Winter Wheat Production in Western Canada - Opportunities and Obstacles

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ABSTRACT

No-till seeding into standing stubble from a previous crop has proven to be a successful method of overwintering wheat on the Canadian prairies. Snow trapped by the standing stubble essentially eliminates the risk of winterkill if cultivars with a high level of winter hardiness are grown using recommended management practices. When combined with recent plant breeding improvements, the major limitations due to winter survival, lodging, crop residue management, and rust susceptibility are now no longer barriers to winter wheat production on the Canadian prairies. In recent years, winter wheat production has grown to become western Canada's third largest wheat class. Average commercial yields of 149, 125, and 118 percent of spring wheat in Manitoba, Saskatchewan, and Alberta, respectively, in the twelve year period from 1999 to 2010 has demonstrated its high grain yield potential. The 10 to 15 percent yield increase of recently released Canada Western General Purpose class cultivars indicates that opportunities exist for continued advances in production potential.

No-till winter wheat embraces the philosophies of conservation farming by providing the opportunity for a) reducing the rate of soil degradation, b) efficient crop moisture utilization, c) avoidance of seeding problems on late, wet springs, d) reduced tillage, e) increased competition with summer annual weeds resulting in reduced pesticide use and selection pressure for herbicide resistance, f) early harvest, g) less disturbance to wildlife, especially waterfowl and upland game birds. A high commercial grain yield also provides the opportunity enormous increases in production potential while employing a production system that fits into the objectives of sustainable agriculture. In light of current concerns with changing weather patterns, diminishing world wheat reserves and an ever increasing number of mouths to feed, one would assume that winter wheat production in western Canada would be widely embraced. However, marketing obstacles, which have a direct influence on farmers' net returns, remain to be overcome before this potential will be fully realized.

PRODUCTION AND MARKETING

An efficient production system and a profitable market are required for an industry to be successful. Flexibility within the system and the ability to adapt to changes in demand are also required if an industry is to be sustained. In this regard, wheat production and marketing is no different from any other business.

Four cornerstones are required for a successful wheat industry (Figure 1). There must be grain buyers and sellers, or in other words, a market place that creates demand.

Cultivar development (breeding) programs are required to ensure a steady, reliable supply of wheat for the market. Agronomic practices that allow farmers to be competitive must be in place and there must be farmers to produce the wheat. As with all industries, regulations must be developed to ensure health and safety, environmental, and performance (grading) standards are met. Effective methods for information sharing among the different industry sectors is the final essential element in all successful wheat production and marketing systems. Most countries have also established comprehensive regional adaptation trials to generate a reliable database that farmers can draw upon when making wheat planting decisions.

