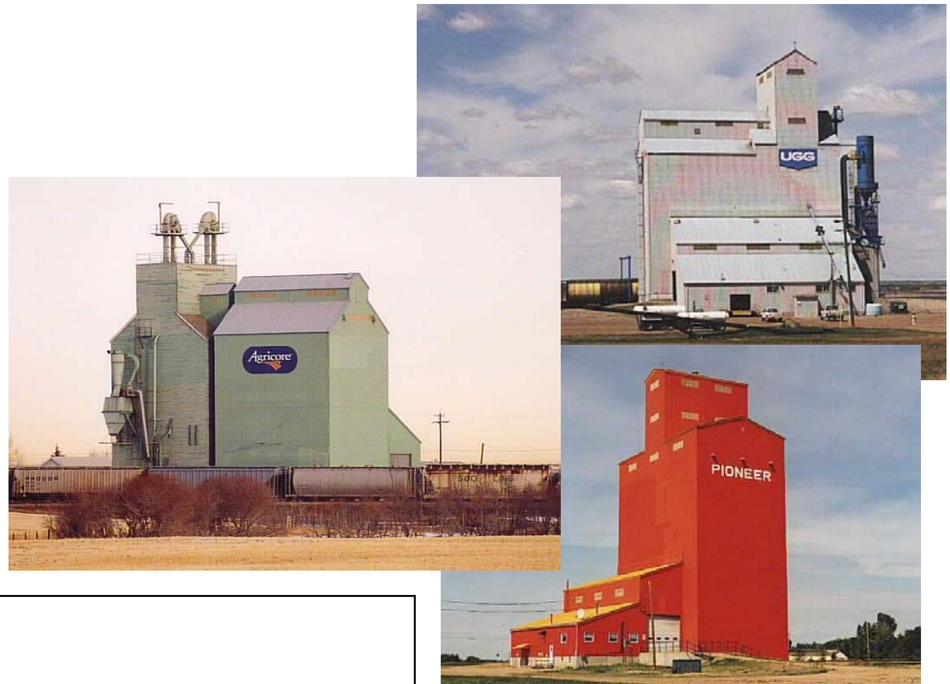

Report:

SAMPLING METHODOLOGY

Representative Sampling of Grain Delivery Stations for the Calculation of Producer Netback and Other Measures

September 2002

Monitoring the Prairie Grain Handling and Transportation System

Submitted to:

Government of Canada Gouvernement du Canada

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1.0 Overview – The Grain Monitoring Program

On May 10, 2000 the Government of Canada announced changes to its grain handling and transportation policies, which came into effect on August 1, 2000. At that time, the government also stated that an independent third party would be appointed to provide a transparent and continuous monitoring program aimed at assessing the overall efficiency of the grain handling and transportation system (GHTS) under these reforms.

On June 19, 2001, the government announced that Edmonton-based Quorum Corporation had been selected to serve as the Monitor of Canada's Grain Handling and Transportation System. The central aim of the Grain Monitoring Program is to provide the federal Ministers of Transport, Agriculture and Agri-Food, as well as the Minister responsible for the Canadian Wheat Board, with relevant and timely information on the overall performance of the reformed GHTS.

2.0 Overview – Sampling Methodology

The Grain Monitoring Program (GMP) envisioned that sampling would be required in the case of certain measures where the collection of industry data would prove onerous or impractical. In its most basic form, the use of an appropriate sampling methodology allows for the identification of a representative set of data points from which inferences about the larger population can be made with confidence. In the context of a time series, a representative sample set provides a practical basis for tracking certain changes in the performance of the GHTS over the entire course of the GMP.

One of the principal objectives set for the GMP by the Government of Canada involved gauging the overall logistics cost associated with moving prairie grain to market – what is commonly referred to as the "export basis" – and the resultant "netback" arising to producers.[1] By definition, both the export basis and the producer netback are location-specific calculations, and typically include such elements as:

- Trucking charges for the movement of grain from the farm gate to a local country elevator;
- Railway freight charges for the movement of grain from a local country elevator to a terminal elevator at a destination port;
- Elevation fees (whether at a local country or terminal elevator);
- Elevator cleaning and storage charges (whether at a local country or terminal elevator); as well as
- Any incentives or discounts accruing to producers.

With a network of 329 delivery points scattered across the prairies towards the end of the 2001-2002 crop year, there were a total of 1,316 distinct origin-destination pairs that could be employed to move Western Canadian grain to the region's four export gateways.[2] Moreover, given the number of differing grains, grain grades, grain company service charges, and freight rates, the permutations inherent in individual producer netback calculations takes on unimaginable dimensions. Such calculations can easily swell into hundreds of thousands of individual estimates. The only practical means by which to simplify this undertaking rests in standardizing the estimates of producer netback

[1] In its basest form, producer netback equates to the remainder derived from subtracting the logistical costs of moving grain from its selling price.

