

Information Bulletin

NUMBER 98· FEBRUARY 2007

CANADIAN WHEAT BOARD PERFORMANCE BENCHMARKING

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with support from: The George M. Cormie Endowment

Library and Archives Canada Cataloguing in Publication

Pedde, Richard, 1961-

Canadian Wheat Board performance benchmarking / by Richard Pedde.

(Information bulletin ; no. 98)

Includes bibliographical references and index.

ISBN 978-1-55195-942-9

1. Canadian Wheat Board--Evaluation. 2. Grain--Canada--Marketing.
3. Grain--Prices--Canada. 4. Grain trade--Canada. I. University of
Alberta. Western Centre for Economic Research II. Title. III. Series:
Information bulletin (University of Alberta. Western Centre for Economic
Research) ; no. 98

HD9044.C24C358 2007

381'.413109712

C2007-901471-2

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Introduction and Overview

Whether or not the Canadian Wheat Board (CWB) should be retained in its present form as sole buyer of Prairie grains is the subject of current debate and a vote by Western Canadian grain farmers in March 2007. This paper contributes to the discussion by adducing new results on the performance of the CWB. It is hoped that the findings will enable more informed voting and follow-up action.

In 2001, the Board of Directors of the CWB had commissioned a performance review of its activities and agreed to the criteria to guide such an evaluation. The so-called Gray Report, "Benchmarks to Measure CWB Performance", focused on the difference between net farmgate prices received by Canadian farmers under single desk selling and the net farmgate prices they would have received, other things equal, in the absence of the CWB. Thus, prices paid on particular days by certain elevators at specific delivery points in Montana and North Dakota were compared to payments received by Western Canadian producers at similar locations. This benchmarking process was subject to external review and based on confidential data that were verified and considered accurate by an impartial third party. Only one benchmarking report based on this methodology was ever made public. It pertained to only one market segment, namely Hard Red Spring Wheat (HRSW), a segment in which the CWB has its strongest market power as a seller. This report was published in January 2002 and covered only the crop year 2000-01.

The lack of more recent information suggests that updating and extending the benchmarking exercise is overdue: intelligent choices cannot be made without a solid and current informational underpinning. Following the agreed procedure and covering the period 1998-2003, our results show that Western Canadian producers received lower returns than comparable producers in the Western US for most grains and grades. Discussions about the future of the CWB, therefore, may have to extend to asking whether, even if it is preserved in its present form, the CWB has the organisational structure and skills necessary for success in today's fast-paced global trading environment.

The paper is organized as follows. A brief historical overview of events leading up to the Gray Report is followed by a more detailed description of the performance measurement process. The third section describes the experience of US farmers in getting good prices. The fourth section places "outperformance" into an appropriate context by discussing the economic concept of "market efficiency". Then our benchmarking results are presented for the various types of grain. A short summary concludes the paper.

Historical Background

Much energy has been spent over the last fifteen years criticizing or defending the CWB; after all, the livelihood of some 60,000 grain producers, including the author's, is at stake. In the academic world, there are two schools of thought on benefits versus costs of the CWB.¹ Amongst numerous studies, a 1996 CWB sponsored study² explored the value of the CWB. Using data not publicly available and therefore neither verifiable nor replicable, the study found that CWB's single desk marketing between 1989/81 and 1993/94 added C\$13.35 per tonne (C\$0.36 per bushel) to the income of Western Canadian producers. A rival study, commissioned by the Alberta Government³, but using publicly available information for approximately the same period, estimated that the CWB system cost wheat producers as much as \$22.96 per tonne.

The Board of Directors of the CWB, wanting to inform the debate and help clarify the issues, commissioned Richard Gray of the University of Saskatchewan to establish an unbiased measure of performance.⁴ The result was the publication of the two studies referred to above. The purpose of the benchmark study was to eliminate as many assumptions as possible, making the benchmark acceptable to farmers and academics alike, as well as to champions and opponents of the CWB. With the framework agreed to by its Board of Directors, the benchmark is likely the only tool available to evaluate the performance of the CWB. This paper, therefore, relies on this approach and not only extends Gray's 2002 report to a longer time frame, but also extends the coverage to grains other than hard red spring wheat.

Modifications of the CWB Performance Measurement Process

The CWB's self-directed benchmarking has addressed many issues though some are still outstanding. Perhaps the most important is whether or not the CWB board of directors is truly committed to the benchmarking process. Only one benchmark has been publicly released thus far – in January 2002 for the crop year ending July 2001 – and it appears neither that revisions nor updates to the benchmarking process appear to be contemplated nor that another benchmark will be produced.

