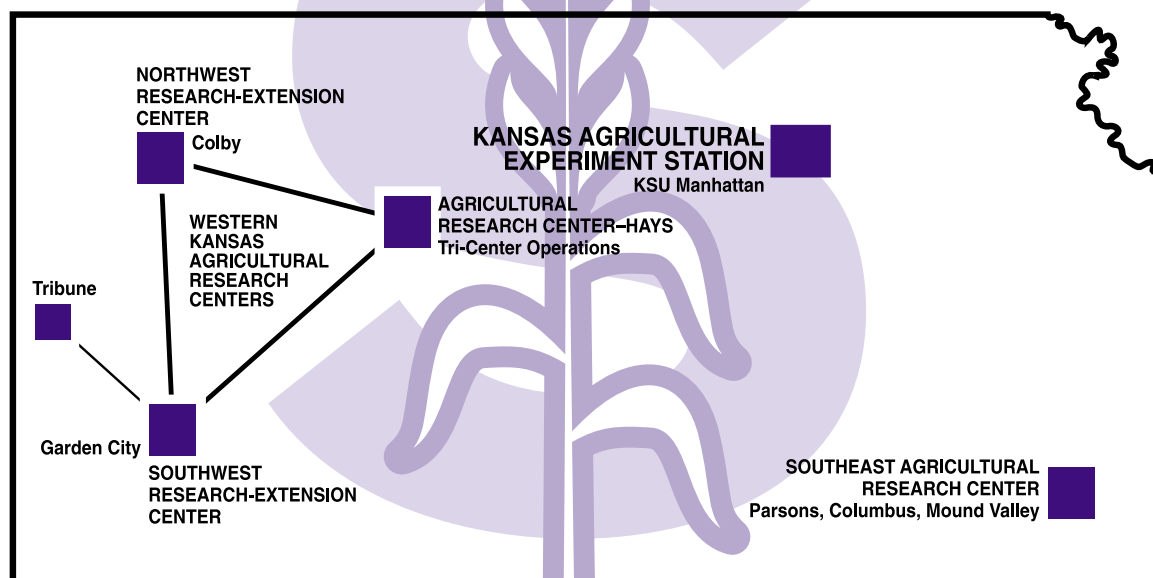


Economic Issues with Certified and Farmer-Saved Wheat Seed



Agricultural Industry Competitiveness

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Economic Issues with Certified and Farmer-Saved Wheat Seed

Recently, several food and agribusiness firms began offering economic incentives for identity-preserved wheat in Kansas. In addition, newly released hard white wheat varieties from K-State Research and Extension must be kept separate from hard red wheats. One key component of the marketing contracts used to purchase these identity-preserved wheats is the need to document the source of the wheat seed. At the present time, all of these contracts require the use of certified seed. This publication provides an overview of issues associated with using certified and farmer-saved wheat seed.

Overview of Certified and Farmer-Saved Seed

Certified seed from public varieties and private companies is defined as seed that has passed field inspection and seed testing standards for varietal purity, which is the absence of certain wheat and other crop seeds, and certain diseases. In addition, most certified seed has been treated with a fungicide to control seed-borne and seedling diseases. In most cases, certified seed must exceed 90 percent germination.

Noncertified seed is called farmer-saved or home-grown seed (TeKrony). Within this category, there are three different types of seed. Bin-run seed is seed that producers have held back to plant next year's crop. With bin-run seed, no seed cleaning, treatment, or testing has been done prior to planting. Custom-cleaned seed is farmer-saved seed that has been cleaned by a custom conditioner, but not treated. Custom-cleaned seed may or may not have been tested for germination and is not usually tested for purity and weed seed contamination. Finally, some farmer-saved wheat seed is custom cleaned, treated, and sometimes tested.

Stanelle et al. found that 82 percent of the farmer-saved wheat seed planted in Kansas had been cleaned prior to planting and 36 percent of the seed had been treated with a fungicide. Only 18 percent had been

tested for germination or purity by a laboratory before planting, although many of the respondents had performed tests on their farm. The same study found use of certified seed highest in the eastern third of Kansas (ranging from 31 to 43 percent) in contrast to the western crop reporting districts where certified seed use was as low as 5 percent (ranging from 5 to 20 percent). Almost 60 percent of the producers reported planting two or more varieties.

Benefits of Certified Seed

Numerous university studies cite the benefits of using certified seed (Shroyer, Kok, and Thompson; Brick). Land grant universities, such as Kansas State University, typically release seed of a new variety to certified seed growers who produce and sell certified seed to wheat producers.