[2] The 329 delivery points cited stems from the July 15, 2002, listing of the Canadian Grain Commission. Commonly referred to as either grain stations or grain delivery stations, they denote only those locations at which at least one licensed primary elevator is situated.

around a representative sample of grains and grain stations. A fuller discussion of producer netback and its calculation under the GMP is presented in Appendix A.

In recognition of this, the government had already agreed to limit these estimates to four specific grains: wheat; durum; canola; and peas.[3] In addition, it had also approved the use of an appropriate sample set of grain stations in estimating the producer netback for these grains. However, any selection of an appropriate sample set must be achieved through statistically valid means, be sufficiently robust so as to properly depict any meaningful shift in producer netback over time, and provide for fair regional representation.[4]

Quorum Corporation proposed to develop an appropriate sampling methodology to be used in the determination of producer netback and other measures as a Supplementary Work Item under the GMP. The Government of Canada accepted this proposal, and issued authorization for Quorum Corporation to commence the work prescribed therein on May 31, 2002.

3.0 General Considerations in Sampling Methodology

Probability versus Non-Probability Sampling

While a variety of sophisticated techniques are often employed in sample collection, these largely apply to cases involving random variables and the extrapolation of a probability distribution in order to predict future events – what is generally referred to as “probability sampling.” This, however, is not the objective at hand in selecting a representative sample set of grain stations to be used in measuring producer netback. Indeed, the very intent is aimed at gaining a perspective on past events rather than in predicting future ones.

As a result, an appropriate sampling methodology need not adhere to the rigours associated with probability sampling. Non-probability sampling techniques typically use judgement, convenience, quotas, or some other non-random process to select a sample. This does not imply that samples selected through non-probability sampling means are necessarily less “representative” of the population being studied than those drawn using probability sampling techniques.

Selection Bias and Sampling Error

The real issue is one involving the potential introduction of selection bias, and its resultant impact on sampling error. For example, if deliveries were to be used as the sole criteria in selecting grain stations for inclusion in the sample, a selection bias favouring stations with larger delivery volumes would likely ensue. Such an approach might well result in the virtual exclusion of smaller-volume stations from the sample. This in turn would likely preclude the inclusion of stations served by shortline railways, or stations having facilities operated by smaller grain companies. The sampling error arising from such a bias would ultimately be reflected in a theoretical misrepresentation of the

[3] In addition to the grains themselves, the grades to be used in the calculation of producer netback have also been specified, namely: 1 CWRS Wheat; 1 CWA Durum; 1 Canada Canola; and Canada Feed Peas.

[4] Owing to competitive pressures, many of the stakeholders in the GHTS use some form of financial incentive to draw grain volumes into their facilities (i.e., country elevators) or over their systems (i.e., railways). Many of these incentives are of a highly sensitive commercial nature. In order to safeguard information relating to these incentives, the Monitor is obligated to shield all point-specific information used in the calculation of producer netback from public disclosure. By way of example, data pertaining to the trucking premiums paid to individual producers by the grain companies for delivery at specific grain stations cannot be disclosed. The Monitor intends to safeguard all such information by presenting all estimates of producer netback at a higher-than-grain-station level of aggregation.

true producer netback for the larger population. Indeed, the GMP mandates that a representative sample should include grain stations that are local to both Class I and non-Class I carriers; that have facilities operated by both large and small grain companies; and that are geographically dispersed throughout Western Canada.

With this in mind, Quorum Corporation engaged the services of a consultant – Dr. Edy Wong, Assistant Dean, University of Alberta School of Business – to provide expert advise in choosing a methodology that adequately provides for the selection of a representative and unbiased sample of grain stations. An outline of Dr. Wong's background is presented as information in Appendix B.

In reviewing the issue at hand, Dr. Wong affirmed that the criteria used to define a representative sample of grain stations under the GMP did not lend itself to the use of probability sampling techniques. This arose because no assurance could be given that a randomly selected sample would necessarily meet the criteria established by the government. Moreover, the very need to safeguard construction of a sample with deference to such criteria effectively compelled use of non-probability sampling techniques. In Dr. Wong's opinion, the overriding concern centred on ensuring that the selection process did not introduce a level of bias that would unduly influence the results and drive up sampling error.

In advance of these preliminary discussions, Quorum Corporation had already assembled a ten-year history of grain station deliveries using data from the Canadian Grain Commission. Although the data was largely intended to define the overall population from which a sample would be drawn, it was also proposed that the data could be used to class and rank individual grain stations, with the sample ultimately determined by a quota-based selection process. Dr. Wong, however, advised that the use of delivery data alone was insufficient, and likely to produce a biased sample. Specifically, he indicated that station deliveries had to be framed within a wider context, and that consideration should be given to the inclusion of other variables as evaluative criteria. To this end, Dr. Wong suggested that individual station deliveries might best be considered against the backdrop of total regional deliveries or production, and that overarching economic and demographic shifts might also be brought to bear in determining a non-biased sample.

