

# *The Economics of Cleaning Grain on the Prairies*

*FINAL REPORT*

*Prairie Horizons Ltd.  
and  
JRG Consulting Group*

*September, 1998*

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# ***The Economics of Cleaning Grain on the Prairies***

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the  
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Prepared for  
**Agriculture and Agri-Food Canada**

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## **Executive Summary**

There has been an increase in grain cleaning on the Prairies relative to cleaning grain at terminals where, traditionally, most grain was cleaned for export. To better understand this shift in grain cleaning, and to better understand the associated implications, Agriculture and Agri-Food Canada commissioned this study to provide information on the economics of cleaning grain on the Prairies. The study objective was:

***To examine efficiency gains in the Grain Handling and Transportation System (GHTS) through cleaning at high through-put elevators, including inland terminals, on the Prairies as opposed to cleaning it at port position, to determine whether there is an economic advantage to cleaning all, or a portion, of grain on the Prairies.***

### **WHY CLEAN GRAIN?**

Grain is cleaned for a variety of reasons, but the principle reason is to remove the dockage to meet the export standards as established by the Canadian Grain Commission (CGC). Grain could be exported without achieving the export standards, and that is the case for some non-Canadian Wheat Board (CWB) grains and, recently, some CWB shipments to the United States. However, these export standards have developed over decades as one of the distinguishing quality features of Canadian grain, they are a major basis for the CWB export program, and they are applied to most exports.

### **WHAT IS GRAIN CLEANING IN WESTERN CANADA?**

Commercial movements and cleaning of prairie grains may be subject to three sets of CGC quality standards – “**commercially clean**”, **export grade determinants**, and **primary grade determinants**. ***This study is about cleaning grain inland to export standards. For that grain, all of these regulations apply.***

**When producers deliver grain into the GHTS and when shippers deliver grain to terminals, the *primary grade determinants* are applied to determine payment. When grain is exported (except to the United States where apparently primary grade standards or buyer specifications may apply), “**commercially clean**” and **export grades apply**. Grain cleaning may produce product which is commercially clean, which can be directly exported, or it may be not commercially clean which means it “is permitted to be exported only with permission of the CGC”. **Cleaning is the removal of dockage from grain.** Each of the three sets of standards treat grain as having all of the **dockage** removed (except for “not commercially clean”). Any allowable material left in grain after the dockage is removed is called **foreign material**.**

Dockage and foreign material have very specific definitions and significance in the Canadian grain industry. **Dockage is defined by the Canada Grain Act as the material that must be removed from grain in order to assign a grade, using approved cleaning equipment and prescribed procedures.** Dockage allowed on higher quality export wheat and barley is zero.

Some dockage is allowed in export canola, defined according to what will pass through particular sieves. Dockage is not a grading factor.

**Foreign material is material other than grain of the same class remaining after dockage has been removed.** Total Foreign Material (TFM) allowed in commercially clean high quality export wheat is 0.4 percent of the weight, of which up to 0.1 percent may be extraneous material such as small seeds, roughage and attrition that collects from handling and moving grain after cleaning. Commercially clean barley may contain up to 0.2 percent extraneous material. Export canola is commercially clean if it contains less than 2.5 percent “material remaining on top of round hole sieve, including coarse grains”. Foreign material is a grading factor.

**Primary grade standards** for wheat and barley have no requirement for commercial cleanliness. No.1 CWRS primary grade determinants allow TFM up to 0.75 percent, No.2 allows 1.5 percent, No.3 allows 3.5, and Feed wheat allows 10.0 percent TFM. Special Select malting barley has a 1.0 percent TFM tolerance, Select malting barley has 2.0, and 1CW Barley has a 2.5 percent TFM tolerance. Foreign material in canola must be less than 1.0 percent for No.1 and 1.5 percent for No.2.

Cleaning grain to this tight export standard requires very sophisticated and expensive cleaning equipment, as well as care in handling and loading clean grain. In order to clean wheat to the 0.40 percent Total Foreign Material (TFM) tolerance (which includes the 0.1 percent which may be picked up after cleaning), the grain is overcleaned. This removes more material than required by the standards. Thus some of the sound host grain ends up in clean-out along with the weed seeds, chaff, unthreshed heads, shrunken and broken kernels, other grains and oilseeds, stones and other material that constitute dockage.

These export standards, and the level of cleaning required to achieve them, is unique to Canada. Our two major commercial competitors, the United States and Australia, do not clean grain to these standards. The clean export standard in Canada is intended to provide an advantage to our grains in the global marketplace.