¹ The Canadian Wheat Board operates separate pool accounts for wheat, durum wheat, barley and designated barley for which it has federally legislated monopoly powers. Revenue from CWB sales is deposited into the appropriate of these four pool accounts and is returned to producers as a pooled payment in the form of initial, interim and final payments. Pool account deficits occur when the initial and / or interim payments exceed sales revenue. The federal government provides a guarantee to the CWB should this occur.
[http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/sis541](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/sis541)

² Kraft, D.F., W.H. Furtan, and E. W. Tyrchniewicz. Performance Evaluation of the Canadian Wheat Board. Winnipeg: Canadian Wheat Board, January 1996.

³ Carter, C.A. and R.M.A. Loyns. "The Economics of Single Desk Selling of Western Canadian Grains." Edmonton: Alberta Agriculture, Food and Rural Development, 1996.
[http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agc2251?OpenDocument](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agc2251?OpenDocument)

⁴ CWB Benchmark Discussion Papers available at: <http://www.usask.ca/agriculture/agec/research/working.htm>

One of Gray's goals was to have the benchmarking process development continue to evolve not only to adjust for gaps in data availability but also to address producer demands for more and better information. The benchmark process was to evolve and incorporate more factors over time while still remaining readable enough and therefore relevant to producers.

The focus of the first benchmark was Hard Red Spring Wheat.⁵ Arguably, the CWB has more monopoly powers in this commodity – as evidenced by its relatively high market share – as compared to other grains. In contrast, as feed wheat competes with corn, the CWB has considerable less pricing power. The results of benchmarking CWB performance in grains where it does not have as much market power may be quite different from HRSW. To provide a better overall picture, a benchmark for other grains must be developed for a complete performance evaluation.

A significant issue in the benchmarking process is the method of price comparisons. The CWB's implementation of Gray's recommendations entails comparing prices on sale dates only. This method measures the premium the CWB can extract from the market on those given days. Conversely, the "naïve strategy" benchmark presumes that an equal amount is priced each and every day over a reference period. Actual performance, which includes premiums earned or lost due to the opportune (or inopportune) timing of sales, is then measured against this reference.

A simple example illustrates this fundamental difference in measurement techniques. Suppose HRSW was \$4 per bushel for every day during the reference period save one day (e.g. March 1st), on which it was \$3. Suppose further that the entire crop was sold on that particular day (March 1st) at a premium price of \$3.50 per bushel. Given the CWB criteria, the CWB benchmarking process would state, quite correctly, that there was outperformance of \$0.50 per bushel. The naïve benchmarking would equally correctly state there was underperformance by \$0.496 per bushel.⁶ The latter approach largely measures how well the CWB does in price forecasting and acting upon those price forecasts, the very essence of trading. Conversely, it could be argued that the former method is a largely a measure of extracting product quality premiums. Anecdotal evidence indicates that this issue is not clear to many producers or even all members of the Board of Directors. It is incumbent upon the publishers of any benchmark, including the CWB itself, to clarify this point.

There are numerous further issues raised by David Buschena of Montana State University (in a critique commissioned by the CWB itself), by the Sparks Study for the Alberta Government, and by others, most of which will require the commitment and cooperation of the CWB directors and management to address. Regardless of the

⁵ Gray rejects the use of an experimental group for an open market because of the self selection and reporting bias and that US agents may give the experimental group preferable treatment. It should be noted that this same logic is equally applicable to the CWB benchmark process evaluating only Hard Red Spring Wheat.

⁶ Over-the-counter derivative contracts guaranteeing the daily average wheat price have been available in the institutional wholesale market since 1992. Aside from the traditional participant interests, non-agricultural entities use such contracts to gain exposure to the grain markets. The author managed a trading desk that offered such products.

unresolved issues, this process can give some valuable guidelines to CWB performance.