After planting a certified seed variety for the first time, producers often keep some wheat for use as seed in the following year (farmer-saved seed). This is possible because wheat is not a hybrid crop.

Purity Issues

Certified seed is more "pure" having less weed seed or foreign material compared to farmer-saved seed because it has been cleaned, but it also has higher costs. The overwhelming majority of producers plant certified seed the first year and then use farmer-saved seed for 1 to 2 years, at which time seed purity declines and then they purchase certified seed again. Stanelle et al. reported that 70 percent of western Kansas producers and 85 percent of eastern Kansas producers planted farmer-saved seed that was 2 or fewer years removed from being certified. Even if producers can maintain seed purity of farmer-saved seed through proper cleaning and treatment, they still may choose to plant certified seed to take advantage of newly released varieties that have the potential to increase yields and the quality of the wheat. Few producers plant certified wheat seed on all of their acres.

Yield Advantage

Research on certified and farmer-saved seed has focused on the benefits of certified seed, including the yield advantage of certified seed and the agronomic disadvantages of farmer-saved seed that might come with poor seed purity. Georgia Crop Improvement Association's (GCIA) Small Grain-Drill Box Survey found that certified wheat seed had a yield premium of 3 bushels per acre over bin-run seed resulting in a \$6.75 per acre return over the cost of certified seed. That study found that of the bin-run samples randomly collected, the majority (62 percent) had severe mechanical (seed damage) and varietal purity problems.

A USDA Economic Research Service study used data from the 1986/87 and 1987/88 *Cropping Practices Survey* to estimate wheat yields per acre in the Great Plains as a function of choice of crop rotations, seeding rate, nitrogen fertilizer application rate, herbicide use, manure use, and farmer-saved seed (Knudson and Hansen). In this study, the use of certified seed provided a 3.5 bushel per acre yield advantage. While these variables explained only 20 percent of the variation in yield, the use of certified seed compared to farmer-saved seed was significant in explaining yield per acre differences in both years.

Producers rely on certified seed when environmental conditions prohibit saving harvested grain for seed. Wheat disease concerns in wheat provide additional incentive for producers to plant certified seed (Bowden). Planting certified seed, however, does not guarantee yield because environmental factors such as weather may cause partial or total crop loss.

Estimated Cost of Certified and Custom Cleaned and Treated Wheat Seed

In order to better understand the market for certified and farmer-saved seed, the cost of certified wheat seed and custom cleaned and treated wheat seed was estimated using USDA data.

Certified Wheat Seed Cost Estimate

The April price of certified winter wheat seed was collected from the United States Department of Agriculture Economic Research Service's (ERS) *Agricultural Resource and Environmental Indicator Update* (AREI).

The certified-seed data represents seed sold by private companies at retail farm stores. Many seed growers sell certified seed of public varieties, which are developed by land grant universities, to neighboring farms.

This certified seed is likely to be priced lower than private varieties sold by farm store retailers because public varieties are released to certified seed growers for the variable costs of bagging and distributing the seed.

Some of the fixed costs for developing these varieties are funded by producer organizations such as the Kansas Wheat Commission and Kansas Crop Improvement Association, but the majority of costs are funded by taxpayers. Private companies must recoup fixed investments made in the research and development of their varieties, which makes their varieties higher-priced relative to public varieties.

The AREI winter wheat seed price is the aggregate of data collected by surveys from 10 states. The 10 states were Colorado, Idaho, Kansas, Montana, Nebraska, Oklahoma, Oregon, South Dakota, Texas, and Washington. The April cash price for these 10 states was collected from 1992 to 1999 using the USDA National Agriculture Statistics Service (NASS) *Published Estimate Database* for winter wheat. The October Kansas cash price for winter wheat was obtained from this database.

The difference between the composite April seed price and the composite April cash price for winter wheat provided the price spread used to estimate Kansas seed price in October. The price spread between the composite seed and cash prices in April was added to the October Kansas cash price of winter wheat to provide an estimate for certified seed price in Kansas from 1992 to 1999. This calculation was performed

Table 1. *Estimated Kansas Certified Seed Cost, Dollars per Bushel, 1992-1999*

Year	April Composite Certified Seed Price ^a	April Cash Price ^b	Price Spread ^c	Kansas October Cash Price ^b	Certified Seed Cost Estimate ^d
1992	7.41	3.53	3.88	3.13	7.01
1993	7.73	3.07	4.66	3.01	7.67
1994	7.90	3.15	4.75	3.74	8.49
1995	7.80	3.42	4.38	4.85	9.23
1996	8.50	5.81	2.69	4.23	6.92
1997	10.00	4.39	5.61	3.33	8.94
1998	8.31	2.89	5.42	2.67	8.09
1999	7.35	2.41	4.94	2.20	7.14
Mean	8.13	3.59	4.54	3.40	7.94

^aSource: USDA's Agricultural Resource and Environmental Indicator (AREI) Update (10-state composite).