The Weighted Score Model

As a result, an effort was made to secure pertinent production and demographic data extending back over a period of five years. It was quickly discovered, however, that the data desired for this examination could not readily be obtained. Moreover, the data that was available stemmed largely from but one year – 2001 – and effectively precluded creation of a longer time series. Dr. Wong deemed that these constraints effectively prohibited the use of more sophisticated techniques to guard against the introduction of bias and sampling error.

Dr. Wong then advanced an alternative method aimed at objectively indexing individual grain stations in accordance with established criteria using what is commonly referred to as a "Weighted Score Model." Such models rest on the foundation that individual factors can be brought to bear in any sampling design, that these factors can be weighted using considered (or expert) opinion, and that the results can then be objectively ranked to identify the best candidates for inclusion in a representative sample. The benefit in using such a model stems from the fact that the weighted scoring of multiple factors effectively dampens the bias arising from use of any single factor as a determinant. A copy of Dr. Wong's preliminary report on this chosen methodology is presented in Appendix C.

In the determination to be made here, a number of independent factors deemed important in the selection process would first be defined. Factor scores would then be calculated for each individual grain station. Weights would then be assigned to each of the factors, with the most important factors being given higher weights. A total weighted score would then be calculated for each grain station, with higher scores considered superior to lower ones. The scores could then be ranked, and an objective sample determined by selecting those grain stations appearing at the top of the ranked listing.

The Weighted Score Model is depicted formulaically as:

[1] Total Weighted Score = $\sum W_i S_i$

Where:

i = *an evaluative factor*

W_i = *weight for evaluative factor i*

S_i = *score for location using evaluative factor i*

The process might best be depicted through the use of the following illustration:

Evaluative Factor (i)	Station A Score (S_i)	Station B Score (S_i)	Station C Score (S_i)	Station D Score (S_i)
1 – Volume handled	$S_1 = 200$	$S_1 = 150$	$S_1 = 100$	$S_1 = 180$
2 – Elevator capacity	$S_2 = 50$	$S_2 = 80$	$S_2 = 100$	$S_2 = 100$
3 – Proximity to a branch line	$S_3 = 25$	$S_3 = 25$	$S_3 = 25$	$S_3 = 50$

Weight (W_i)	Evaluative Factor (i)	Station A Score (W_iS_i)	Station B Score (W_iS_i)	Station C Score (W_iS_i)	Station D Score (W_iS_i)
$W_1 = .50$	1 – Volume handled	100	75	50	90
$W_2 = .30$	2 – Elevator capacity	15	24	30	30
$W_3 = .20$	3 – Proximity to a branch line	5	5	5	10
($\sum W_i$) = 1.00	**Total Score ($\sum W_iS_i$)**	**120**	**104**	**85**	**130**

Let us suppose that three evaluative factors have been selected to rank four separate grain stations having one elevator each: volume handled; elevator capacity; and proximity to a branch line. A score for each factor is calculated independently for all four stations. The score S_i denotes the performance of an individual grain station with respect to factor i. For example, if station A has a higher volume than station B, then the value of S_1 would be correspondingly greater for the former than the latter (200 versus 150 in this instance).

Each factor is then given a weighting W_i that is intended to reflect the relative importance of the factor in selecting a candidate station for inclusion within a sample. For example, the relative importance of the volume handled in relation to elevator capacity is reflected in the higher value accorded W_1 than W_2 (0.50 versus 0.30 in this instance). Similarly, proximity to a branch line is deemed to be a somewhat less important factor than either of the others, and thus receives a value of 0.20 for W_3.

The weighted score, W_iS_i, reflects the importance of the factor and the grain station's relative performance with respect to that particular factor. In the above example, station A would receive a weighted score of 100 for factor 1 (volume handled) while station B received 75, station C 50, and station D 90.

The sum of all individual weighted factor scores for each station then provides a basis for the objective ranking of all stations – 120, 104, 85 and 130 for stations A, B, C and D respectively. In this particular case, station D would be regarded as the best candidate to select since it obtained the highest total weighted score among the four stations examined.

The methodology suggested above is one that is in common use. The critical concerns surrounding its use are: the selection of appropriate evaluative factors, how each factor is measured, and – most importantly – the weightings to be applied against each factor.

