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Economics of Producing for an Identity-Preserved (IP) Grain Market

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Abstract

Demand for identity-preserved (IP) crops produced by Northern Plains farmers is increasing. Buyers are willing to pay a premium for grains that can be guaranteed to possess a unique characteristic.

Several general crop management practices apply to crops raised for IP. These include greater investment in segregated storage facilities, more meticulous production, isolation, added cleaning/sorting, documentation, greater testing, additional marketing, and risks of liability. To illustrate, the economics of producing certified seed for sale to other farmers is used as an example of IP grain production. Many of the concepts and specific practices of certified seed production are applicable to most IP crops raised.

Key Words: identity-preserved, crop production, economics, marketing, certified seed

Economics of Producing for an Identity-Preserved (IP) Grain Market

Cole R. Gustafson*

Demand for IP Crops Increasing

Demand for identity-preserved (IP) crops produced by Northern Plains farmers is increasing. Buyers are willing to pay a higher price (a premium) for grains that can be guaranteed to possess a unique characteristic. These special attributes may include a specific varietal/cultivar composition that relates to physical attributes such as seed color (white wheat) or metabolic factors (high oil, protein, phytochemicals). Sole market outlets can encourage premiums as well as traditional cultural practices (organic). Genetic modifications (GM) may encourage new IP markets for varieties with inserted genes and likewise demand for genetically pure non-GM varieties.

There are several reasons why premiums for IP crops are increasing. First, grain processors have found that farm commodities, once thought to be homogeneous, are much more heterogeneous than previously thought with respect to quality, traits, and other characteristics. Protein, oil, starch, and organic matter vary greatly by variety, region, and production method. More importantly, they have learned that producers can control many of these trait and quality levels with management. Therefore, processors are willing to pay management premiums to farmers for this expertise Grain processors then utilize these special products in their processes, which enables them to reduce manufacturing losses (Wilson) or secure a market premium for a unique differentiated product. Processors have developed exacting methods and equipment to maximize efficiency in the production of a consistent quality product. The uniformity available in an IP crop provides stability at the processing level and fewer adjustments, such as blending and recipe changes, are required to achieve consistency. Processors want their product to look and taste the same today, tomorrow, and next year in order to build market acceptance.

Food safety concerns among the general public, especially in foreign countries that import products raised in the Northern Plains, are also motivating greater IP. As risks of product contamination and liability increase, food manufacturers desire assurance that their ingredients meet specified quality levels. Complete assurance only occurs when traceability and source verification maintain the identity of individual growers through the point of eventual sale to consumers.

Consumer preference and trade policies have stimulated greater demand for IP grain products. In particular, biotechnology has altered the genetic composition of several crops. Consumer acceptance of these crops and market products varies greatly by region and country. These differential levels of demand offer arbitrage opportunities to farm markets who can assure IP of their grains.

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Another important reason is the move from one or two government buyers purchasing most of a product, to many private buyers wanting to differentiate their brands to consumers.

Finally, technological advances have lowered the cost and provided increasing sophistication of quality/trait testing. Tests that previously could only be conducted in laboratory settings are now commonplace in elevators and farms. In addition, greater precision enables buyers to more keenly distinguish between product lots.

Developing an IP Strategy for Production

Producers must carefully analyze premiums offered in the marketplace to assure that the added costs of producing and marketing an IP crop are covered. North Dakota farmers have an advantage over producers in other regions of the United States because they have experience with crop segregation at marketing. Many small grains have historically been sold to buyers on the basis of variety, for example. However, many of the new opportunities for IP grain production will involve smaller quantities and greater levels of specificity than past markets have required. This implies that individual producers will have to devote more effort to identifying and preserving market opportunities.

Although grain production methods for each specific IP market do vary, there are several general practices that apply to all. These include greater investment in segregated storage facilities, more meticulous production, more field isolation and stance, added cleaning/sorting, greater testing, additional marketing, and risks of liability. To illustrate, the economics of producing certified seed for sale to other farmers is used below as an example of IP crop production. Many of the concepts and specific practices of certified seed production are applicable to most IP crops raised.