Getting Good Prices: US Farmers' Experience

CWB performance measuring studies do not refer to the wealth of information about US producers' experiences in marketing their grain – yet the University of Illinois regularly updates its performance review of US producers in Illinois and some of the market advisory services available to them.⁷ In the corn, soybean and wheat evaluations, the market benchmark price is the 24-month average cash price adjusted to a harvest equivalent basis.⁸ This benchmark could well be referred to as a “naïve strategy”, which essentially entails a producer selling a fixed percentage of production each and every day over the 24-month period, regardless of prevailing prices or expectations of future prices.⁹ They also measure the average price actually received by farmers for a crop. The results of these pricing performance studies (Tables 1 to 3) consistently show:

- Farmers under-perform the market benchmark.
- Advisory services may modestly outperform farmers.
- Advisory services retained by farmers may have difficulty outperforming market benchmarks, especially on a risk-adjusted basis.
- There is little evidence that past performance of market advisory services can be used to predict future performance.

What of “Efficient Markets”?

Discussion of CWB performance deserves framing in the context of the market it operates in, which means a financial marketplace. According to Eugene Fama (1970, updated 1991), the efficient markets paradigm states that security prices correctly and almost immediately reflect all available information and expectations. As such, investors cannot consistently outperform the market because of the sporadic or random flow in which information is received and the subsequent, almost immediate, price adjustment to reflect the latest information. The price dynamic process is usually referred to as a random walk¹⁰ where the expected average change in price is zero. Therefore, the strict definition of efficient markets implies that the

⁷ AgMAS Report 2002-06 “The Pricing Performance of Market Advisory Services in Corn and Soybeans Over 1995-2001” http://www.farmdoc.uiuc.edu/agmas/reports/03_05/text.html , and, “Do Agricultural Market Advisory Services Beat the Market? Evidence from the Wheat Market Over 1995-1998” http://www.farmdoc.uiuc.edu/agmas/reports/2001-01/agmas_2001-01.pdf

⁸ Gray’s benchmark allows for an adjustment “based on CWB experience” to quoted prices vs. actual traded prices. In speaking with the authors of the AgMAS studies, it is their view that this type of adjustment is not warranted.

⁹ It has been shown that for corn and soybeans, the price realized via a more manageable strategy of routinely selling twelve times during the marketing window very closely approximates the average cash price achieved by selling equal amounts each and every day.

¹⁰ Campbell, Lo, and MacKinlay, 1997; Tomek and Querin, 1984

market correctly prices all securities at any time and, as a result, investors will not find securities mispriced enough to yield an assured profit.¹¹

Given the theory of efficient markets, it is not surprising to note that the advisory programs surveyed only outperformed the naïve 24-month benchmark by, at best, marginal amounts: 2% for soybeans; are neutral (0%) for corn; or have underperformed substantially (about 5%) for wheat. Similarly, it is not surprising that farmers underperform this same index by almost 4% for corn and by almost 1% for soybeans. The implications are clear: neither farmers nor advisory programs consistently “beat the market”.

Furthermore there is also a wide variance of performance – the financial economics definition of risk – compared to the naïve strategy by both advisors and farmers. In particular, though the farmers’ benchmark for soybeans only underperformed by an average of less than 1% over the 5 year period, the \$0.68 underperformance in 1998 had to be financed by gains for 3 years on either side. Such a pattern is likely to affect the producers’ capital situation – the willingness of banks to finance – and more importantly, it will have a considerable and immeasurable impact on producer psychology.

Given Fama’s paradigm the results of Illinois farmers and advisors should not be surprising; it is extremely tough to consistently outperform the market, be it as an individual or as a larger trading organization.

Show Me the Money: Historical Results

A benchmarking analysis similar to the one Richard Gray recommended was also back tested. This involved a simple analysis of Montana producer prices, collected and reported by the US Department of Agriculture (USDA)¹² over a 5 crop year period, 1998 to 2002. With this longer time horizon, short term performance deviations have by definition been smoothed. As per Gray’s recommendations for more data analysis, the review covers more than HRSW: it specifically covers 3 protein levels of each of HRSW and Hard Red Winter Wheat (HRWW), Soft White Wheat, as well as Feed and Malting barley. The price data series are from a daily survey by USDA personnel, from numerous commercial entities within various Montana regions, for which five comparable regions in western Canada were used. Canadian producer returns in those equivalent delivery points (Table 4 below) are the sum of all payments from the CWB less the location specific freight and elevation charges.

Four factors suggest that the USDA price data are a fair reflection of the prevailing market values. First, the data are primarily collected for US government support programs. Second, all price quotes for a given commodity within a given region were quite similar as evidenced by the relatively tight spread between the high and low quotes within a region. Third, this data collection process is similar to the one used by the USDA staff in Illinois, the results of which are applied to the

¹¹ Efficient market hypothesis includes and / or forms the foundation of much other finance such as Random Walk price discovery so that on average an investor is unlikely to beat the market. This belief underpins arbitrage pricing theory, the capital asset pricing models and risk measurement concepts such as beta.