4.0 Work Plan

Relational Database

From the proceeding, Quorum Corporation assembled a relational database that linked individual grain station deliveries to higher-level geographic data. This was achieved by first assigning each grain station to its respective rural municipality, county or district. These in turn were then assigned to their respective Census Agricultural Regions and Census Divisions, and then populated with data for the 2000-01 crop year from the Canadian Grain Commission and the 2001 Census. Although this proved to be an extremely labour-intensive process, the database created ultimately included the following elements:

- Census Agricultural Region
- Census Division
- District (rural municipality, county)
- Population
- Private Dwellings
- Land Area (square kilometres)
- Grain production (estimated from available Statistics Canada data)
- Grain Deliveries
- Grain Stations
- Multiple-Elevator Grain Stations
- High-Throughput-Elevator Grain Stations
- Conventional Elevators
- High-Throughput-Elevators; and
- Elevator Status (active or closed)

Factor Selection

Once assembled, Quorum Corporation provided Dr. Wong with a copy of the database for his use in assembling a meaningful list of potential evaluative factors. In developing these factors, Dr. Wong focused on a number of key economic considerations, specifically:

- Density and distribution of stations (as an indication of regional duplication and competition);
- Regional impact or importance of the stations;
- Trends in producer and regional demand;
- Productivity of stations;
- Capacity of the stations;
- Utilization of station capacity (a measure of efficiency);
- Need for market mediation; and
- Changes in demographics.

These considerations were pivotal in his advancement of ten potential evaluative factors – banded under six broad categories – that could be used as determinants in the Weighted Score Model. These candidates are listed in Table 1.

Table 1 – Potential Evaluative Factors

Potential Evaluative Factor	Candidates	
	Preliminary	Selected
Elevator Distribution		
1 - Elevators per District	X	
2 - Multiple Elevator Grain Stations per District	X	
Density per Production Unit		
3 - District Elevators per 100,000 tonnes of Production	X	
Producer Demand		
4 - District Production per Station (100,000-tonne lots)	X	X
Regional Importance		
5 - District Deliveries per Station (100,000-tonne lots)	X	
6 - District Deliveries per Unit of District Production	X	
7 - Station Delivery per Unit of District Production	X	X
8 - Station Delivery per Unit of District Deliveries	X	X
Capacity Utilization		
9 - Station Delivery per Unit of Station Capacity	X	X
Market Mediation		
10 - District Production per sq. km. (tonnes)	X	

With final reflection given to the lack of data variability, the tendency for some degree of duplication between evaluative factors, and the absence of some important demographic and trend variables, four of the preliminary candidates were selected for service in the Weighted Score Model, namely:

- District Production per Station (measured in 100,000-tonne lots)
- Station Delivery per Unit of District Production
- Station Delivery per Unit of District Deliveries
- Station Delivery per Unit of Station Capacity

5.0 Final Sample Selection

Sample Selection Workshop

Dr. Wong presented his findings at a workshop held in the Edmonton offices of Quorum Corporation on Thursday, 26 September 2002. In attendance were:

Dr. Edy Wong	University of Alberta
Bruce McFadden	Quorum Corporation
Mark Hemmes	Quorum Corporation
Marcel Beaulieu	Quorum Corporation

Denis Tully	Government of Canada – Agriculture and Agri-Food Canada
John Dobson	Government of Canada – Transport Canada

Following a general discussion on sampling methodology, the Weighted Score Model, and the evaluative factors selected by Dr. Wong, the group collectively agreed to proceed with the actual sample selection.

The participants were then asked to privately consider the weightings they would give to each of the four evaluative factors presented to them for use in the Weighted Score Model.[5] The individual weights were then submitted and tabulated to produce a collective average weighting for each factor from the group as a whole.

The resultant group weights were then applied against the calculated factor scores for each one of the 329 individual grain stations listed by the Canadian Grain Commission as being active on July 15, 2002. The total weighted score calculated for each of these grain stations were then ranked, with the locations of the highest scoring grain stations in each province then plotted on a map.[6]

Final Sample Selection Process

In the general opinion of the participants, the geographic coverage derived from this initial selection process left two significant physical gaps within the province of Saskatchewan. As an alternative, it was suggested that the top scoring grain station in each of the Census Agricultural Regions be selected as a means of ensuring that full geographic coverage was provided for in the selection process.

Dr. Wong deemed this approach to be a reasonable means of balancing the objective assessment of the Weighted Score Model with the practical need to ensure full territorial coverage. Accordingly, this approach was adopted and used to select some 45 separate grain stations for use as a representative sample in calculating producer netback. Not all Census Agricultural Regions, however, are created equal; the land area within being one of the most contrasting elements in any inter-provincial comparison. For this reason, several regions were combined with others, and one eliminated from inclusion altogether.[7] This left a remainder of 42 grain stations.

In the week immediately following the workshop, the Canadian Grain Commission reissued its list of licensed elevator facilities as at August 1, 2002. This listing indicated that three of the grain stations selected under the process outlined had elevators that had either been de-licensed or transferred to companies specializing in malting barley. These grain stations were, therefore, replaced in the sample with alternates from each of the affected Census Agricultural Regions.

[5] Dr. Wong abstained from voting on the grounds that his views should not be allowed to influence the actual sample selection process; that only those with an appropriate degree of industry knowledge and a stake in the outcome of the process should be accorded such rights.