Growing Certified Seed, an Example of IP Production

In 2001, North Dakota farmers raised and inspected 311,182 acres of certified seed. Producer interest in certified seed has continued to grow over time as more differentiated crop varieties and specific end-use crops have come to market:

Year	Acres Planted	Number of Growers
1992	190,365	684
1993	222,726	874
1994	222,718	771
1995	230,248	866
1996	282,402	885
1997	262,966	900
1998	304,112	1,560
1999	220,589	646
2000	311,182	1,019

Certified seed acreage represents 1.5 percent of all total harvested cropland in North Dakota.

The purpose of certified seed production is to take registered seed of new crop varieties, increase volume, and sell the production to farmers desiring to improve the genetics of the varieties they raise for commercial (commodity) production. The certified seed increase system is a limited generation pedigree program designed to maintain the enhanced performance and quality traits of a variety as described by the releasing plant breeder. Foundation class seed is used to produce registered class seed, which is then planted to produce the certified seed class. Certified seed is recognized as genetically pure seed capable of maximizing yield and quality attributes when planted for commercial (commodity) production. Special care in production, handling, and distribution is needed to ensure identity and genetic purity. Certified seed production is governed by the State Seed Department as outlined in the North Dakota Century Code Sections 4-09-16. Eligible growers must meet certain crop rotational requirements, isolation restrictions, allow inspections, and meet quality standards for weeds/diseases. A Seedstocks Policies and Production Handbook, *How to Certify Your Seed*, and *North Dakota Seed Certification Standards* is available to familiarize growers with program policies and agronomic practices necessary for successful crop management.

Investment Required

Many producers are surprised to find out that the amount of financial capital needed to invest in IP crop production is minimal compared with other farm enterprise or value-added opportunities. In most cases, small modifications to existing equipment is all that is required (as described later). Two exceptions are smaller storage bins to hold segregated grain and cleaning equipment. The latter service is readily available commercially in most areas.

However, most producers are also surprised to learn the level of additional human capital (your time and knowledge) that is needed to initiate IP crop production. In addition to just acquiring basic production knowledge, considerable effort must be devoted to securing IP markets.

Securing a Market

The essence of IP grain production is the planting of a crop in a unique way (either genetic trait or production practice) for a market that offers a premium to compensate you for the additional costs involved. Successful IP grain producers have specific markets identified before their production season. This affords them the opportunity to tailor their production and management practices in a manner that maximizes desirable end-use characteristics.

IP grain markets are increasingly being secured prior to production with contracts. Caution must be exercised to ensure that contract specifications are fair to both parties and that you have the capabilities to successfully fulfill your obligation. As IP contracting becomes more prevalent, increasing numbers of opportunities will be presented to producers. **Given the wide variation in contracting arrangements that presently exists in the marketplace, the single most important factor influencing the profitability of your IP crop is the effort you devote to securing a market offering you greatest return.**

The other means of securing an IP market is through private sale to either an individual or company. In doing so, you assume the risk of marketing and may or may not have a guaranteed sale at the end of the crop season. Careful market research must be conducted prior to the production year to ascertain the quality and volume of the specific IP crop you are considering to produce. Advertizing to farmers, commercial processors, and consumers may be necessary. It may be necessary to extend credit to entice sales. Likewise, repayment risks should also be considered. Bad checks and defaults are a normal transactional costs of business. Collection agency and/or legal fees typically total 1/3 to 2/3 of any outstanding balance owed you.

The amount of time you spend obtaining an IP market, either by contract or private sale, needs to be considered as a cost of production. It is a fixed cost that will be allocated to each unit of production sold. These costs include the amount of time you and others spend researching opportunities, compiling data on past performance of your unit, advertising, negotiating terms, completing paperwork, and developing reports.

Finally, specialty IP crop markets are very dynamic and change over time. Greatest profit opportunities accrue to producers who recognize market voids and provide products first. Over time, as other producers learn of the opportunity and also supply products, profit margins diminish–thus, the crop becomes a commodity. IP crop producers must continually seek out new market niches.

Field Selection

Field selection for IP crop production must be done with considerable care. In general, selected fields must offer the highest potential for production. Since your overall investment in an IP crop will surpass other fields of commodity production, you want to assure your highest probability of success. Fields should be free from noxious and other weeds that may reduce quality or raise cleaning costs. In addition, the topography of the field should allow access in difficult climatic conditions because several production practices may be very time-sensitive.