¹² Agricultural Marketing Services, USDA, <http://www.ams.usda.gov/LSMNpubs/index.htm>

wheat, soybean and corn benchmarking done at the University of Illinois. And finally, the USDA and CWB price collection techniques appear to be quite similar. As Table 5 (below) shows, the prices are comparable within each time span, although the CWB estimate is consistently higher. An explanation for this may well be that the facilities and freight rates applicable to the CWB reference point, Wolf Point, are different from the other points within North Central Montana.

To keep the analysis conservative, should the calculations indicate CWB out-performance, the higher CWB estimates of Montana prices would be used; this will of course reduce the measured out-performance. Conversely, if the CWB underperforms, then the lower USDA estimates of Montana prices will be used. The net result is that indications of out-performance, or underperformance, will constitute likely lower bounds.

Similar to Gray's benchmarking recommendations, this analysis does not attempt to factor in either direct or indirect government subsidies. Clearly the US loan program guarantees and other US farm programs, as well as CWB export loan guarantees, banking guarantees, initial and interim payment guarantees, freight rate caps, etc all have an impact. Given the complexity involved, these will not be addressed here.

As not all wheat, or any other grain, is fungible, definitions of quality must be clarified. Regardless of government mandated grading terminology and methodology, grain grades, particularly with products such as malt barley, are very subjective.¹³ The CWB definition of "high quality wheat" is: Nos. 1 and 2 Canada Western Red Spring (CWRS) 13.0% protein or higher, or, US Hard Red Spring (HRS) 14.0% protein or better.¹⁴ As not all industry sources agree on this comparison – even the CWB at times compares #1CWRS 13.5% to #1DNS 14% - the analysis herein has again been done on a conservative basis. If the CWB appears to be outperforming Montana producer returns, then the comparison is as per the CWB definition; if it appears to be underperforming, then the analysis will be purely on a grade and protein equivalent. The former would be #1CWRS 13% versus #1DNS 14%; the latter would be #1CWRS 14% versus #1DNS 14%. The difference between the two approaches is approximately \$15 per tonne.

This conservative approach to performance measurement was used in the analysis of all of the grains. With regards to durum, the average of all protein levels paid by the CWB was compared to the price for "ordinary" durum prices in Montana. Similarly, #3 Malt Barley, 70% plump, was compared to #1 Special Select 2 Row CWB pricing and #2 Feed Barley with #1 CWB feed barley. Conservatively, the cumulative "benefits of the doubt" again averages \$15 per tonne bias in favour of the CWB.

The most general observation from this data set is that CWB performance is not consistently superior to the naïve strategy in any of the grains or any of the grades (Tables 6 to 11 below). More specifically, there is no evidence of a consistently positive performance in any of the grains or grades, supporting the premise that grain markets are efficient.

¹³ The argument has been made that in the CWB's quest for higher returns, customers simply "raised the specs," resulting in lower volumes transacted at higher quality levels.

¹⁴ Ibid 68, http://www.cwb.ca/en/growing/market_analysis/mrac.pdf.

With regards to specific grains, the results of the analysis indicate that the CWB achieves higher, but still not excess, returns marketing high grade and high protein HRSW than other grains. The average returns over the 5 year period and 3 protein levels is a little more than \$1 per tonne than the naïve strategy but the variation around that average is from a \$9 premium (#1 CWRS, 13%, 1999-00 Lethbridge / Billings) to a negative \$13.59 (#1CWRS, 14%, 2001-02, Taber / Golden Triangle). The CWB self evaluation of 2000-01 claimed that Canadian producers received \$10.49 per tonne more at the farmgate. This analysis shows for #1CWRS 13 to 15% the return was -\$6.74 against the average of daily prices over all 5 regions.

The data for other grains equally indicate that excess returns are not to be had, or had consistently, by western Canadian producers. In markets where the CWB has little if any pricing power - such as HRWW where CWB exported 30,000t annually, 1992-97, versus single terminals in Midwest US having a larger one time capacity - the analysis shows sub-par returns. For HRWW over the 5 yr period the average was -\$14.59 with a low of more than -\$36 and a high of +\$10.84. That is, the total returns from the CWB are on average lower than prices paid at Montana locations.