[6] Dr. Wong had predetermined that a statistically valid sample for a population defined as having 329 grain stations should fall within the range of 5 – 10%. Using the midpoint of 7.5%, this meant that 25 grain stations were needed for a valid sample. Using a proportional system based on provincial grain deliveries for the 2000-01 crop year, this implied that the top-ranking 4 stations from Manitoba, 12 from Saskatchewan, 8 from Alberta, and 1 from British Columbia, would be selected for the sample.

[7] Specifically, Saskatchewan saw two mergers of its agricultural regions – 3AN was combined with 3AS to form 3A, and 3BN was combined with 3BS to form 3B. Manitoba's more northerly located agricultural region 12 was dropped completely.

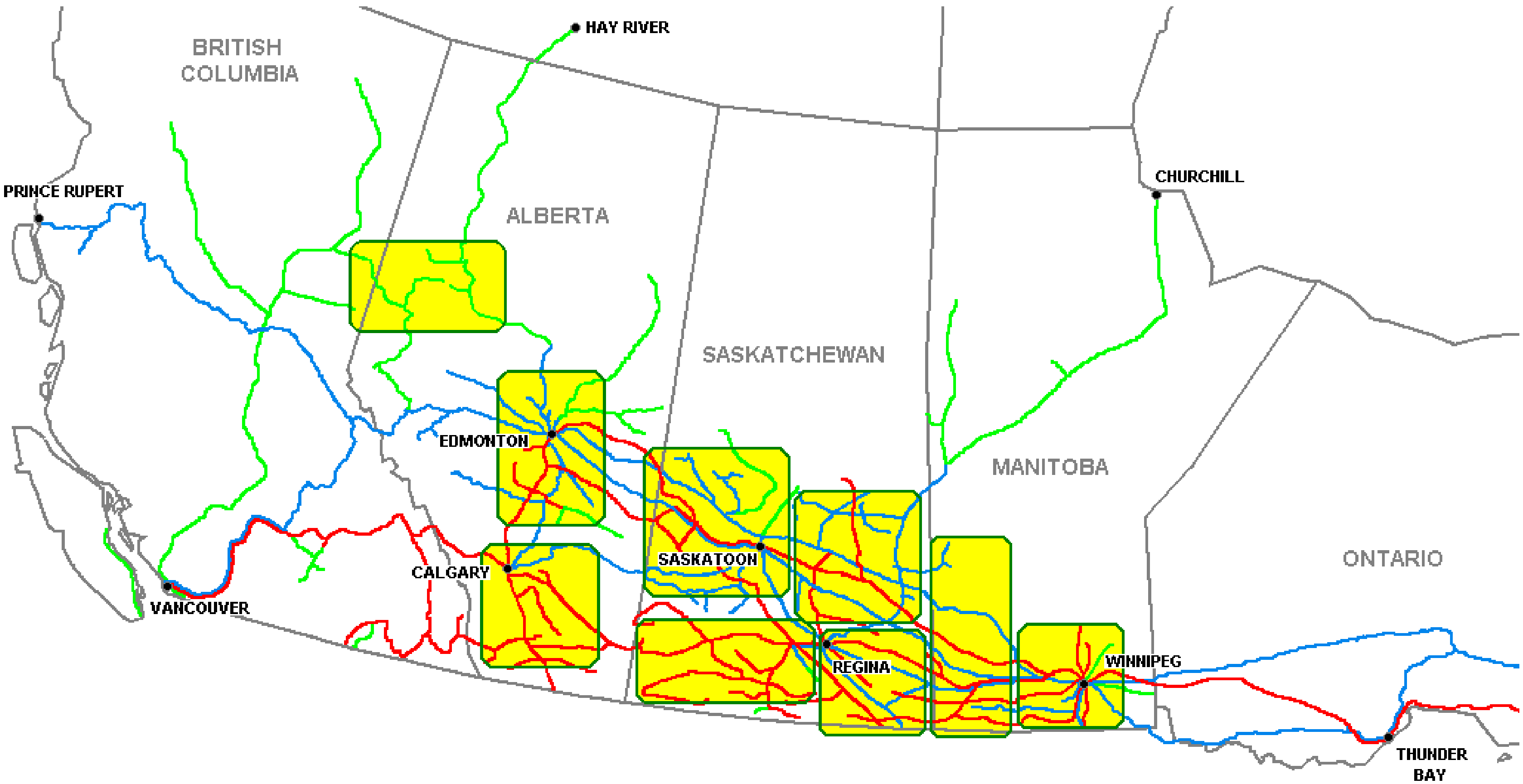
These grain stations were then grouped into nine geographically based sectors, to comprise between four and six grain stations each, namely:

- Manitoba East;
- Manitoba West;
- Saskatchewan Northeast;
- Saskatchewan Northwest;
- Saskatchewan Southeast;
- Saskatchewan Southwest;
- Alberta North;
- Alberta South; and
- Peace River.