A cropping history should be available for each parcel and kept on record. The history should include previous crop, variety, fertility, weed/insect/disease problems, pesticide applications, and other pertinent agronomic practices. A four-year rotation is the minimal recommended interval between varieties of same or similar crops, whenever possible. In dry climates where volunteers can emerge two and three years later, consistent rotations of the same varieties can be an advantage. No-till can be a problem due to lack of regrowth in the fall.

Selected fields should be isolated from neighboring fields of the same crop to prevent cross pollination and mixing during planting and harvest. Field boundaries should be clearly defined and properly isolated. Regulations vary by each crop. Traditionally, a 5' isolation strip (mowed, planted to another crop, or uncropped) was required for many small grains. Recent concerns expressed by consumers of organic products has resulted in expanded isolation guidelines for certification of those IP crops. At present, North Dakota Department of

Agriculture guidelines suggest a minimum border of 300' to a similar crop. It is advisable to check with the eventual purchaser of your IP crop to ensure your isolation boundaries yield the level of quality specified by the buyer.

If production of an IP crop restricts activities that you would normally perform on a parcel(s) of land bordering your field selected for IP production, that is an economic cost that needs to be considered. In most cases, the crop you are required to plant to preserve quality of the IP crop will be less profitable than would otherwise be the case.

Crop Production Activities

For the most part, crop production activities do not differ that much for IP and traditional crops. Thorough tillage, top variety selection, adherence to fertility recommendations, optimal seeding rates, timely planting, and constant monitoring of weed/pest problems are all required–typical attention that producers would give to their most important traditional crops.

In addition, time has to be allocated to thoroughly clean out implements before and after use to prevent contamination. Such activities include careful cleaning of planters, removal of plants/seeds from cultivators, etc.

But, since quality standards for IP crops may be higher than traditional market opportunities, additional costs may be incurred. For example, tolerances for weed seed and other foreign matter are lower for most IP crops. Fields may need to be rogued to remove undesirable or variant crop plants. In some cases, offending plants are of such harm that they may have to physically be removed from the IP field, again at additional cost. You should plan on several additional days devoted to crop monitoring, roguing, etc.

Given the value of an IP crop, breakeven analyses may lead producers to conclude that additional crop treatments (pesticides, etc.) are now economically justified.

Many IP crops command a premium because a seed variety with unique qualities or traits is required for production. This uniqueness may lead to scarce supplies at planting. IP crop producers frequently have to develop agronomic management strategies that maximize low seeding rates, if seed supplies are limited.

Operating Credit

A study of agricultural lending practices in North Dakota found few lenders familiar with the credit needs of value-added crop producers (Gustafson, Beyer, and Saxowsky). In general, credit availability and borrowing limits were constrained to those of traditional crop producers. Providing you have a good credit history and can document your added borrowing needs, additional financing is widely available from other sources, at greater cost.

Harvesting, Handling, and Storage

If the production field is planted with contamination-free equipment and adequate isolation procedures are followed, your IP crop should be pure and free of foreign matter up to the point of harvest. Most contamination of IP crops occurs at or following harvest when mixtures of other crops/varieties are introduced to the lot you are trying to preserve. IP crop producers must insure that harvesting, handling, and storage equipment facilities are cleaned out thoroughly to avoid mixtures of other crops and varieties. Certain foreign matter can render an entire lot worthless.

Appendix A illustrates combine modifications that can be made to ease the task of routine clean-out. These modifications require only miscellaneous parts and operator time (about one day of labor).

You should completely clean out of your combine before the harvest of any IP crop. Compressed air and vacuums should be used to remove kernels from all crevices. Headers should be cleaned, especially pans and corners of augers. Feeder houses should be reversed and blown out. All augers should be opened and cleaned out. Holding bins need special attention as kernels can easily lodge in cracks under sheet metal. Cleaning should occur under all shields and covers. Sieves need to be removed to prevent errant kernels from re-entering the machine. Finally, do not forget the machine's exterior, especially the cab. Crop residue on top of the cab can easily fall in a header and contaminate a crop if a quick stop is made. Finally, do not forget to clean yourself as clothing can harbor foreign matter which could adulterate the crop you are trying to preserve.

The time you spend cleaning (about 8 hours/clean-out) is a fixed costs that also must be budgeted for.

Even with thorough physical cleaning, it is impossible to remove every contaminant. Therefore, it is recommended that the first 50 bu. of crop harvested be discarded and sold as common commodity. The lost revenue from this disposal also needs to be considered in the final pricing of your crop.