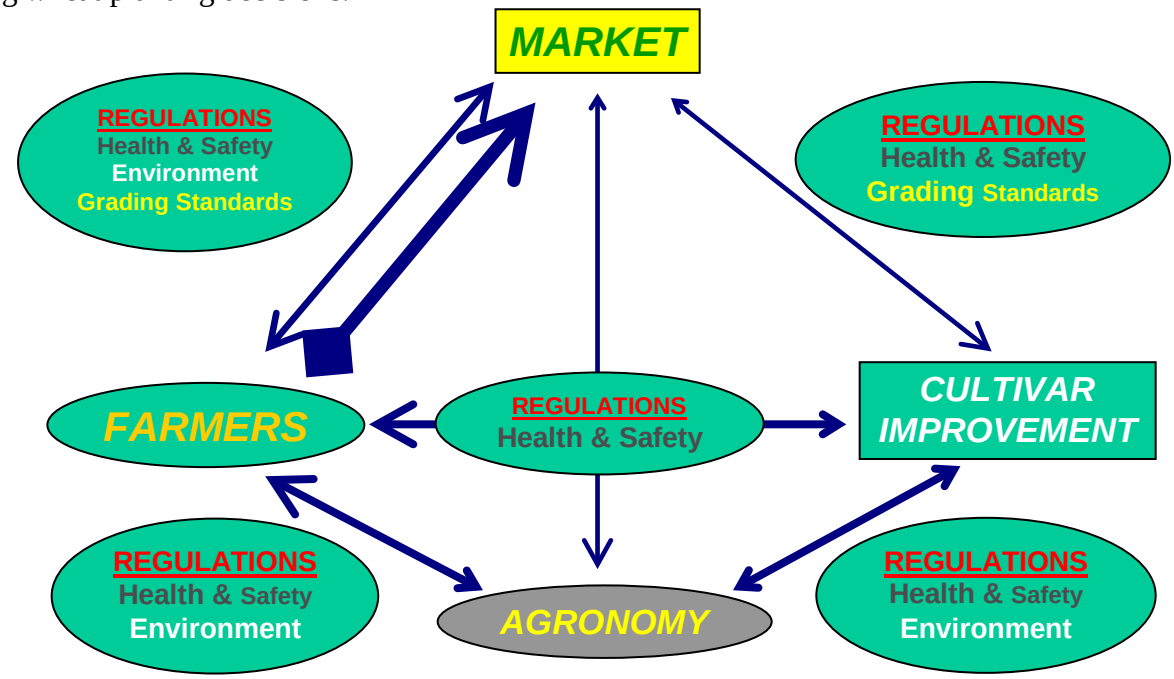

Figure 1. Essential elements of a wheat market.

While agronomy is recognized as an essential pillar in successful crop production and marketing systems, this discussion will focus mainly on the role of cultivar development and release in promoting innovation in the marketplace and at the farm level. In this regard, the western Canadian wheat cultivar improvement and marketing system is unique in the world and has been widely criticized for suppressing rather than promoting innovation. If we compare the Canadian system with those found in Australia, France, Germany, and the UK, we find there are major differences in the decision making processes. Canada is the only country with a single-desk wheat market and it has a registration system that forcefully restricts the cultivars which can be grown for the food market. At the beginning of 2008, Canadian wheat cultivar development programs had two additional barriers between cultivar release and the marketplace that were found nowhere else in the world (Figure 2). These were kernel visual distinguishability (KVD) requirements and the Prairie Grain Development Committee (PGDC). Although the debate still rages, KVD requirements were removed in August of 2008. The PGDC has the responsibility for recommending the lines from wheat breeding programs for

registration by the Canadian Food Inspection Agency (CFIA). CFIA will not normally register a variety for sale in Canada unless it is recommended by the PRDC.