^bSource: USDA National Agricultural Statistics Service (NASS).

^cDifference between April Composite Certified Seed Price and the April Cash Price.

^dSum of the October Cash Price and the Price-Spread.

Table 2. *Farmer-saved Wheat Seed Cost Estimates for Kansas, Dollars per Bushel, 1992-1999*

Year	July Cash Price ^a	In-Out Charge	Storage Cost ^b	Treatment Cost ^c	Cleaning Cost ^c	Farmer-saved Cost Estimate ^d
1992	3.07	.02	.15	.17	.31	3.72
1993	2.75	.02	.14	.17	.31	3.39
1994	3.02	.02	.15	.15	.31	3.65
1995	4.28	.02	.17	.19	.34	5.00
1996	5.02	.02	.19	.14	.34	5.71
1997	3.14	.02	.15	.20	.33	3.84
1998	2.50	.02	.13	.16	.36	3.17
1999	2.15	.02	.13	.15	.36	2.81
Mean	3.24	.02	.15	.17	.33	3.91

^aSource: USDA's National Agricultural Statistics Service (NASS).

^bStorage cost is calculated as the sum of physical cost of commercial storage (\$.026 per bushel per month) and interest for 3 months (2.25 percent multiplied by the July cash price).

^cTreatment Cost and Cleaning Cost from USDA NASS Rates Paid by Kansas Farmers for Custom Work were calculated based on 36 and 82 percent of the farmer-saved seed being cleaned and treated, respectively.

^dEqual to the sum of the July Cash Price, In-Out Charge, Storage Cost, Treatment Cost, and Cleaning Cost.

based on the assumption that Kansas certified seed price in October is a function of the October cash price of wheat plus certification costs. Table 1 shows the price information used to estimate the October cost of certified seed in Kansas.

Custom Cleaned and Treated Farmer-Saved Wheat Seed Cost Estimate

Custom cleaned and treated farmer-saved wheat seed cost per bushel was estimated using the Kansas July cash price and adding 3 months of storage costs, an in-out charge, custom cleaning, and treatment costs.

Storage costs are the sum of physical storage and interest. Physical storage costs were based on USDA's *Summary of Offer Rates for Country Elevators* and these

commercial storage rates were \$0.026 per bushel per month or \$0.078 for 3 months.

Interest costs for 3 months were calculated by multiplying the July cash price by 2.25 percent (9 percent annual rate).

In-out charges were obtained from *USDA NASS Rates Paid by Kansas Farmers for Custom Work*.

Wheat seed custom cleaning and treatment costs were also taken from *Rates Paid by Kansas Farmers for Custom Work*. These were weighted by the averages reported by Stanelle et al. (e.g., 82 percent of the wheat was cleaned and 36 percent was treated). Table 2 provides the information used to estimate the cost of farmer-saved seed for Kansas from 1992 to 1999.

Table 3. Comparison of Certified and Farmer-saved Seed Cost Estimates, Dollars per Bushel, 1992-1999

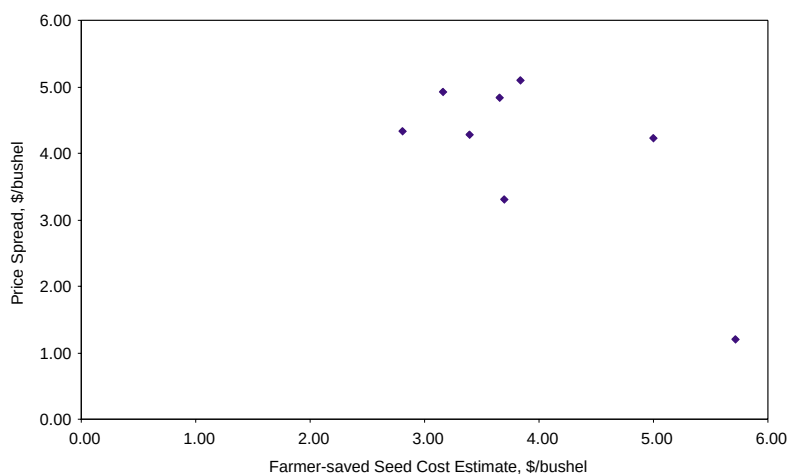
Year	Certified Seed Cost Estimate ^a	Farmer-saved Cost Estimate ^b	Difference ^c
1992	7.01	3.72	3.29
1993	7.67	3.39	4.28
1994	8.49	3.65	4.84
1995	9.23	5.00	4.23
1996	6.92	5.71	1.21
1997	8.94	3.84	5.10
1998	8.09	3.17	4.92
1999	7.14	2.81	4.33
Mean	7.94	3.91	4.03

