

VISIONS OF GROWTH:

Policy Implications for the 2004/05 Crop Year

Economic and Policy Analysis Directorate
Policy Branch

October 1998

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Agriculture and Agri-Food Canada

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Executive Summary

A target of "doubling the combined value of exports and domestic processing of western grain" over a 10-year period has been established by an advisory group of senior executives from the grains industry (called the Vision Committee). This goal of achieving such ambitious growth in western grains and oilseeds production is intended to expand the vision of the corporate strategies and policies of the industry. AAFC, in conjunction with the Western Grains Strategic Planning Group, conducted this analysis with the objective of quantifying the potential for the western agricultural sector to meet this growth target.

The analysis defines and quantifies the target in terms of the value of exports and domestic processing of western grains and oilseeds. It is estimated that this value was \$12 billion in 1994. Doubling the sector's output by 2004/5 yields a total Grain Visions Target of \$24 billion.

The values of grains and oilseeds production in 2004/05 are estimated based on the AAFC Medium Term Baseline. These estimates indicate that the total value of grains and oilseeds exports and domestic processing would be \$16.4 billion by 2004/05 if current production patterns and policies were to continue. From this baseline, scenarios are modelled to examine simultaneously the impacts of increased livestock production and meeting the 1994 Canadian Wheat Board export forecasts for wheat and barley. By changing crop yields and relative price levels, insights as to the requirements for meeting the target are determined.

The first part of this report examines the scenarios and the results in terms of how closely they meet the established target. The main conclusion is that a large gap remains between what the industry would like to achieve and what might be obtained in 2004/05. Even with optimistic increases in yields that allow higher bulk exports, and a significant increase in red meat production, the industry still faces an unresolved challenge of some \$6-7 billion. Relative to the 2004 baseline figure of \$16.4 billion, even aggressive growth scenarios contribute only an additional \$1 billion to the value of output. These results are then put into broader terms with respect to the resource constraints facing current agricultural production.

The analysis provides a backdrop on which to discuss the future of all aspects of the Prairie grain and livestock industries. The second part of the report is thus designed to stimulate discussion regarding the possible policy concerns or pressures that might emanate from these results. A number of issues are raised under the broad headings of regulation, research and development, marketing systems, and other related policy issues.

One of the impacts of setting such an optimistic target is that it forces the discussion away from the status quo. It also encourages the search for innovations and new strategies. Clearly, stakeholders (industry, government and producer groups) will assess the findings from their own perspective.

Analysis and Implications

Background

Agriculture and Agri-Food Canada (AAFC), in conjunction with the Western Grains Strategic Planning Group¹, conducted this analysis. The intention was to quantify the potential for the western agricultural sector to meet a growth target established by the Vision Committee. By admission, the qualitative target to achieve sustained growth in the western grains and oilseeds industry was one intended to stretch the imagination of those in industry. It was hoped that the industry, as a whole, would seek collective solutions to the challenge.

The Vision Committee set a target of "doubling the combined value of exports and domestic processing of western grain" over a ten-year period. As with any attempt to come up with a single number, what is included and what is excluded in the definition of the target must be specified. The definition originally agreed on by the Planning Group includes the value of cattle and hogs produced on the Prairies (net of feed grain consumed) and is the one used throughout this study.² Also included are the value of bulk grains and oilseeds exports, the value of processed products of grains and oilseeds produced on the Prairies³, and the value of feedgrains consumed on the Prairies. This Grain Vision Target (GVT) totals \$24 billion for the 2004/05 crop year.

The analysis was submitted to the Planning Group and presented to the industry. The results are summarized in Figure 1, and the method is described in the Technical Appendix. The following discussion represents the project team's assessment of the analysis.

-
1. The Minister of Agriculture's *May 16th Group* is an advisory body composed of senior executives from the grains industry. The Vision Committee is a subset of this group which developed a set of targets for the industry. The Western Grains Strategic Planning Group was formed by the Vision Committee to develop strategic plans for achieving these targets.
 2. Adding more commodities or the value of further-processing would affect both the base as well as the size of the "doubling" target. After considering several alternative definitions, it was concluded that this had little impact on the key factors resulting from the analysis.
 3. Includes only the first level of processing such as flour, millfeeds, malt, starches, canola oil and meal, gluten, ethanol, particle board plus a few other products.