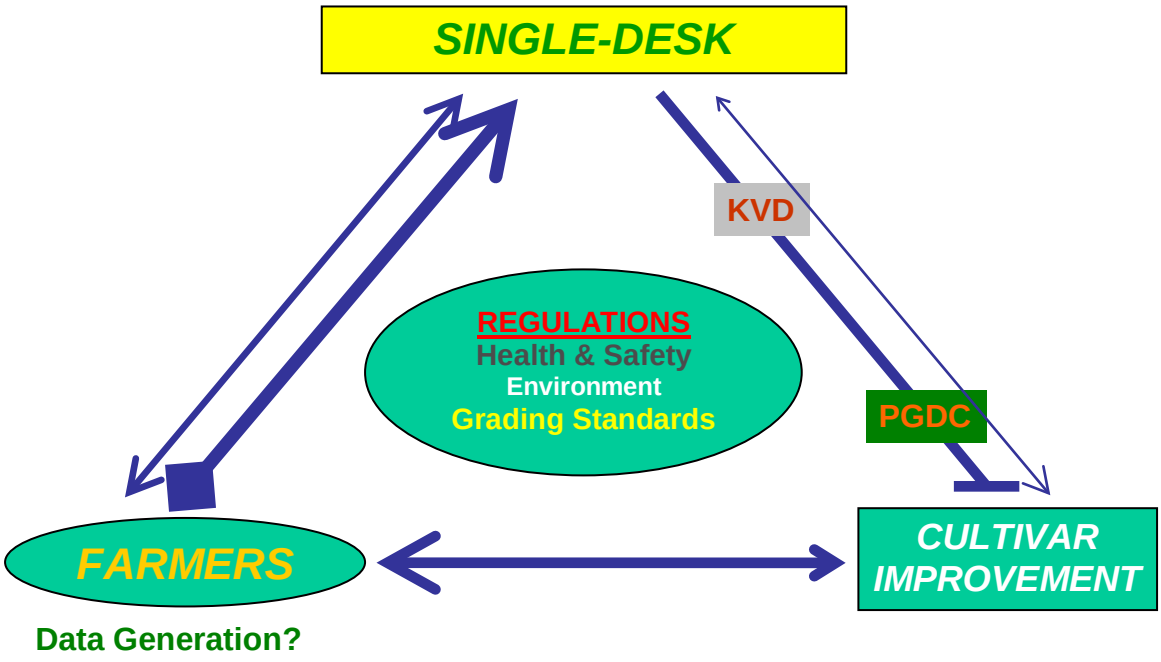

Figure 2. The western Canadian wheat market.

USE OF KERNEL VISUAL DISTINGUISHABILITY TO SEGREGATE WHEAT CLASSES

A) Evidence that Kernel Visual Distinguishability never was an effective method for quality segregation of wheat classes

The western Canadian wheat industry defended KVD as the main tool for identifying wheat classes delivered to elevators for over 80 years. However, for at least 50 of those years KVD requirements were criticized as being a major restriction to cultivar release and the development of new wheat markets. Detailed examination of the system has failed to produce any objective evidence in support of the claims that KVD played a positive role in the practical operation of the western Canadian Wheat Quality and Quantity Assurance programs. In fact, it has been difficult to find any evidence to support the argument that KVD was actually being used to segregate cultivars according to class at the time of grain delivery (Fowler, 2006).

1) Approximately 10 percent of the time, registered Canadian Western Red Spring (CWRS) wheat cultivars were classified as having unacceptable KVD when they were included as hidden checks in spring wheat breeding trials. Given this failure rate, 10 percent of CWRS wheat farm deliveries to the elevator would also be expected to fail KVD. This did not happen suggesting that KVD was never successfully employed as a method for identifying wheat classes at the time of delivery.

2) There is a large genotype by environment interaction associated with the KVD traits, which means that the kernel characteristics used in KVD were extremely difficult to

select for and were unreliable as markers. For example, winter wheat cultivars could not be mixtures of CWRS and Canadian Western Red Winter (CWRW) kernel characteristics. However, there were numerous instances in the Central Winter Wheat Co-operative (CWWC) trials where entries with acceptable CWRW kernel characteristics in their first and second years of testing were classified as mixtures of CWRW and CWRS kernel types in subsequent years of testing indicating poor heritability of the KVD characters. Between 2002 and 2007 this problem became so severe that winter wheat programs may as well have been shut down because all lines under evaluation had to be discarded due to KVD problems.

3) The Canadian Grain Commission (CGC) would not provide KVD descriptions of entries in co-operative trials unless the check cultivars were identified. If the KVD system effectively classified the different wheat cultivars, then the identity of the samples should have been unknown at the time of kernel description. Also, if the system actually worked, there should have been no need for a farmer to declare the cultivar name or class at the time of grain delivery. The buyer should have been able to determine this simply by looking at the sample. However, if the CGC experts could not routinely identify registered cultivars to class using KVD unless they had the reference check grown in the same environment, how could grain buyers who were grading individual deliveries be expected to efficiently segregate for quality based on visual characteristics of different classes? It then follows that, if the experts are unable to separate these apparent CWRS/CWRW mixtures from CWRS, KVD could not be used to dissuade farmers or grain handlers from mixing registered CWRS and CWRW cultivars and selling the mixture as the higher priced CWRS. Given this situation the only conclusion one can arrive at is that appropriate quality classes could not be determined by visual inspection at the time of wheat delivery and KVD did not play a bona fide role in maintaining quality standards. These observations demonstrate that segregation of quality at the time of wheat delivery was not based on KVD but, in fact, on farmer declarations (the buyers asked the farmers what they were delivering).