^aThe Certified Seed Cost Estimate is taken from Table 1.

^bThe Farmer-saved Cost Estimate is taken from Table 2.

^cDifference between Certified Seed Cost Estimate and Farmer-saved Cost Estimate.

Figure 1. Farmer-Saved Seed Cost Estimate vs Price Spread, 1992 to 1999



Certified and Farmer-saved Wheat Seed Comparison

Table 3 compares the estimated costs of certified and farmer-saved wheat seed. The average difference was \$4.03 per bushel. The average certified seed price was 2.03 times greater than the farmer-saved seed price. Figure 1 shows the relationship between farmer-saved seed and the price spread between certified and farmer-saved seed. The underlying cash price of wheat grain is an important factor in determining the difference between the farmer-saved and certified seed costs. These data suggest that as the price of wheat increases, the price spread decreases. This negative relationship between farmer-saved costs (i.e., wheat cash prices) and the spread between farmer-saved and certified seed costs is the result of wheat

cash prices being relatively more variable than certified seed costs over time.

Inputs such as fertilizers, lime, herbicides, and insecticides are considered critical for producers to realize yield goals. Seed is a small percentage of the overall cost of production. For example, the Kansas Farm Management Association reported that seed costs were 4 percent of total variable and fixed costs for 589 non-irrigated Kansas wheat farms in 1999 (Langemeier and DeLano). Ali, Brooks, and McElroy reported no variability in certified and farmer-saved seed costs for wheat producers in the south central United States. Certified wheat seed has a higher cost, per pound and per acre of wheat planted, compared to farmer-saved seed.

The average return from using certified seed is calculated as the difference between the additional revenue under various yield assumptions and the additional cost of certified seed. The price spread between farmer-saved and certified seed changes in response to supply and demand conditions as indicated earlier. Using the average price spread of \$4.03 per bushel would understate the returns to certified seed when cash prices are high and overstate net returns when wheat prices are low. Thus, a regression equation was used to predict the price spread between certified and farmer-saved seed as a linear function of the July cash price.

Table 4 shows the return per bushel needed when using certified seed for various yield increases with certified seed and selling price. The predicted price spread is contained in the last column of Table 4. An increase in yield of 2 bushels has a positive return when the price of wheat is \$2.50 or higher per bushel. However, with a yield increase of only 1 bushel, price needs to be greater than \$3.50 per bushel in order for certified seed to increase returns.

Implications

Certified wheat seed has additional value when considering the current and potential future trends of production

Table 4. *Return per Bushel of Certified Seed Using a Predicted Price Spread between Certified Seed and Custom Cleaned and Treated Farmer-Saved Seed per Bushel*

Wheat Price, \$/bushel	Improved Yield Per Bushel Planted							Predicted Price Spread
	0.00	0.50	1.00	1.50	2.00	2.50	3.00	
2.50	-4.74	-3.49	-2.24	-0.99	0.26	1.51	2.76	4.74
2.75	-4.50	-3.13	-1.75	-0.38	1.00	2.37	3.75	4.50
3.00	-4.26	-2.76	-1.26	0.24	1.74	3.24	4.74	4.26
3.25	-4.02	-2.39	-0.77	0.86 ^a	2.48	4.11	5.73	4.02
3.50	-3.78	-2.03	-0.28	1.47	3.22	4.97	6.72	3.78
3.75	-3.54	-1.66	0.21	2.09	3.96	5.84	7.71	3.54
4.00	-3.29	-1.29	0.71	2.71	4.71	6.71	8.71	3.29

^aFor example, a 1.5 bushel increase in yield per bushel planted when the price of wheat is \$3.25 per bushel yields \$4.875 in added revenue per bushel (\$3.25 multiplied by 1.50). The added cost equals the average price spread of \$4.02. Thus, net revenue is \$0.86 per bushel (\$4.875 - \$4.02).

agriculture. Identity-preserved systems are increasingly being used by food and agribusiness firms such as General Mills (Willis), Farmland Industries (Blades), and Cargill.