Can the Prairies Reach the Target?

It is estimated that the value of the grains and oilseeds industry output in 1994 on the Prairies was \$12 billion. To double sector output to \$24 billion, as per the target statement, presents a real challenge. Several scenarios demonstrate this challenge in Figure 1. Based on AAFC's 1996 Medium Term Baseline (MTB), the value of included activities would reach \$16.4 billion by 2004/05. This is shown by the bar labelled 2004 MTB. The MTB was adjusted to account for the planned expansion of processing activities of grains and oilseeds announced since the 1995 federal budget. Hence, the 2004 projections used in this analysis are not quite the same as those presented in the MTB because they allow for investment currently being undertaken. Productivity growth of crops and livestock are based on historic trends.

There is an expectation that red meat production (cattle and hogs) will expand significantly beyond the projections in the MTB. This is partially in response to reforms in the grain handling and transportation system such as the removal of the Western Grain Transportation Act (WGTA) subsidy on rail freight costs for moving grain to Vancouver or Thunder Bay. This is reflected in an aggressive growth scenario labelled 2004 AMTB (Adjusted MTB) where Prairie hog production is doubled over 1994 levels and beef production is increased by 50%. As seen in Figure 1, this would contribute another \$0.7 billion toward meeting the target, still leaving a shortfall of \$6.9 billion. A critical finding from this scenario is that expansion of red meat production of this magnitude will put considerable pressure on the land base to supply the required feedgrains and forage. Exports of feed barley virtually cease and the level of total bulk exports falls below that obtained in 1994. In addition, 1.4 million hectares of land used to produce grains and oilseeds switch to forage production to meet the feed demands of the increased beef herd.

In 1995, the Canadian Wheat Board (CWB) established export forecasts for Canadian wheat and barley for 2004/05 based on projections of demand growth in overseas markets. At that time, the CWB was fairly bullish about the potential to expand exports, especially for wheat (including durum) and malting barley⁴. The next two scenarios evaluate how the value gap would be affected if the CWB forecasts of export shipments could be achieved, over and above what are already contained in the scenario 2004 AMTB. In the scenario labelled AMTB + CWB Yield, it is estimated that productivity increases of 22% for wheat and 30% for barley⁵ would be required. Assuming this can be achieved without affecting world prices, the gap would be reduced to \$6.7 billion, a gain of only \$0.2 billion.

A second method of achieving the CWB forecast exports would be through stronger prices for wheat and barley relative to other grains and oilseeds. In the scenario AMTB + CWB Price, it is estimated that relative price increases of 30-50% would be required. Under this scenario, the gap is reduced to \$5.5 billion as the value of output increases to \$18.5 billion. Hence, a substantial challenge still remains to meet the \$24 billion target even with a set of very optimistic, if somewhat unrealistic, assumptions about the future. Higher relative prices of 30-50% for wheat and barley would shift a significant amount of land away from other commodities, reducing export shipments of canola, flax, oats, and other crops by about 5 million tonnes. It would also put the livestock sector under considerable pressure to remain competitive.

4. The CWB is currently in the process of revising its 1995 forecasts.

5. Productivity increase is defined as the additional increase in yield, over and above historic yield growth, required to achieve the CWB export forecasts of 26 million metric tonnes of wheat and 1.4 million metric tonnes of malting barley.

Key Findings from Analysis of Scenarios

There are several key findings that can be drawn from the scenarios summarized in Figure 1. First, a large gap remains between what the industry says it would like to achieve and what might be obtained. Even with optimistic increases in yields that allow higher bulk exports and a significant increase in red meat production, the industry still faces an unresolved challenge of \$6-7 billion. Relative to the 2004 MTB, these aggressive growth scenarios would contribute only an additional \$1 billion to the value of output.