4) With the removal of KVD requirements, the skeletons quickly came out of the closet and it soon became apparent that KVD was actually compromising the western Canadian grain marketing system. Once variety eligibility declarations (VED) replaced KVD requirements, there were numerous reports of farmers who weren't sure what cultivar they were growing. The line elevators also expressed concerns with the declaration system because they weren't sure what was in their bins and, of course, VED could limit their ability to blend. In reality, the removal of KVD did not create these problems. It would have taken several years for cultivars with mixed KVD characteristics to be registered and enter the commercial production system. Consequently, the removal of KVD requirements did not have an immediate effect on anything relating to the wheat quality assurance program in western Canada. KVD was in fact just a placebo that worked because everyone believed it worked.

What was the cost of attempting to segregate quality classes using defined Kernel Visual Distinguishability?

1) Every additional character that a plant breeder must select for increases the cost of their program and reduces the likelihood that overall breeding objectives will be met. The

large number of difficult-to-measure kernel traits (a total of 10) associated with KVD were of no direct economic value on their own and, as such, they created a tremendous drag on breeding programs and reduced the likelihood that overall breeding objectives would be met.
2) A large number of risk reduction, production, and market opportunities were lost because superior candidate cultivars did not met KVD standards. These lost opportunities threatened the industry's long-term competitiveness.
a) Variety choice was restricted by KVD requirements and CWB market priorities ensured that there were essentially only two products in the marketplace, CWRS and durum wheat. As noted in the 2006 Review of the Canada Grain Act and the Canadian Grain Commission (COMPAS Inc., 2006), "KVD has necessarily blocked the introduction of some new varieties that were greatly desired by those who would buy it for feed or feedstock". Domestic feed and industrial uses (ethanol) have the potential to offer the single largest individual markets for Canadian wheat.
b) Potential fusarium-resistant spring wheat cultivars were also examples of a lost opportunity to reduce risk.
c) KVD requirements were a major barrier to the release of improved winter wheat cultivars through the Winter Wheat Cooperative Trials. This limitation eventually reached a point where all winter wheat breeding efforts for the Canadian prairies became irrelevant.
3) KVD was in effect a quality assurance placebo for a stagnated marketing system that was designed to handle durum and CWRS. The industry believed that KVD was an effective quality control tool and that was all that mattered. Buyers asked the farmers what they were delivering so we were essentially operating a market system based on farmer declarations. The ineffectiveness of KVD compromised the quality of Canadian wheat in the marketplace and, as such, it did not play a bona fide role in maintaining quality standards. With the loss of KVD, producers and grain handlers have expressed concerns that variety eligibility declaration (VED) will force them into a position where they must know what varieties are now being grown and handled. For this reason alone, VED should improve the western Canadian wheat Quality Assurance program

PROMOTING INNOVATION

The Canadian Wheat Board (CWB) has monopoly control over the marketing of western Canadian wheat produced for human consumption. Its wheat quality control system has four key elements that are listed on its web site (CWB, 2008). 1) Varietal registration and functional performance: Each of the *eight (excluding General Purpose) unique wheat classes determined by the CWB* has a distinct range of functional characteristics. *Before a variety can be registered into a milling class it must match the functional performance of reference varieties on all aspects of quality.* 2) Grading system: Enforced independently by the Canadian Grain Commission (CGC). All wheat shipments are accompanied by a CGC Certificate Final. 3) Uniformity: Grain of the same grade grown in different regions is combined and blended by the time it reaches export. *Uniformity is assured through the registration system where strict quality requirements results in very few new varieties being introduced.* 4) Cleanliness and safety: Strict grading standards and cleaning procedures ensure buyers get exactly what is paid for.