CWB exports of feed barley compete with the large and diverse animal feed market including corn, oil seed meals, fats, tallow, etc. Pricing power in a market where the US produces over 10 billion bushels of corn and exports over 2 billion is unlikely. The analysis supports this where the return is marginally negative (\$0.10) but a wide variation from +\$21.73 to -\$22.51. The outperformance in two years, but equally disappointing performance in the other three years, is reminiscent of the situation for Illinois soybean growers in 1998.

Ironically, in another market in which the CWB does not have much market power, Soft White Wheat (CWB exported 181,000t vs. 5,247,000t from US, 1992-97), it appears as that the CWB may have added value (+\$12.85). This deserves a caveat: because Soft White Wheat production in Montana is not continuously grown in all regions, there are relatively few data points and any conclusions from them largely rely on the accuracy of comparing Lethbridge with Billings, Hardin and Malt production.

In a market where the CWB should have some pricing power, amber durum, there is some evidence of better returns. The CWB exported almost 3 times as much durum as the US did in the 1992 to 97 period. Because durum is not grown in all of the regions consistently, the data is not as complete but the average return is +\$2.20 with a variation of +\$11.23 to -\$8.03. There are two issues that make the results less than clear cut: the analysis was a blend of all #1 CWAD protein levels compared to Montana ordinary durum prices, and, the ability of the CWB to restrict producer deliveries to less than 100% of the contracted amount (2002-03 and 2005-06).

In what some describe as an identity preserved market, malt barley, the data shows performance is lagging behind the naïve strategy: the average was more than -\$23. The results would be even more disappointing if the grade “USDA #3 or better w/ 70% plump” were compared to grades lower than the Canadian Special Select.

In general, for the grains surveyed over the 5 year period, the results are commensurate with financial economic theory. Just as producers in Illinois struggle to gain value over the simple naïve “equal daily sales strategy”, even when using advisors, Canadian producers struggle as well via the CWB.

Summary

If history is any indication, the debate on whether or not the Canadian producers could earn higher returns with or without the CWB will continue for some time. For example, based on data not much different from that used by the CWB self benchmarking process, this paper comes to quite different conclusions. The one and only CWB performance benchmark done by the CWB indicates that it is performing well; the analysis performed here shows quite the opposite over a wider spectrum of grains and a longer time frame.

One of the main purposes of any benchmarking process is to aid management in the decision making process. The Gray benchmarking process is invaluable in promoting quantifiable performance measurements. This paper attempts, at least partially, to fulfill this. The analysis should help interested Canadians move away from the simple rhetoric that too often has suffused the CWB debate.

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 For the CWB version of its history see
http://www.cwb.ca/en/about/vision_mission/history.jsp
 For an alternative perspective see <http://aic.ucdavis.edu/oa/stecwb.pdf>

Tables

Table 1: Soybean: Comparison of Net Advisory Prices, Farmer and Benchmark Prices

Crop Year	# of Advisors	Average Advisor Price	24 Month Bench-mark	20 Month Bench-mark	Farmer Bench-mark	Difference between Advisors and 24 Month Benchmark	Difference between Advisors and 20 Month Benchmark	Difference between Advisors & Farmer Bench-mark	Difference between Farmer & 24 Month Bench-mark
1995	25	6.59	6.26	6.39	6.59	0.33	0.20	-	0.33
1996	24	7.27	7.08	7.21	7.17	0.19	0.06	0.10	0.09
1997	23	6.38	6.30	6.22	6.17	0.08	0.16	0.21	(0.13)
1998	22	5.82	5.86	5.64	5.18	(0.04)	0.18	0.64	(0.68)
1999	25	5.67	5.50	5.30	5.39	0.17	0.37	0.28	(0.11)
2000	26	5.44	5.42	5.38	5.29	0.02	0.06	0.15	(0.13)
2001	26	5.45	5.35	5.21	5.55	0.10	0.24	(0.10)	0.20
Average		6.08	5.96	5.91	5.91	0.12	0.17	0.17	(0.05)