Second, it would not appear that the challenge of \$24 billion of output in 2004/05 can be achieved by continuing to rely as heavily on bulk exports. The fundamental constraint is the amount of arable land available. Even with a significant increase in commodity prices, the Prairies can not produce enough grains and oilseeds to reach the target if they continue to ship them in bulk form. Value-added livestock and non-livestock products will have to substitute for bulk shipments.

Finally, competition for land and what it can produce will increase. Unless productivity can increase at unprecedented levels to offset the pressure for land, the comparative advantage that the sector currently enjoys could be eroded. These issues are also related to sustainability. As existing land is used more intensively, there is a risk that either marginal land most susceptible to degradation, or land that currently provides other environmental services such as wetlands and wildlife habitat, would be converted to more intensive agricultural management. An increase in intensive livestock operations also brings with it a special set of environmental concerns. These include water quality issues related to the management of manure, and the intensification of greenhouse gas emissions.

This analysis should not be interpreted as saying that the "doubling" target established by industry is not achievable. It simply points out that concentrating solely on increasing bulk exports and red meat production would not have a large enough impact. Furthermore, the analysis provides a perspective on some of the pressures on resources and other commodities that could arise if certain targets or forecasts are achieved. It indicates that the comparative advantage needed to be competitive in export markets is a dynamic factor, and that the strive for growth will bring a new set of pressures with which the industry must deal.

Policy Implications/Pressures

The analysis provides a basis on which to discuss the future of all aspects of the Prairie grain and livestock industry. That is one of the key objectives of setting "stretch" targets, which forces the discussion away from the status quo. It will encourage the search for innovations and new strategies. Clearly, stakeholders will assess the findings from their own perspective. Industry will use these findings to assess and plan investment strategies that will underpin any growth that is achieved. Government also needs to evaluate its policies and programmes to determine if they are consistent with what industry (and society at large) is trying to achieve. The following discussion will look at policies under the broad headings of regulation, research and development (R&D), market issues, and direct support and related issues.

Regulatory Issues

Grain Handling and Transportation System (GHTS)

One message of this analysis is that if the "doubling" target represents where industry is headed, bulk exports will have to decline as more and more grains and oilseeds are processed on the Prairies. This has significant implications for the GHTS that is geared to handling bulk commodities and moving them to port. Although recent reforms have greatly reduced the role of government, there are still some remaining issues through which government can influence the outcome and operation of the system:

- (a) **Improved efficiency** will be sought in terms of handling export grain. Also, there will be greater emphasis on internal flows of grains and oilseeds to domestic processors and on the need to transport value-added commodities to export markets. The truck, rail and sea freight systems will need to evolve to ensure distance-related issues do not deter growth and that regulations governing maximum freight rates do not impede future adaptation.
- (b) The movement away from a bulk orientated system also means developing a **GHTS that is flexible and dynamic**. Price movements will quickly signal changes in the demand and supply for transportation and handling services within and between years. This implies a faster evolution from kernel visual distinguishability (KVD) to a cost-effective identity preserved system (IPS) and the development of stronger linkages between individual producers and consumers that are facilitated by the GHTS. An IPS is one way of adding value, and this system will have to operate side-by-side with a bulk handling system to meet the needs of some buyers.
- (c) The movement to an IPS and more domestic processing may require a **change in the storage system**, with more emphasis placed on off-farm storage than currently exists. An off-farm system offers greater dependability in terms of ensuring access to supplies that processors want.

Varietal Registration

Adding value intrinsically means supplying buyers with more of what they are willing to purchase, whether it be in the form of the product or the services that facilitate the transfer of the product to the buyer. In terms of the form of the product, this includes not just increased processing but more differentiated products. Objective testing is better able to segregate/differentiate products based on functional attributes or properties. The emergence of biotechnology means that the components of a variety can be specifically altered to meet a customer's demand. A varietal registration system geared heavily to meeting a predetermined set of uniform standards and to ensuring that a bulk handling system can deliver, may be losing its relevance to the industry. A true identity preserved system (IPS) may be required with a focus on functional, as opposed to physical, characteristics for the following reasons:

- (a) **Kernel visual distinguishability (KVD)** is an intrinsic component of the existing varietal registration system, primarily for wheat. In the past, this has guaranteed quality in conjunction with a bulk handling and marketing system as different classes of wheat or other grains could be identified simply by looking at them. There is a cost to maintaining such a system, mainly a high rejection rate of new varieties. Rejection of

new varieties due to KVD will likely become less acceptable to the industry as the result of new technology, the development of more private varieties due to Plant Breeders' Rights, and greater ability to segregate the market.