Western Canada has two major wheat markets, Canada Western Red Spring (CWRS) and Canada Western Amber Durum (Figure 3). The 2008 CWB variety survey indicated that these two classes accounted for 88.3 percent of the western Canadian wheat acreage (Grenier, 2008). Six classes share the remaining 11.7 percent of the acreage, which relegates them to little more than niche market status. As a consequence, although there were eight classes (the new General Purpose class was not yet in place), the CWB focus was dominated by two wheat classes. Two major wheat classes, a limited number of varieties, strict grading standards, and regional blending that ensure uniformity of export shipments are strong selling points in the industrial wheat market where assembly line milling and baking procedures are used. The requirement that new variety releases in each milling class must match the functional performance of reference varieties is added protection against change creeping into the western Canadian wheat production and marketing system. This rigid photocopy approach to wheat quality may serve the major export market well, but it has acted to suppress innovation and prevent the exploration and development of niche markets that are characteristic of a mature marketplace.

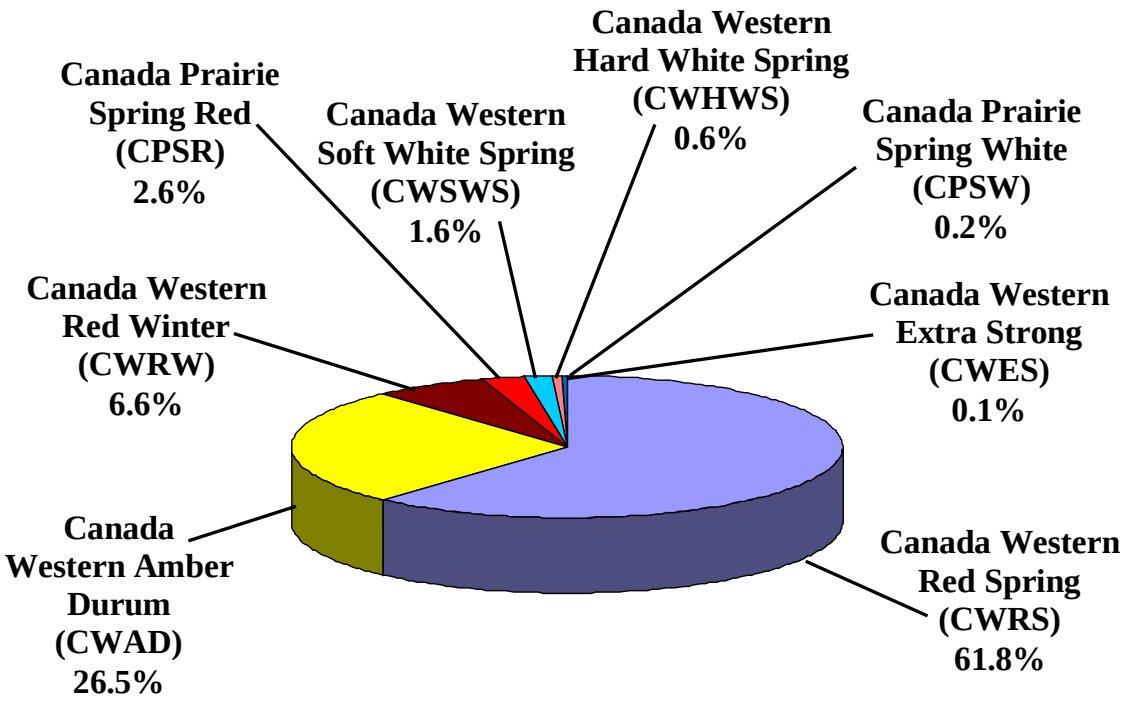

Figure 3. Prairie wheat market classes - Canadian Wheat Board 2008 Variety Survey. Adapted from Grenier, 2008.