Over-cleaning of wheat results in a loss of around 1 percent of the original volume of grain cleaned. This portion of the clean-out is a valuable by-product of the cleaning process. To capture that value, another stage occurs in most cleaning systems, **the reclaiming process**. In this reclaiming process, the original host grains are reclaimed, along with other saleable grains and oilseeds when they are present. Generally, more saleable grain is reclaimed than lost through over-cleaning because reclaiming allows recapture of lost host grain such as small or unthreshed material, and other grains and oilseeds for blending. Some of the reclaimed product was part of the dockage assessed against the delivery originally. These reclaimed grains and oilseeds are referred to as **house grains** in the trade and have value in the blending that goes on within elevators and terminals. House grains are to be distinguished from dockage and from screenings. **Screenings** may be any clean-out of dockage but practically or commercially in the prairie GHTS, they are the materials derived from the cleaning process that will be removed from an elevator as commercial by-product or as waste material. Blending also uses up a portion of dockage cleaned out in sophisticated cleaning operations. In reality, in only exceptional circumstances are screenings material valueless under current technology and market conditions.

**Dockage is the material which must be removed for assignment of a grade. Cleaning removes dockage as well as sound grain. Due to the need to overclean, the cleaning/reclaim process produces “house grains” which can be blended into commercially marketed grains, and screenings which are segregated into various grades – 1Feed Screenings, Mixed Feed Oats, Refuse Screenings.**

The last stage of the cleaning process is the segregation of the screenings into various grade categories. The CGC has official export grades for screenings that appear to be used mostly at port. A version of these screening grades appears to be used inland - usually #1Feed screenings, mixed feed oats, and refuse screenings. Refuse screenings are mainly dust, chaff and other light clean-out which is processed into pellets called GSPs or grain screenings pellets. In some country operations this segregation does not occur and the material will be sold as some form of “raw screenings”. Composition and characteristics of screenings are variable, and sometimes unknown.

**Variability of inland produced screenings was identified within this study as a limitation on their value.**

The ability to blend the house grains and some of the screenings (a portion of the clean-out) back into commercial grain before it is shipped is an important aspect of the economics of cleaning. Blending occurs for virtually all categories of grain and is a major determinant of profitability of cleaning. In some grains such as barley and peas where producers typically deliver less dockage than export tolerances allow, screenings are used to blend up to the tolerance. Screenings used this way acquire the value of their new host.

Cleaning prairie grain is an expensive proposition. For example, in the new inland facilities that are being constructed, the capital cost for all of the associated cleaning operation equipment can range between \$1.5 and \$2.0 million. In contrast, a US country elevator of comparable size which does not need to clean to the same export standard, and does not recapture grains initially cleaned out as dockage, invests under \$0.5 million in its cleaning equipment.

## **ASSESSING DOCKAGE**

A grade is established on producer deliveries by the receiving elevator when the dockage has been removed from a grain sample. Dockage estimated from a grain sample is deducted from the gross weight of a producer delivery to give a net settlement weight. There are a few examples of companies paying producers for dockage but the historical and prevailing industry practice is to make no direct payment for the value of dockage clean-out – the captured grains and the screenings. The view is expressed right across the industry in support of this practice, that producers receive benefits indirectly through lower cleaning, and perhaps handling charges.

## **EXPORT STANDARD VERSUS THE PRIMARY STANDARD**

As mentioned above, 1 CWRS has an export standard where the tolerance in the grain to be exported cannot exceed 0.40 percent TFM and it must be commercially clean which requires zero dockage and less than 0.1 percent small seeds, roughage and attrition which is included in the 0.4. However, 1 CWRS delivered to the primary elevator system is assigned a grade based on a tolerance, after cleaning (presumably at the country location) of 0.75 percent TFM with no requirement in relation to commercial cleanliness. These differences in tolerance indicate the tight standards placed on exports and the increased requirements of cleaning to export standards.

## **INCREASE IN INLAND GRAIN CLEANING CAPABILITY**

Economies of scale needed to operate the grain cleaning and reclaiming equipment was one reason for cleaning being done at port. The second reason was that the freight cost of the dockage was not significant when rail freight rates were subsidized. Both of these factors have changed.

Freight rates on moving grain to port are no longer subsidized and the shipper cost of moving all grain to port has increased significantly since the beginning of the 1995 crop year. Freight savings on dockage movement are an incentive to clean at source. As well, grain companies have begun to invest in new HTPE (high through-put prairie elevators) which provide the scale economies to clean grain down to export standards. This study identified that 66 HTPE currently clean grain on the Prairies. Those 66 elevators clean around 4.2 million tonnes, or 13 percent of grain delivered into the system.

Based on information supplied by the major grain companies, another 54 locations are planned to have grain cleaning equipment installed, resulting in an estimated 9.0 million tonnes of grain cleaned inland, or 27 percent of current deliveries. Manitoba has, and is planned to have, proportionately more cleaning capacity relative to grain delivered to elevators.