- (b) With **biotechnology**, greater value may be added by extracting specific components or chemicals contained in a new variety of grain or oilseed, with most of the kernel or seed simply treated as a byproduct. Public licencing of these varieties may not be in the interest of the developer.
- (c) The debate between **quality and yield** will be exacerbated, especially if pressure is placed on the sector to produce relatively cheap feedgrains to maintain a comparative advantage in livestock production. A competitive feed industry can not depend on poor harvest conditions to meet its demand for competitively priced feed wheat or feed barley. The feed industry will want access to the varieties of feedgrains which best meet their requirements.

Environmental Issues

Previously, if the agricultural sector handled purchased inputs in a safe and appropriate manner and did not abuse livestock, it was left alone to manage its resources as the sector saw fit. Externalities, especially of the non-point pollution type, were largely accepted. This situation is rapidly changing. The public is demanding a greater say in how resources are managed, regardless of whether they are privately or publicly owned. This arises from a greater understanding of how agriculture interacts with the ecosystem and that not all of the interactions are beneficial or benign. Consumers, both in Canada and in export markets, are more aware of the impacts of agricultural production on the sustainability of land, air and water resources. This situation will be exacerbated as competition for land and the intensity of its use increases.

Research and Development Issues

The analysis highlights the potential for supply side pressures related to sustained growth in the sector. Will there be enough forage, grains and oilseeds to meet the competing demands, and at what price? Can the land be used more intensively and in a manner consistent with sustainable development? Can new, higher valued crops and varieties be developed and introduced safely into the sector? Will environmental externalities related to more intensive use of resources be dealt with and how? If anything, the challenges established by the "doubling" target and the resultant pressures to remain competitive will put more demands on the research establishment.

Funding

- (a) The need to supply significantly more forage, grains and oilseeds from a fixed land base means that the **rate of technological advance** has to increase. This implies that the level of research funding must increase. A considerable amount of existing plant breeding research, relatively narrowly focused on milling quality wheats, aims to maintain productivity. Not only must the amount produced increase in total, but also the product mix must expand, along with the various attributes for each individual product. At the same time, the orientation of the research process must turn around so that the direction of R&D for new products or attributes is determined by market demands.

- (b) The appropriate **sources of funding** must be determined. If the level of funding needs to increase, there will be implications for the existing suppliers of funds, namely industry and government. Plant Breeder's Rights, along with stronger rules on Intellectual Property Rights that are developing internationally, set the stage for the private sector to play a much larger role in the future.
- (c) The **priority setting process**, especially for public R&D funds, will continue to be a critical issue. In order to realize the full potential of advances in technology, public R&D policy should fill in where private funds would not otherwise be invested. The process followed, as well as the strategy adopted, may have significant longer term implications in terms of realized or missed opportunities.

Research Priorities

If supply side pressure results in higher input prices, especially for livestock, this would reduce the comparative advantage of the region. One way to offset this pressure is through productivity gains, that is, finding substitutes for land through increased output per hectare. This issue can be divided into several areas:

- (a) Developing **Instrumental Objective Testing** to replace KVD to distinguish between varieties, might remove one constraint on productivity enhancement in the context of a bulk handling system. In the longer term, if movement is fundamentally away from a bulk handling system to a true IPS, in order to obtain greater value-added at all stages, instrumental objective testing may not have longer term applications.
- (b) The **quality versus quantity** debate in breeding will continue. Given that supplies will be short, more emphasis will be placed on quantity. However, are the returns from the market for quality still as strong today (or tomorrow) as in the past, given the improved technology in milling and baking? If a broader mix of grains is required, does the system need to change to allow a greater flow of market forces?
- (c) To avoid significant increases in feed prices that would place the livestock industry at a comparative disadvantage, greater emphasis is needed on **feed varieties** where the component structure of the grain may be quite different from what millers/bakers require. For cattle, access to cheap **forage** is critical to maintaining comparative advantage. As land is used more intensively, can the productivity of hayland and pastures be improved either through better management or better varieties of grasses and legumes?
- (d) With the ability of industry to extract chemical components from plants, the emerging markets may be in **components of plants** rather than in the whole plant (or whole kernel or seed) with biotechnology augmenting this trend.
- (e) Greater emphasis is placed on **emerging or new crops** that have a potential in higher valued niche markets.
- (f) To maintain a comparative advantage in livestock production, research into improving **livestock productivity** in Canada's relatively colder climate needs to continue.

- (g) With greater intensity of use, the potential for degradation of the resource base increases. Management regimes need to develop **best practices** that are economically efficient and that minimize or mitigate the environmental externalities attached to agricultural production.
- (h) Government needs to determine where its direct involvement is required in terms of ensuring that an **adequate level and mix of R&D** is maintained. Government can provide funds directly through the tax system, or indirectly by developing the institutional framework that would allow the sector to raise the necessary industry capital through mechanisms such as check-offs.

Marketing System Issues

The analysis is orientated to the supply side of the market to quantify the magnitude of the challenge the industry has set for itself. A whole range of issues that would need to be addressed arise from the discussion above. One cannot simply assume that markets for a wider variety of Canadian products will exist and that products with greater value-added will be competitive in the market place. The following are some of the issues that will have to be dealt with in the context of key results arising from this analysis.

- (a) **Access to export markets**, especially for non-traditional, value-added exports, will have to be obtained. Tariffs may be of the least concern as a trade barrier. Technical barriers to trade may represent the greatest access barrier to an emerging industry in Canada. The movement away from bulk exports toward greater value-added will require a different **market development strategy** as both product mix and country destination could change dramatically.
- (b) **Introducing new crops** raises many issues in that it takes time to develop a complete marketing system to deal adequately with new commodities. Large startup costs and risk premiums require large margins which may leave the Canadian product at a competitive disadvantage. Considerably more effort may have to be diverted to helping these emerging commodities overcome the high start-up costs associated with launching new products.
- (c) Movement from the existing dependence on a bulk handling system to one dominated by an **IPS** may require a different set of institutions and may change the role of some existing players. Some roles may no longer be required as direct linkages between consumer and producer are enhanced.
- (d) Recent reform of legislation affecting the GHTS in the Prairies has unleashed a significant **level of investment**, especially in the grain handling industry, as the need for long overdue restructuring finally commenced. At the same time, restructuring in the beef processing industry has proceeded and significant new investment in the hog industry is underway. Emerging competitive forces may render some of this investment unprofitable, especially if supply side pressures build as the increased capacity to handle and process grain outstrips the capacity to produce more grain. Similarly, additional investment in new processing capacity will be required if the shift away from bulk exports is to be achieved.

- (e) The principle of reciprocity means that gaining greater access to export markets requires reducing barriers to imports. **Greater integration of North American and world markets** is a requirement for achieving the industry targets. However, it must be kept in mind that competition is a two-way street and that while some sectors or industries may gain, others will come under significant market pressures.
- (f) The shift away from bulk exports may be seen most dramatically for feed barley as internal demand increases for barley for both livestock and other further-processing. **Feed barley exports** may become a small residual market requiring a different institutional structure than presently exists.

Other Related Policy Issues

When discussing the magnitude of growth and change implied by the "doubling" target, there will be impacts on other government policies and programs.