These sectors are depicted geographically in Figure 1. This final assignment resulted in two cases were representation was either over, or under, the targets established. Accordingly, one grain station was dropped and two others added. These adjustments produced a final sample set made up of 43 grain stations – a full 13.1% of the 329 grain stations deemed to define the larger population. Within the general context of the population as a whole, these points represent:

- 30 stations with one or more high-throughput grain elevators;
- 27 stations with one or more conventional grain elevators;
- 19 stations that are local to the branch line railway network; and
- 10 stations that are directly served by regional and shortline railway carriers.

Figure 1 – Selected Sampling Sectors



6.0 Conclusion

While a variety of sophisticated techniques are often employed in sample collection, these largely apply to cases involving random variables and the extrapolation of a probability distribution in order to predict future events – what is generally referred to as "probability sampling." Since, however, this was not the objective in selecting a representative sample set of grain stations to be used in measuring producer netback, an appropriate sampling methodology need not adhere to the rigours associated with probability sampling – non-probability sampling techniques can produce equally "representative" samples of the population under examination.

The real issue is one involving the potential introduction of selection bias, and its resultant impact on sampling error. With this in mind, Quorum Corporation engaged the services of Dr. Edy Wong to provide expert advise in choosing a methodology that adequately provides for the selection of a representative and unbiased sample of grain stations as a precursor to the calculation of producer netback. Dr. Wong advanced a method aimed at objectively indexing individual grain stations in accordance with established criteria using what is known as a "Weighted Score Model." The benefit in using such a model stems from the fact that the weighted scoring of multiple factors effectively dampens the bias arising from use of any single factor as a determinant.

The Weighted Score Model used here proved successful, and helped to define a representative sample of 43 distinct grain stations drawn from all areas of Western Canada. In the mix can be found both large and small grain delivery stations; locations having one or more elevators; and conventional as well as high-throughput elevators. In addition, these stations comprise mainline and branch line points served by both national railways as well as their shortline partners; and where the elevator facilities are owned and operated by large and small grain companies alike.

And while the sample drawn can effectively aid in developing regional estimates of producer netback extending three crop years back in time, there can be no guarantee that additional elevator closures will not undermine the stability of the sample itself by fostering the closure of one or more of the stations contained within it. Nevertheless, a mechanism for the substitution of these same points provides reasonable assurance that a representative sample can be maintained throughout the course of the GMP, and that a fair depiction of regional producer netbacks can be obtained as a result.

APPENDIX A

Producer Netback Overview and Approach

Netback in its basest form is a simple formula; the sale price of grain less the logistical cost of its movement:

Producer Netback	=	Sale Price of Grain at Port	-	**Export Basis –** ***the average cost of movement from farm gate to Port (loaded to ship)***

Changes in producer netback will reflect changes in both market conditions and logistics costs.

The Monitor is to calculate producer netback for wheat, durum, canola and feed peas at the provincial level and to determine annual percentage changes attributable to changes in the export basis and in port prices.

Producer netback is location specific. The Monitor's intent is to use a transparent approach to illustrate the component parts of the export basis at various locations. These will be regionally representative and include locations on mainlines and branch lines, high throughput and conventional elevators as well as single and multi-company points (to the extent possible without revealing commercially sensitive data).

Each producer's cost structure is highly individual. By presenting both actual costs and an estimate of potential costs and potential incentive savings at a variety of locations, the netback methodology will provide producers with the tools necessary to analyze their individual situations and assess whether they are sharing in the benefits of reforms to the system.

The calculation of export basis and producer netback is not intended to compare marketing systems. Different methodologies are used to study netback for Canadian Wheat Board grains and canola and feed peas.

The Monitor is to track changes in the export basis from the base year 1999-2000 forward. The methodology for calculating CWB export basis allows us to "backtrack", and determine the export basis for CWB grains at specific locations for the 1999 and 2000 crop years. The Winnipeg Commodity Exchange (WCE) maintains a historical database of the basis for canola and will provide annual historical and future data to the Monitor. The WCE does not split the basis into its components. Similar data for feed pea prices and basis will be obtained from STAT Publishing, which tracks special crops.

The draft methodology will allow the Monitor to measure changes in the export basis and producer netback from the base year forward. The following table provides an example of the producer netback calculation for wheat and durum.