## **FORCES DRIVING THE INLAND GRAIN CLEANING INVESTMENT DECISION**

Why do grain companies invest inland grain cleaning capability when they already have the capacity at port locations? The answer is two-fold. First there is a saving on the freight on the dockage. This saving can exceed \$50,000 for a HTPE that cleans 80,000 tonnes of wheat with 2 percent dockage (based on just under 1,500 tonnes of dockage not shipped at commercial rates).

At most prairie elevators (there are a few exceptions from time to time) producers are levied a transportation charge on the gross amount delivered of both CWB and non-CWB grains. That means that producer money is collected to cover all of the transportation on both clean grain and dockage. Elevator companies pay the railway companies for the freight to port on Board and non-board shipments. When an elevator cleans inland, it has any excess of transportation charges collected over transportation charges paid as a gain from the cleaning operation.

The second reason is to enhance the options available to market clean grain. Cleaned grain can be exported directly from the Prairies to US markets, directly to transfer elevators in the St. Lawrence, and directly to US port locations, if necessary.



## INLAND GRAIN CLEANING IS PROFITABLE

This study indicates that the economics are favourable for inland cleaning. Modeling conducted for this study indicated that it is profitable to clean grain in all three types of elevators – terminal elevators, inland terminals, and HTPE. The optimal location of cleaning is driven by the value of the screenings produced, the cost of freight on the grain, the cost of labour, and the utilization rate on the cleaning equipment. In our analysis, the highest margin attained on cleaning was inland at the new HTPE, with the lowest margin at terminal location. The cleaning margin, before considering corporate overhead charges, was positive at all locations.

There are several sources of revenue and costs to consider when assessing the economics of inland cleaning. An example for an inland terminal for wheat (Moose Jaw) is provided in the following table. On a per tonne basis the fixed and variable costs are one dollar per tonne of grain cleaned, before considering the cost of the wheat lost (\$1.85/t at 2 percent dockage). Revenue is attained from the cleaning charge, the value of the reclaimed grains, the value of the screenings going into the feed market, and the avoided transport costs on the dockage in the wheat.

### Sources of Revenue and Costs in Assessing Inland Cleaning

<i>Item</i>	<i>\$/tonne of wheat (2% dockage)</i>
Fixed costs	\$0.35
Variable costs	0.64
Total costs	0.99
Wheat loss before reclaim	1.85
Reclaimed grains	1.95
Screenings sold	1.09
Freight saving on dockage	0.66
Cleaning charge assessed producer	3.40
<b><i>Cleaning margin before corporate overhead</i></b>	<b><i>4.24</i></b>

Source: Chapter 7.

## WHY IS IT MORE PROFITABLE TO CLEAN GRAIN ON THE PRAIRIES?

This study indicates that cleaning grain on the Prairies provides more margin than cleaning at terminal locations. There are two fundamental reasons – the savings to inland locations on the freight that would have been assessed on the dockage, and the lower cost of labour at inland locations relative to the terminal elevators situated in Vancouver and Thunder Bay. These cost savings outweigh the economies of scale advantage that exist with terminal elevator's cleaning operations.

**Cleaning inland is more profitable than cleaning at port due primarily to the savings on freight on dockage, and lower labour costs.**

## **SHOULD SOME GRAIN STILL BE CLEANED AT TERMINAL ELEVATORS?**

Grain cleaning at terminal elevators can be characterized as having economies of size and scope due to their extensive investment in grain cleaning, and their ability to clean all grains and oilseeds delivered. Reclaiming and blending, and producing more consistent composition of screenings are port advantages. As well, these investments can be considered sunk costs. Country cleaning operations are not designed to clean every tonne delivered, but rather to focus on the predominant grain being delivered. On balance, the volume grains for export on the Prairies are wheat and canola. That is mostly what will be cleaned to export standards on the Prairies. Some will clean only wheat, others may clean wheat then switch to canola when wheat deliveries are slow, and some may clean only canola. There will be some barley and other grains cleaned on the Prairies but their significance relative to wheat and canola will be small. Since country operations are not likely to clean every tonne delivered for export, grain-cleaning capability will be required at terminal locations.

## **PRAIRIE SCREENINGS ARE BEING USED IN THE PRAIRIE LIVESTOCK SECTOR**

Some of the cleaning margin comes from the sale of screenings. The supply of screenings from all prairie grain is small, very small, compared to the feed grains consumed on the Prairies. Current and planned screenings supply in the Prairies will be around 150,000 tonnes, which is only a fraction of the anticipated 10 to 11 million tonnes of feed grain, and more than that of forage, that will be needed by the livestock sector.

This market is evolving on the Prairies, and it has a very optimistic future provided it can be made to function more effectively. The screenings market needs to be made more transparent in prices, volumes, and values in terms of composition and nutritional characteristics. Basic information is required on all of these components of the screenings market, and some nutritional and economic research will have to be undertaken to show the way. Screenings need to be viewed within the grain industry and its regulators as a valuable feed and nutritional resource, rather than as a grain by-product.