Table 2: Corn: Comparison of Net Advisory Prices, Farmer and Benchmark Prices

Crop Year	# of Advisors	Average Advisor Price	24 Month Bench-mark	20 Month Bench-mark	Farmer Bench-mark	Difference between Advisors and 24 Month Benchmark	Difference between Advisors and 20 Month Benchmark	Difference between Advisors & Farmer Bench-mark	Difference between Farmer & 24 Month Bench-mark
1995	25	3.03	2.90	3.07	3.06	0.13	(0.04)	(0.03)	0.16
1996	26	2.63	2.65	2.66	2.50	(0.02)	(0.03)	0.13	(0.15)
1997	25	2.32	2.33	2.27	2.23	(0.01)	0.05	0.09	(0.10)
1998	23	2.17	2.02	2.05	1.97	0.15	0.12	0.20	(0.05)
1999	26	2.02	2.05	1.97	1.93	(0.03)	0.05	0.09	(0.12)
2000	27	2.13	2.09	2.01	1.95	0.04	0.12	0.18	(0.14)
2001	27	1.99	2.00	1.94	1.95	(0.01)	0.05	0.04	(0.05)
Average		2.32	2.32	2.29	2.23	-	0.03	0.09	(0.09)

Table 3: Wheat: Comparison of Net Advisory Prices and Benchmark Prices

Crop Year	# of Advisors	Average Advisor Price	Max. Advisor Price	Min. Advisor Price	24 Month Bench-mark	20 Month Bench-mark	Difference between Advisors and 20 Month Bench-mark	Difference between Advisors and 24 Month Bench-mark
1995	24	3.79	4.71	3.01	3.61	3.77	0.18	0.02
1996	23	3.81	4.94	2.74	3.95	4.07	(0.14)	(0.26)
1997	20	2.64	3.90	1.34	3.22	3.12	(0.58)	(0.48)
1998	21	2.36	3.33	1.34	2.90	2.75	(0.54)	(0.39)
Average		3.15	3.48	2.76	3.42	3.43	(0.27)	(0.28)

Table 4: Comparable Montana & Canadian Grain Buying Locations

Region	1	2	3	4	5
Montana Regions	Billings	Golden Triangle	Great Falls	North Central	North East
Buying Points MT Region	Billings	Cut Bank	Ft. Benton	Moccassin	Wolf Point
	Hardin	Conrad	Great Falls	Havre	Plentywood
	Malt			Moore	Circle
Equivalent Canadian Points	Lethbridge	Taber	Medicine Hat	Swift Current	Moose Jaw

Table 5: Comparison of CWB and USDA Estimated Montana Prices

	Monthly average of CWB estimate of DNS 14% Wolf Point MT prices	Monthly average of USDA estimate of DNS 14% North East MT prices	Difference
Jan-03	3.626	3.480	0.15
Feb-03	3.716	3.623	0.09
Mar-03	3.676	3.576	0.10
Apr-03	3.549	3.456	0.09
May-03	3.585	3.422	0.16
Jun-03	3.430	3.240	0.19
Jul-03	3.255	3.090	0.17
Aug-03	3.462	3.351	0.11
Sep-03	3.437	3.263	0.17
Oct-03	3.490	3.324	0.17
Nov-03	3.732	3.579	0.15
Dec-03	3.661	3.608	0.05
Average	3.552	3.418	0.13

Table 6. Relative Returns to Canadian vs Montana Producers for Comparable Grains, Protein Levels and Delivery Points, in Canadian dollars per tonne