Table 1 – Estimate of Producer Netback for the 2000-2001 Crop Year

Rate/ tonne	Manitoba		Saskatchewan		Alberta		British Columbia	
	CWRS	CWAD	CWRS	CWAD	CWRS	CWAD	CWRS	CWAD
Rail Costs								
Avg. Freight To Thunder Bay (1) (2)	20.53	20.53	29.44	29.44	38.99	38.99	48.28	48.28
Avg. Freight To Vancouver (1) (2)	43.05	43.05	35.89	35.89	27.64	27.64	21.39	21.39
Avg. FAF (1) (2)	9.88	(0.47)	10.41	0.22	10.43	0.26	10.43	0.26
Applicable Freight	30.41	20.06	35.89	29.66	27.64	27.64	21.39	21.39
Other Costs								
Trucking	6.10	6.10	6.10	6.10	6.10	6.10	6.10	6.10
Primary Elevation	10.59	10.59	9.61	9.61	10.05	10.05	10.05	10.05
Dockage – Terminal Cleaning	3.52	3.52	3.63	3.63	3.49	3.49	3.49	3.49
CWB Costs	5.14	23.97	5.14	23.97	5.14	23.97	5.14	23.97
Sub Total	**55.76**	**64.24**	**60.37**	**72.97**	**52.42**	**71.25**	**46.17**	**65.00**
Calculation of Producer Incentives								
Trucking Premiums	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CWB Transportation Savings	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sub Total - Producer Incentives	-	-	-	-	-	-	-	-
Total - Export Basis	**55.76**	**64.24**	**60.37**	**72.97**	**52.42**	**71.25**	**46.17**	**65.00**
CWB Final Price 1 CWRS	190.82	240.64	190.82	240.64	190.82	240.64	190.82	240.64
Adjusted CWB Final Price 1 CWRS	195.97	264.61	195.97	264.61	195.97	264.61	195.97	264.61
Visible Netback to Producers	**140.21**	**200.37**	**135.60**	**191.64**	**143.55**	**193.36**	**149.80**	**199.61**

(1) – In the aggregated form presented here, freight rates and the Freight Adjustment Factors (FAF) are averaged by province.

(2) – The applicable rail freight is calculated by taking the lesser of the Thunder Bay rate plus FAF, or the Vancouver rate.

The methodology for calculating the total export basis for CWB wheat and durum is as follows:

1.) **Determine the applicable rail freight**: The applicable rail freight for wheat and durum is the lesser of the rail freight to Thunder Bay plus the appropriate Freight Adjustment Factor (FAF) or the rail freight to Vancouver. This is the actual freight deduction from producers' cash tickets.

2.) **Add the cost of commercial trucking** from the farm to the elevator. Costs will be estimated on the basis of a 40-mile haul to elevator.

3.) **Add the primary tariff for elevation.** If more than one company is at a location, the average of posted tariffs will be calculated. The figure used is the maximum amount that can be charged – the potential charge.

4.) **Add the primary tariff for dockage (terminal cleaning).** If there is more than one company at a location a simple average will be calculated. The figure used in the calculation is the maximum amount that can be charged – the potential charge.

5.) **Add the CWB costs from the appropriate pool account (total operating costs).**

6.) **Subtract an estimate of producer incentives.**

- Data on *trucking premiums* paid to producers will be provided by the grain companies.
- Data on the amount of *transportation savings* contributed to the pool accounts will be provided by the CWB.

The visible producer netback for wheat and durum is calculated as follows:

1.) **Adjust the CWB final price for the CWB operating costs** (increase the final price by the CWB operating costs).

2.) **Subtract the total export basis from the adjusted final price**.

APPENDIX B

BACKGROUND: EDY WONG, Ph.D.

PROFESSIONAL BACKGROUND

- National Board of the Purchasing Management Association of Canada (PMAC)
- Chair, National Task Force on Education and Accreditation, PMAC. The mandates of this task force are (1) the identification the "body of Knowledge" in supply chain management and industry expectations for the skills of supply chain professionals and (2) revision of PMAC's current education programs and establishment of new professional credentials if appropriate.
- Founder of E-Taipan, an Edmonton based company establish in 2000 to develop and market an E-business integration package for wholesalers and international distributors.

ACADEMIC EXPERIENCE

Program /Course Development

- Concept originator and initiator for the Bachelor of Applied International Business and Supply Chain Management (ASCM) Program, Grant MacEwan College, Edmonton, Alberta.
- Author of the following courses in the ASCM program: Principles of Supply Chain Management, Introduction to E-Business, Logistics decision-Making, Global Supply Management, and Warehouse Management.

Instructional Experience

- Logistics decision-Making
- Global Supply Management

PROFESSIONAL TRAININGS

Executive Programs

March 2001	*Transportation/Logistics Executive Program*, The Transportation Center, Northwestern University, Evanston, Illinois
May 2000	"*Managing Warehouse Operations*," Educational Seminar Series, Warehousing Education and Research Council, Atlanta, Georgia
April 2000	*E-Commerce: Electronically Linking the Supply Chain*, Logistics Management Seminars, University of North Florida/Ohio State University/Council of Logistics Management, Jacksonville, Florida.