- (a) **Safety Nets (Crop Insurance, NISA, Initial Payments):** The sources of risk may change significantly as the system moves from a bulk orientated system to one much more dominated by direct contractual arrangement between producers and processors of grains and oilseeds. Although production risks may remain (or increase as emphasis shifts to non-traditional crops and varieties), the sources of market risk may be substantially different, calling for new risk management tools which may possibly extend beyond the farmgate.
- (b) **Disaster Relief:** Striving for the "doubling" target will mean using the existing resource base more intensively which implies less of a built-in cushion to deal with either production or market shortfalls. For example, the negative implications of a localized or widespread drought on forage supplies and the cattle industry would become amplified as little slack to cover such contingencies would remain.
- (c) **Rural Development and Adaptation:** There is nothing in this analysis to imply that achieving the "doubling" target will solve problems related to the regional distribution of activities and/or off-farm employment opportunities in rural communities.
- (d) **Infrastructure Investment:** Demand for government involvement in developing infrastructure may continue. Pressure already exists to expand water delivery systems so that irrigation can increase since in many areas moisture/water remains one of the most serious constraints to developing new crop production activities.
- (e) **Sustainable Development Policy:** Agriculture is not the only sector that will be placing increased demands on the resource base. Besides food and non-food agricultural products, consumers also demand resources for maintaining wildlife, bio-diversity and recreational opportunities. In many areas, agriculture competes directly for land with forestry whose products are also in increasing demand. Given this, the sector's contribution to issues such as greenhouse gases and climate change (both as a source and potential sink) must also have been taken into consideration.

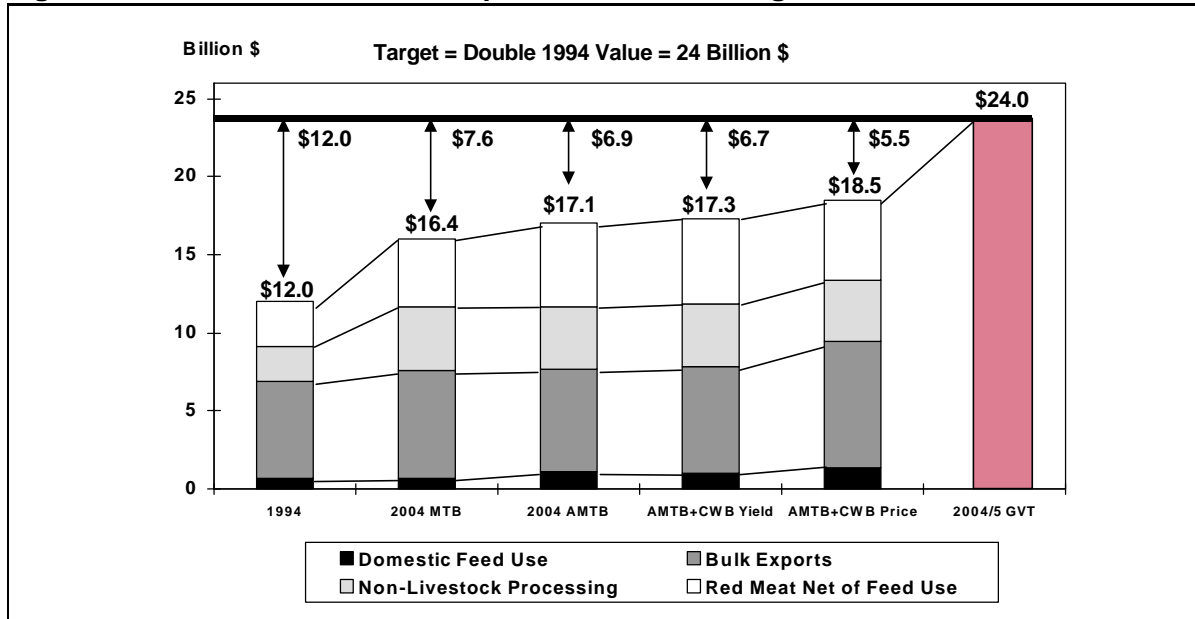
Summary

The objective of this analysis was to provoke discussion and provide additional input to the policy development process. No conclusions related to policy development have been put forward. The analysis, in and of itself, does not provide sufficient information to undertake this task.