## **DOCKAGE VALUATION**

Currently, the value of dockage is not made explicit on the cash ticket in most inland locations. By making dockage valuation explicit on a cash ticket, two things happen. First, the transfer of ownership from the producer to the grain company is made explicit. Transfer occurs today based on industry convention. This transfer could occur at a zero value. Our analysis indicated that a dockage credit of \$30 per tonne of dockage (at 2 percent dockage) would reduce the elevators cleaning margin by only \$0.60/tonne of wheat cleaned.

Second, making ownership explicit provides needed transparency. Dockage value at the producer level is not transparent in the existing system despite the direct costs levied on producers for transportation and removal, and despite its inherent value. One way to improve

transparency would be to include a line on the cash or storage ticket associated with all producer deliveries. There may be other mechanisms.

Transparency in transactions is a desirable market characteristic, which improves market performance by enhancing the fit between costs and returns. It also improves the flow of market signals. This transparency might cause some producers to invest in removing dockage prior to delivery. The need to improve transparency is indicated by the dockage costs and returns identified in this study.

A grain company that assesses dockage inland, but sends the grain to port for cleaning may not be in a position to place a value on the dockage since the grain company has no guarantee that it will clean the grain. This occurs because grain cars are pooled at terminal elevators. Car-pooling exists for other reasons but an effect is that grain companies can not internalize the value of the dockage assessed. For example, if a grain company gave a producer a dockage credit on the cash ticket, but sent the grain to port for cleaning, there is currently no mechanism for the grain company to get reimbursed for the dockage credit. The dockage will not necessarily have the same value to each company. However, by replacing car pooling and allowing each grain company to send the grain it received to its own terminals or a terminal with which it had prior arrangements, the value of dockage becomes internalized within the decision framework. In this case, the grain company could place a value of dockage on the producer's cash ticket.

## **SYSTEM WIDE IMPACT OF INLAND GRAIN CLEANING**

Some of the system wide issues that can be attributed to more inland cleaning include:

- More margin (revenue) residing in the countryside due to country cleaning;
- Enhanced marketing options for prairie grains;
- More competition among grain companies to attract producers grain;
- Potentially lower handling costs charged to grain producers due to increased competition,
- Lower handling costs at terminals through direct-hit shipping facilities;
- Lower seaway charges with terminal elevator specialization at Thunder Bay;
- Capability of greater through-put and capacity at the West Coast;
- Lower requirement for hopper cars.

***This study confirms that grain cleaning is a profitable activity on the Prairies, that it is a viable proposition for grain companies, and that it will provide a benefit to prairie grain producers.***

## WHAT DOES INLAND GRAIN CLEANING MEAN FOR FARMERS?

These results imply some potentially sizeable benefits to prairie farmers. The following estimates are aggregates but indicative.

There should be an aggregate transportation saving of about \$ 4.5 million from the transport of less bulk grain (by the amount of screenings sold on the Prairies at \$30/t average freight) to port. This implies an increase in the effective capacity of the existing transportation fleet by around 2 percent on wheat exported, and about 5 percent on canola exported. That implies a longer run saving on the replacement cost of the existing fleet, and better timing of movement and delivery when that counts. This is one potential source of producer benefits.

In many ways the elevator system is becoming more competitive as a consequence of less regulation and more volume-based business operations. There is the potential for more competitive cleaning charges and some return for dockage reflecting in producer returns. Fifty cents per tonne lower cleaning charges represent \$15 million back to farmers, and \$10/tonne credit (on dockage) assessed to farmers represents about \$ 5 million. The margins determined within this study suggest that a more competitive, better-organized cleaning function could return these amounts or more.

There is a potential supply of more than half a million tonnes of livestock feed available from all dockage. At emerging inland cleaning capacity there will be up to 150,000 tonnes of screenings generated for the commercial market. This is a significant net addition to the feed market and even if only one quarter of the screenings (1Feed and Mixed Feed Oats) resulted in freeing up of higher quality wheat and barley commercial sales, more commercial wheat and barley would move in the GHTS. This amount will be a positive, significant contribution to the entire system. It is equivalent to production from 25,000 to 30,000 acres of medium quality land.

Inland cleaning means less economic activity at port for a given supply of exports and a probable net transfer of financial returns back to the basic producer. The exact amounts were not determined and some of them would be indirect benefits received over time. However, these summary comments indicate amounts numbering in the tens of millions if the systems retains, or even increases its competitive structure.

Most importantly, aside from the exact magnitude of the savings in resources used and revenues generated and how they are distributed, is the firm conclusion that inland cleaning contributes to a more efficient grain industry on the Prairies in economic terms. The contributions are worth pursuing aggressively.