Conditioning

All IP crops should be conditioned to to meet highest standards possible. Conditioning is done for two purposes, to remove foreign matter and to size the kernels into uniform lots. The most frequent equipment used are air screen cleaners and gravity table separators.

Common industry standards for small grain certified seed are:

Factor	Tolerance
Pure Seed	99.0% (minimum)
Total Weed Seeds	10 per pound (maximum)
Other Varieties	3 per pound (maximum)
Other Crops	3 per pound (maximum)
Inert Matter	1.0% (maximum)
Prohibited Weeds	none
Objectionable Weeds	1 per pound (maximum)
Germination	85% (minimum)

Current specifications and quality standards for new crops can be obtained from the North Dakota State Seed Department**.**

Testing

As a routine part of the conditioning process, representative samples should be collected from each lot and retained for a minimum of two years. Depending on specifications outlined by IP buyers, testing of each sample, especially for disease and/or foreign genetic material, may also be required.

If the IP crop you produced is intended to be sold as certified seed, additional testing is necessary. Part of the sample taken above must be submitted to the North Dakota State Seed Department for germination testing, purity analysis, and final certification (Sinner). Samples of each lot must be retained for two years. Testing results must be retained for three years after the last sale has been transacted.

Given heightened consumer interest in biotechnology and crop production, several methods are available to detect the presence of biotech content in IP crops. A pre-emergence treatment and germination test for determining the presence of the Roundup Ready gene has recently been developed by Iowa State University and approved by Monsanto. Seeds are embedded in a 2% solution of Roundup formulation, germinated, and evaluated. Seedlings with Roundup Ready genes develop normally.

A more sophisticated technique, called the polymerase chain reaction (PCR) can be used to detect specific foreign material inserted into the plant's DNA. In PCR, DNA fragments are separated on a gel and the size/intensity of the DNA band produced is examined. The test is only available commercially and not readily adaptable on-site. The test takes from 2-10 days and costs $200-$400 per test. The test can detect 0.1 percent biotech content in a sample.

A third method for detecting biotech content is the protein-based enzyme-linked immunosorbent assay (ELISA). The ELISA test analyzes for a specific antibody reaction that marks the presence of biotech material. The test takes two days at a cost of $70 per test.

A number of private and public firms provide these testing services.

Legal Disputes

As with any commercial transaction, legal disputes do arise with the sale of IP crops and certified seed. Contamination and lack of seedling performance are the most frequent complaints. When a dispute arises, producers can petition a hearing before the North Dakota Seed Arbitration Board (Knutson). It is a voluntary process that yields a nonbinding settlement recommendation. Although disputes arise infrequently, it is a cost of business that must be planned for.

Additional Costs of Production and Sale

Two interviews on certified seeds production (Spilde and Gustafson) provide cost estimates for small grains that may be useful for planning purposes. Since every farm operation differs and each IP crop opportunity is unique, estimates for your own IP crop should always be determined. These costs of production should be considered additional to the costs normally incurred for commodity production:

Item	Planning Cost ($/bu.)	Your Cost ($/bu.)
Extra seed cost	.20	
Additional chemicals	.15	
Isolation cost	.10	
Roguing	.10	
Equipment clean out	.40	
Conditioning	.80	
Clean out (loss of market value)	.20	
Packaging	.75	
Lab/testing/certification fees	.10	
Warehousing	.30	
Insurance and handling	.15	
Transportation	.20	
Risk (lack of sale)	.25	
Management (additional attention)	.75	
Interest (6 mo. @ 10%)	.23	
Total	$4.68	

Extra seed costs represents the added costs producers must pay above commercial seed prices for the specific seed they require. In this example, registered seed must be purchased to produce certified seed. Additional chemical costs are the expected additional expenses needed to control weeds and pests in your IP crop. Fewer weed/pest damage and foreign material increases quality/yield and lessens conditioning expenses later.

Isolation cost is the lost profit on the acreage bordering your IP crop plot on which you are not able to raise a crop. The total value of the lost acreage is divided by the amount of IP crop bushels sold to place the value on a per unit basis.

Roguing expenses are the value of labor necessary to physically remove weeds, foreign varieties, and other unwanted plants from your plots. Likewise, equipment clean out is the value of labor needed to completely clean out your planter, combine, storage, and handling equipment.