Opportunities for Kansas's wheat producers continue to develop as more wheat varieties are developed for specific end uses. If these varieties have sufficient differentiated characteristics such that they reduce a miller or baker's cost or improves producer yields, variety certification will become even more important. Kansas is the largest wheat flour milling state and flour millers who are using marketing contracts in identity-preserved production systems also require the use of certified wheat seed. Future identity-preserved systems may likely require planting certified seed of a certain variety and keeping it segregated from other wheats. However, there will continue to be markets for non-identity preserved wheat and hence, many producers will likely continue to use farmer-saved wheat seed.

References

- Ali, M.B., N.L. Brooks, and R.G. McElroy. 2000. *Characteristics of U.S. Wheat Farming: A Snapshot*. Resource Economics Division, Economic Research Service, U.S. Department of Agriculture. Statistical Bulletin No. 968. Available online September 27, 2000. <http://www.ers.usda.gov/publications/SB968/>
- Blades, C. 2000. Managing White Wheat Segregation in Merchandising Channels. Presentation at 2000 National Association of Wheat Growers Conference. Available online September 27, 2000. <http://www.wheatworld.org/Proceedings2000/blades.htm>
- Bowden, R. 1995. Plant Disease Alert. 95-23, (edited by N.A. Tisserat). Cooperative Extension Service, Kansas State University, Manhattan, Kansas. Available online March 31, 2000.
- Brick, M.A. 1995. Improve Yield with High Quality Seed. No. 303 Cooperative Extension Service, Colorado State University, Fort Collins, Colorado. Available online September 28, 2000. <http://www.colostate.edu/Depts/CoopExt/PUBS/CROPS/00303.html>
- Georgia Crop Improvement Association. 1985. Small Grain Drill Box Survey (Wheat). GCIA Leaflet 85-1, GCIA Athens, Georgia.
- Knudson, M. and L. Hansen. 1991. *Intellectual Property Rights and the Private Seed Industry*. U.S. Department of Agriculture, Economic Research Service, Agricultural Economic Report Number 654.
- Langemeier, L.N. and F.D. DeLano. 1999. Enterprise ProfitLink Summary Report for Nonirrigated Wheat. In *Enterprise Profitcenter Summary Analysis and Information*. Kansas Farm Management Association, K-State Research and Extension, Kansas State University, Manhattan, KS.

- Shroyer, J.P., H. Kok, and C.R. Thompson. 1997. Planting Practices In *Wheat Production Handbook*. C-529. Cooperative Extension Service, Kansas State University, Manhattan, Kansas. Available Online May 1, 2000. <http://www.oznet.ksu.edu/library/crpsl2/c529.pdf>
- Stanell, J.R., L.A. Burchett, R.L. Vanderlip, and J.P. Shroyer. 1986. *Quality of Wheat Seed in Kansas*. Bulletin 651. Agricultural Experiment Station, Kansas State University, Manhattan, Kansas.
- TeKrony, D. M. 1999. Planting Farmer-Saved Wheat Seed—Are You Really Saving Money? In *Wheat Newsletter*, Department of Agronomy, University of Kentucky, Lexington, KY. Available online October 15, 2000. <http://www.ca.uky.edu/ukrec/Sept99W.htm>
- U.S. Department of Agriculture, National Agriculture Statistics Service. *Published Estimates Database*. Washington D.C., various years.
- U.S. Department of Agriculture, Economic Research Service. 1997. Seed Use, Cost, and Trade. In *Updates on Agricultural Resource and Environmental Indicators*. Number 8. Available Online September 28, 2000. <http://www.ers.usda.gov/epubs/pdf/arei/97upd/upd97-8.pdf>
- U.S. Department of Agriculture, Farm Services Agency. 1998. *Summary of Offer Rates for Country Elevators*. Unpublished report, Kansas City, MO.
- U.S. Department of Agriculture, National Agriculture Statistics Service. 1999. *Rates Paid by Kansas Farmers for Custom Work*. Compiled by Kansas Agricultural Statistics Service. Available Online October 15, 2000. <http://www.nass.usda.gov/ks/custom/crsel.htm>
- Willis, T. 2000. Ingredient Based Agriculture. In *Proceedings of the 2000 National Association of Wheat Growers Conference*. Washington DC.

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