March 2000	*Executive Program on Supply Chain Globalization,* Cranfield School of Management, University of Cranfield, Bedford, England, U.K.
June 1999	*1999 Executive Program in Logistics & Supply Chain Management*, York University, Toronto

Industry Workshops

June 2001	*The SCOR (Supply Chain Operations Reference Model) Workshop*, The supply Chain Council, Anaheim, California.
February 2001	S*enior Supply Chain Executives Retreat*, The Supply Chain Council, Phoenix, Arizona
April 2000	"*Technology Management for a Connected W*orld," Trivoli Systems Canada/IBM Canada, Toronto, Ontario.
January 2000	"*Developing High - Performance Supply Chain Achievement – A Cross Functional Approach*," The Canadian Association of Logistics Management/Michigan State University, Toronto.

Conferences

March 2002	*The 13th Annual North American Research/Teaching Symposium on Purchasing and Supply chain Management*, Dallas
September 2000	*Supply Chain World Europe Conference*, Amsterdam, Netherlands.
November 1999	*Globalizing the Supply Chain*, Canadian Association of Logistics Managers (CALM) Conference, Toronto, Ontario.
October 1999	*1999 American Production and Inventory Control Society (APICS) International Conference*, New Orleans, Louisiana.

PROFESSIONAL MEMBERSHIPS

October 1999 to Present	Council of Logistics Management
September 1999 to December 2001	Canadian Association of Logistics and Supply Chain Management Managers
February 2000 to December 2001	The Supply Chain Council, North American Chapter

AWARD

June 2001	Award of Excellence, the Northern Alberta Transportation Club, Edmonton.

APPENDIX C

MONITORING THE GRAIN HANDLING AND TRANSPORTATION SYSTEM SUPPLEMENTARY WORK ITEM

PRELIMINARY REPORT ON CHOSEN METHODOLOGY
SEPTEMBER 2002

SUMMARY

In selecting a sample of grain stations for the purpose of future studies, it is important to identifying those which will have the highest economic viability and sustainability. This assumption is necessary to ensure that the subjects chosen will have the longevity required for a meaningful study over time. In identifying these factors, we have considered the following:

- The quality and availability of data;
- The regional impact or importance of the stations;
- Capacity of the elevators/stations;
- Utilization of the elevators/stations;
- Distribution of elevators (as an indication of regional duplication and competition);
- Producer demand;
- Productivity of stations/elevators;
- Trends in producer and regional demand;
- Efficiency measures;
- Proximity to transportation routes; and
- Changes in demographics;

While the above list approximates a reasonable representation of the underlying factors that one would include in the present study, the lack of readily comparable statistics and time-series data on many of the variables has precluded the inclusion of trend and change variables in our study. The data that are available essentially exist at a point in time. Once the data are filtered into a set of comparable statistics, the number of variables we can include in our study is reduced even further. The list of available variables amenable to our analytical treatment include production, land area, population, the number of grain stations, the number of elevators at each station, storage capacity of elevators, and data on delivery at the stations. They all exist at the agricultural district level. Additionally, reliable statistics on transportation facilities are also unavailable. In view of the fact that unit transportation charges are similar for all producers, who are essentially price-takers, we have elected to put aside this consideration as well.

In selecting the final sample, the criteria of long-term economic viability and sustainability bring into focus the relevance of elevator throughput and the number of elevators at each station. Using this sub-set of our sample, we have determined that the following factors should be used in the selection of elevators/stations for further study.

POTENTIAL FACTORS

1. Producer Demand:

Score for producer demand:

- Standardized output unit (1,000 tonnes) per station in district (This will give the same value for all stations in the district but will also reflect station or elevator distribution across districts).

2. Regional Importance

Score for regional importance:

- Ratio of total delivery at station to total production in district
- Ratio of total annual delivery at station to total delivery in district **OR** Ratio of total delivery at station to average station delivery in district

3. Capacity Utilization (i.e. Turnover)

Score for capacity utilization:

- Ratio of delivery at station to capacity;

THE SELECTION PROCESS

The stations to be selected in our exercise will be chosen in a two-stage process. First, the weighted score model will be used to rank the grain stations in our sample. For the purpose of this exercise, stations would be divided into two categories to account for major centers that serve as distribution centers but have little local production. Second, considerations not amenable to formal quantitative treatment in our study such as geographical diversity, and the role of major centers can be brought to bear in determining the final representative sample for this study. The latter exercise will necessarily entail the use of subjective judgment but will also permit the inclusion of factors not formally accounted in the weighted score model.

Specifically, the Weighted Score Model:

Total Weighted Score = $\Sigma W_i S_i$

Where:

i = index for factors
Wi = weight for factor i
Si = score of the location being evaluated for factor i

While the score values may be calculated using the available data, the determination of the weights which reflect the relative importance attached to each factor is a process that is characterized by judgment and subjective knowledge of the relative significance of the factors. The assignment of weights is an exercise that will be conducted in consultation and with input from the clients at a later date.

Finally, conventional sampling techniques would normally call for the selection of between 5 and 10 percent of the available grain stations. With approximately 325 grain stations, an appropriate sample size would fall somewhere between 16 and 32 stations. A sample size based on a midpoint value of 7.5 percent, or 24 stations, would be statistically valid.