			1998-99	1999-00	2000-01	2001-02	2002-03	
DARK NORTHERN SPRING WHEAT No 1								
Payment by CWB for #1 CWRS 13% protein compared to #1DNS 13%.	13%	Billings Area	8.50	9.17	(1.05)	5.37	(4.38)	
		Golden Triangle	(0.53)	0.37	(11.11)	(3.16)	(8.97)	
		Great Falls	(0.29)	1.31	(10.47)	(2.45)	(9.67)	
		North Central Mt.	2.60	4.69	(9.74)	(1.22)	(6.44)	
		North East Mt.	5.68	8.69	(2.63)	3.50	(0.65)	
	14%	Billings Area	4.52	3.49	(3.31)	3.02	(3.50)	
		Golden Triangle	(4.36)	(4.95)	(13.59)	(4.13)	(8.39)	
		Great Falls	(4.27)	(4.03)	(12.20)	(4.10)	(9.25)	
		North Central Mt.	(1.19)	(0.55)	(11.48)	(3.32)	(5.70)	
		North East Mt.	1.60	2.91	(5.52)	3.29	0.16	
Payment by CWB for #1 CWRS 15% protein compared to #1DNS 15%.	15%	Billings Area	-	5.79	1.06	5.46	1.61	
		Golden Triangle	(2.10)	(2.64)	(7.97)	(0.92)	(3.38)	
		Great Falls	(3.74)	(2.04)	(6.86)	(1.26)	(4.29)	
		North Central Mt.	0.91	1.66	(6.22)	(0.89)	(0.76)	
		North East Mt.	4.74	6.01	(0.11)	6.28	5.06	
	HARD RED WINTER WHEAT No 1							
	Payment for #1 CWRW 11% protein compared to 1/2 (#1HRWW 11% + #1HRWW 12%)	11.5%	Billings Area	5.55	0.47	(23.22)	(12.01)	(25.34)
			Golden Triangle	(3.53)	(6.35)	(32.68)	(19.76)	(32.62)
			Great Falls	(5.98)	(6.98)	(33.06)	(26.54)	(33.63)
			North Central Mt.	(1.11)	(2.20)	(31.96)	(20.95)	(28.84)
North East Mt.			2.66	1.73	(23.73)	(11.49)	(20.43)	
Ordinary		Billings Area	10.84	8.18	(20.84)	(11.82)	(27.63)	
		Golden Triangle	0.59	(0.66)	(30.21)	(20.37)	(34.99)	
		Great Falls	(0.90)	(0.22)	(30.17)	(27.45)	(36.30)	
		North Central Mt.	3.40	3.14	(28.88)	(21.95)	(32.04)	
		North East Mt.	7.40	8.37	(21.87)	(11.24)	(22.00)	
Payment by CWB for #1 CWRW less than 11% protein compared to #1HRWW Ordinary.								

HARD AMBER DURUM WHEAT No 1

	Golden Triangle	1.21	9.95	(2.21)	6.98
	Great Falls	1.08	7.84	(6.58)	(1.13)
	North Central Mt.	(0.04)	6.82	(1.82)	-
Payment by CWB for #1 CWAD 13% compared to HADW 13% protein.	North East Mt.	-	8.83	9.68	10.94 (1.75)

SOFT WHITE WHEAT No 1

	Billings Area	10.11	14.18	22.10	23.25	-
Payment by CWB for #1 SWS compared with SWW No 1.	Great Falls	1.87	5.61	-	-	-

FEED BARLEY No 2

	Billings Area	4.64	(2.36)	(9.53)	20.78	-
	Golden Triangle	14.13	(6.04)	(5.12)	8.30	(21.48)
	Great Falls	11.24	(8.78)	(7.14)	7.87	(22.51)
Payment by CWB for #1 CW Feed compared with Feed Barley #2.	North Central Mt.	16.17	(6.75)	(5.92)	8.79	(19.91)
	North East Mt.	15.23	(2.04)	(1.73)	21.73	(12.05)

MALTING BARLEY

	Golden Triangle	(25.98)	(27.56)	(31.60)	(34.15)	(15.65)
	Great Falls	(20.66)	(14.42)	(19.96)	(32.76)	(7.12)
Payment by CWB for Special Select 2 Row compared with "No 3 or Better, with 70% Plump or Better"	North Central Mt.	(22.63)	(24.98)	(29.58)	(37.36)	(10.93)

Notes:

1. Canadian producer returns calculated from CWB total payments basis Vancouver / Thunder Bay less appropriate listed rail and elevation charges.
2. Montana producer returns calculated as average of daily prices as quoted to USDA by the various delivery points within each region over the relevant crop year. The conversion to Canadian dollar value is at the Bank of Canada noon day rate.
3. Canadian government guarantees of initial and interim payments are included in Canadian producer returns.
4. Timing of payments **not** reduced to a "Harvest Equivalent" via present value function for either Montana or Canadian producers.
5. Canadian producer returns are not adjusted for cleaning and CGC charges or for trucking premiums received.

Sources:

Freight Rates:	http://www1.agric.gov.ab.ca/\$department/deptdocs.nsf/all/econ1523?opendocument http://www.cta-otc.gc.ca/rail-ferro/grain/rates/index_e.html
Elevation Charges:	http://grainscanada.gc.ca/Pubs/tariffs/tariffsfs-e.htm and Canadian Grain Commission; Agricore United charges were used as a proxy for other entities.
Montana Producer Prices:	http://www.ams.usda.gov/LSMNpubs/index.htm and USDA Market News Service, Billings, MT
USDA Grain Standards:	http://www.usda.gov/gipsa/reference-library/standards/standards.htm