Conditioning expenses are the operating and ownership costs of using the equipment to clean your IP crop. Costs include investment, labor, repairs, electricity, and other operating costs. The value listed here is similar to that charged by commercial conditioners. Clean out costs are the loss in value of material cleaned out from your IP crop during conditioning. Normally, it would be sold with the crop at market prices, but now has minimal feed value.

Packaging identifies the costs of boxing/bagging your product for sale. Increasing volumes of certified seed are being purchased bulk, so this cost would be negated. However, other IP crops may have very specific packaging requirements.

Lab testing and certification fees are the monies needed to test the quality of your IP crop and certify that it does meet the quality criteria specified.

Warehousing fees are the costs of storing your IP crop from harvest until eventual sale. Most certified seed will be sold by early spring of the following crop year, but a small portion may remain unsold if demand is low. Costs in this example are based on a small 2,000 bushel hopper bin with expected storage of 8 months.

Insurance and handling are costs of protecting and moving your IP crop on site. Transportation costs represent the expenses of hauling your IP crop to an eventual purchaser.

Risk is the value of unsold IP crop remaining at the end of the season, divided by all of the bushels that were sold. It may be unsold because it spoiled, went out of condition, or lacked demand from purchasers.

Management is a general charge representing the amount of time necessary to secure a market for IP crop sales and the additional attention required throughout the growing and processing seasons.

Interest is a return to the additional capital invested in your IP crop. It is derived assuming a 10% interest rate and six months of average investment.

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Appendix

Appendix A

Shown in this appendix are combine modifications that operators harvesting IP crops typically make to ease the task of clean-out. These modifications can be made in an average farm shop and require about a day of labor.

Farmers who have made these modifications and have subsequently traded their machines in for new equipment did not report note any depreciation in value accruing from these changes.

1) Header

A hole is cut in one end of the header to blow grain out. Operators simply take an air hose, start in the far end and blow grain across the table and out the exit hole. It is difficult to blow the grain out of a header without the hole because wind in the corner catches kernels deflecting them back into the header. Vacuuming is difficult because it is difficult to reach completely around the auger.

2) Feeder house

No modifications are made, but be sure to reverse and clean thoroughly. The rock trap should also be opened and cleaned.

3) Unloading Auger

Large quantities of grain remain in most unloading augers, despite extended run-times that operators do in an effort to clean them out. IP crop harvesters cut removable doors in augers so they can reach in with an air hose to completely blowout the auger. Doors are cut and then secured with a hinge on one end and a latch on the other. During use, doors are taped shut with duct tape to completely seal the auger. Doors should be located close enough together so you can reach all points inside. Most unloading augers require at least four doors.

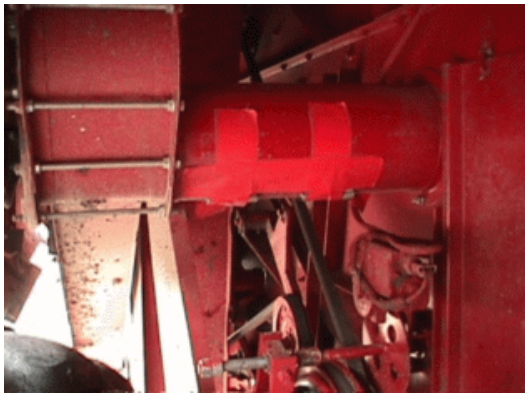
4) Grain Tank

Several modifications are needed to ease clean out of a combine's grain tank. First all safety shields and covers must be removed to gain access. Steps can be removed permanently if desired. Covers on augers can just rest on top of augers without securing nuts in most cases to ease removal.

Adding a door to the sump of the vertical auger facilitates access and clean out. Note that this operator also added a small wood filler near the base of the sump to prevent kernels from falling into the tight bottom crevice.

In addition, all exposed ends of sheet metal and corners should be caulked to prevent kernel lodging.

A door is also added outside the sump (exterior side of combine). The open door shows a clear view into the grain tank.



5) Horizontal auger

A door is added to the horizontal return auger. Note the door is taped with duct tape to seal joints.

6) Cab

Again, no modifications are needed. However, all crevices on top of a cab must be cleaned to prevent kernels from falling down into the header and re-entering the harvester.

7) Straw walkers/Sieves

Combine sieves should be pulled to facilitate clean out and re-entry of grain. One-way nuts and long bolts can be added to ease alignment and replacement.