If the goal of the industry group were to establish a "stretch" target to challenge itself and the government, this analysis indicates that this has been achieved. In the context of looking into the not-so-distant future, the analysis identifies some of the potential supply side pressures that would result if the industry pursues growth through significant investment. It also indicates the direction that investment will have to take if the "doubling" target is to be challenged seriously. Although reliance on bulk exports of grain has served the economy well during this century, that is rapidly coming to a close. The next century will have to see a movement away from bulk exports toward both livestock and non-livestock valued-added products destined for export markets.

The question for government policy makers is: What is the government's role in facilitating sustained growth? Some of the issues that need to be considered are listed above. Decisions on these sorts of issues need to take into consideration the longer term growth and evolution of the sector. Hopefully, this analysis provides some information on what the future might hold. The analysis is not an end in itself. It is meant to initiate and stimulate a process of dialogue and further analysis in the on-going policy process.

Figure 1: 1994 Value of Prairie Output, Grain Vision Target for 2004/05 and Scenarios



- MTB Medium Term Baseline
- AMTB Adjusted Medium Term Baseline (increased red meat production)
- CWB Yield CWB export forecasts for wheat and barley achieved through increased yields
- CWB Price CWB export forecasts for wheat and barley achieved through increased prices
- GVT Grains Vision Target

Technical Appendix

Empirical Model

The quantitative tool used in the analysis is the Canadian Regional Agricultural Model (CRAM)¹. CRAM is a static, mathematical programming model that has the capability of providing detailed provincial and regional information on the crops and livestock sectors. CRAM is a comprehensive model that includes all aspects of agriculture such as land usage, grains and oilseeds production, livestock (including supply managed commodities) and meat production, trade and demand. It also models the linkages among these sectors including feed requirements and commodity movements, which enable the evaluation of cross sector impacts induced by policy shocks.

The strength of CRAM is that it enables an evaluation of the simultaneous effects of changes in policy or market conditions on various components of the agricultural sector at a regional level. The characteristics of CRAM are essential in terms of assessing the Grain Vision Target. For example, if the export price of barley is increased, the model captures impacts on the crop mix due to the increased profitability of barley, relative to other crops, as well as implications for the livestock sector due to increased feed costs.

CRAM 2004 Baseline

The targets put forth by the Visions Planning Group in 1994 were based on a ten-year time line ending in 2004/5. In essence, the targets state the general objective of the prairie grains and oilseeds industry for the year 2004/5. For the 2004 base year, the 1996 Medium Term Baseline² (MTB) provided estimates for production, consumption, prices and trade levels. The analysis examines the Grain Vision Target combined with the Canadian Wheat Board forecast. The first step was to update the most recent version of CRAM (1994) to 2004. Specific changes to do this included equalizing crop areas, yields and exports. Commercial

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1. Horner, G.L., J. Corman, R.E. Howitt, C.A. Carter and R.J. MacGregor, "The Canadian Regional Agricultural Model: Structure, Operation and Development", Policy Branch Technical Report 1/92, Agriculture Canada, Ottawa, October 1992.
 2. The Medium Term Baseline is an annual AAFC publication which projects forward 10 years for all major Canadian agricultural commodities.

transportation rates were adjusted and the WGTA subsidy was removed. Livestock inventories were adjusted to estimated 2004 levels. Domestic prices and quantities, as well as import and export prices and costs of production, were adjusted for all commodities. The 2004 version of CRAM provides a reference level representing the expected state of the industry based on the MTB assumptions.

Analysis of Scenarios

Three scenarios were modelled to estimate changes from the 2004 baseline in terms of the structure of prairie agriculture.

Scenario 1 (the Adjusted Medium Term Baseline) examines the effects of anticipated increases in livestock production on the prairies. Hog production is increased 100% over 1994 levels while beef production is increased 50%. This scenario provides an assessment of the expected impacts of increasing livestock production in the Prairies given current trends in area planted, yields and market prices.

Scenario 2 maintains the increased livestock levels. However, average yields of wheat, feed barley and malting barley are increased in an iterative fashion until all the CWB export forecasts (i.e. 26 million metric tonnes of wheat, 1.6 million metric tonnes of feed barley, and 1.4 million metric tonnes of malting barley) are met.

Scenario 3 is identical to Scenario 2 except that a different shock is applied to the model. Rather than employing a change in average crop yields, exports of wheat and barley are expanded through increases in export prices relative to other crops. Thus, all yields remain constant at the baseline 2004 level.

Calculation of Value for Assessing Grain Vision Target

The Grain Vision Target was defined in terms of a monetary value according to 1994 prices and quantities. Its precise definition is as follows:

$$\begin{aligned} \text{Grain Vision Target} &= \text{Value of Western Feed Use} \\ &+ \text{Value of Bulk Grain Exports} \\ &+ \text{Value of Non-Livestock Prairie Grain Processing} \\ &+ (\text{Value of Western Red Meat Net of Western Red Meat} \\ &\quad \text{Feed Use}). \end{aligned}$$

Included in bulk grains were the primary Prairie grains and oilseeds such as wheat, barley, canola, oats, flax, rye and pulses. Values for feed use, bulk grain exports and red meat production were calculated using the prices and quantities generated by CRAM.

Non-livestock prairie-grain processing included many first-level processed goods listed under the Bulk, Intermediate and Consumer Oriented System (BICO). BICO is a product-based approach to classifying Statistics Canada trade data. BICO is often used to highlight

the importance and performance of value-added products in export markets. Thus the inclusion of the export values for the following goods was deemed essential: wheat flour, malt, starches and gluten, pasta, rolled and flaked grains.

The Visions Planning Group felt that increases in some processed grains and oilseeds products over the next ten years were not adequately captured in the 1996 MTB projections. These included wheat millfeed, ethanol, particle board, canola oil and meal, groats and steel cut. The Visions Planning Group supplied their own price and quantity projections for these commodities which were then included in the total value for the 2004 MTB and the scenarios.

After selecting all these commodities, a base value for the prairie grains, oilseeds and hog and beef sectors was calculated to be \$12 billion. Thus, in order to meet the "doubling" objective, the Grain Vision Target must total \$24 billion by 2004. Each of the three scenarios was carried out with the goal of more closely attaining the \$24 billion target in order to demonstrate the types of adjustments required in the prairie agricultural sector. Each scenario yielded changes in the crop mix, in the level of exports and, in the case of Scenario 3, in the price level. Consequently, converting the results to a monetary value according to the above equation yielded different values. These values, and their consequences, are discussed in the body of the study.

Limitations and Assumptions

The following limitations and assumptions apply to the results reported in this study:

1. The 2004 projections from the 1996 MTB were used to establish a reference point for the analysis. This represents a baseline that has undergone a substantial review process.
2. No new types or varieties of crops were incorporated into the model. The model is based on average yields for varieties grown over the past ten years. No allowance was made for the introduction of cultivars which may produce higher yields but a lower quality product.
3. The livestock component of the model includes beef, hogs, dairy and poultry. Increasing trends in the production of "other livestock" such as elk, bison, ostrich, emu etc. were not incorporated.
4. The MTB does not distinguish between feed barley and malting barley, hence the same yield increases were used for both in CRAM. This assumption will have to be investigated further since there may be evidence that yields for these two types of barley are not increasing at the same rate.
5. Significant increases in livestock production are predicted between 1996 and 2004 in the baseline models (40% for beef and 15% for pork). These levels were even further increased in the scenarios, given numbers frequently published in provincial and national media. Members of the Visions Planning Group agreed that numbers for livestock should increase over that projected in the MTB, but still remain on the conservative side. Communication with provincial agriculture ministries confirmed that expansion of the livestock herds on the Prairies will likely exceed the 2004 projections of the 1996 MTB.

6. CRAM does not include information on the processing of non-livestock grains and oilseeds. Values for this component were derived from the MTB projections of Statistics Canada trade data and projections provided by the Visions Planning Group.
7. In order to meet the CWB export targets, increases in prices and yields were considered separately. Combinations of price and yield impacts could also be examined.