The western Canadian wheat registration system

Variety development programs for self-pollinated crops, like wheat, start with crosses among selected parents to create a large number of progeny (Figure 4). Wheat breeders, with the help of pathologists, cereal chemists and other team members, then identify superior progeny from these crosses using selection procedures carried out over

several generations. In some countries, superior performing lines that meet health and safety and environmental regulations are then released for commercial production. Comprehensive regional adaptation trials are used to generate the databases necessary for cultivar recommendation lists that guide production decisions of farmers and provide grain quality profiles for the marketplace. In Canada there is an extra step in this process that involves registration recommending committees.

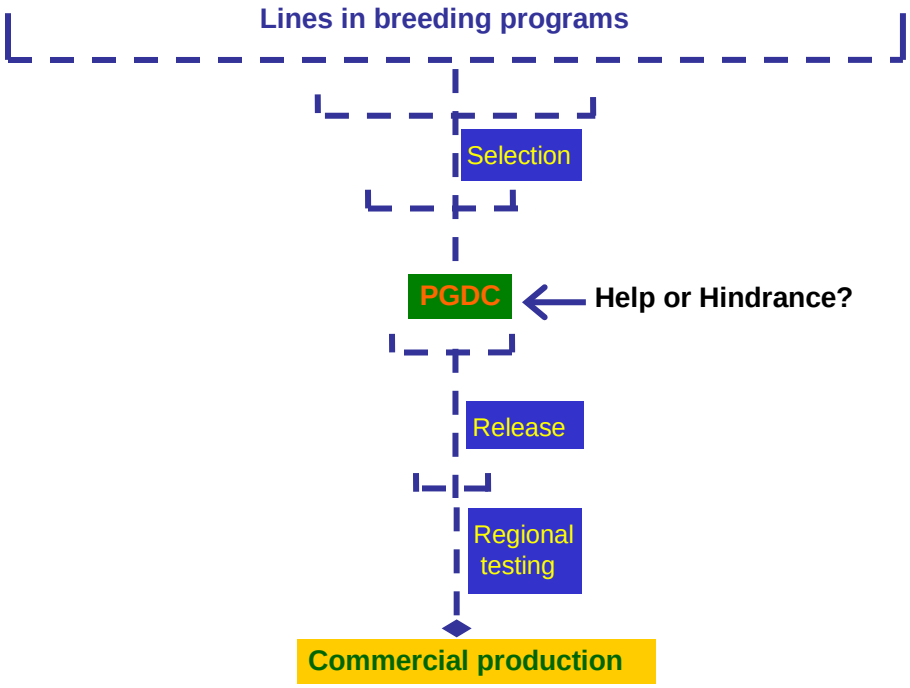

Figure 4. Cultivar development for commercial production.

The western Canadian wheat registration system is rigidly controlled by the Prairie Grain Development Committee (PGDC) cooperative testing and registration procedures and evaluation teams (Figure 5). Superior later generation lines are advanced to cooperative, or pre-registration trials where they undergo final evaluation for two to three years at locations scattered throughout western Canada. The PGDC is responsible for coordination of the cooperative trials and the final evaluation of potential wheat cultivars for the CWB area of western Canada. In most cases, three years of evaluation in cooperative trials is required before the PGDC makes a final decision to recommend an entry for registration. Only lines that have successfully passed through this registration system may be offered for sale in western Canada.

The data generated by the cooperative testing system is considered by three evaluation teams; grain quality, agronomic performance and disease, that report back to a main committee for a final vote on whether or not a line will be discarded or supported for registration by the CFIA (Figure 5). Consequently, it is these three PGDC evaluation teams that determine which wheat cultivars farmers can grow in western Canada. The quality evaluation team is made up of representatives from the milling industry, CWB, CGC, etc., but it is the CWB that ultimately determines the market targets. The Grain Quality evaluation team only determines if the lines under consideration match the

functional performance of reference varieties for the target wheat class. *This restricted view of the wheat marketplace actively discourages innovation resulting in lost opportunities and limited competitiveness.*

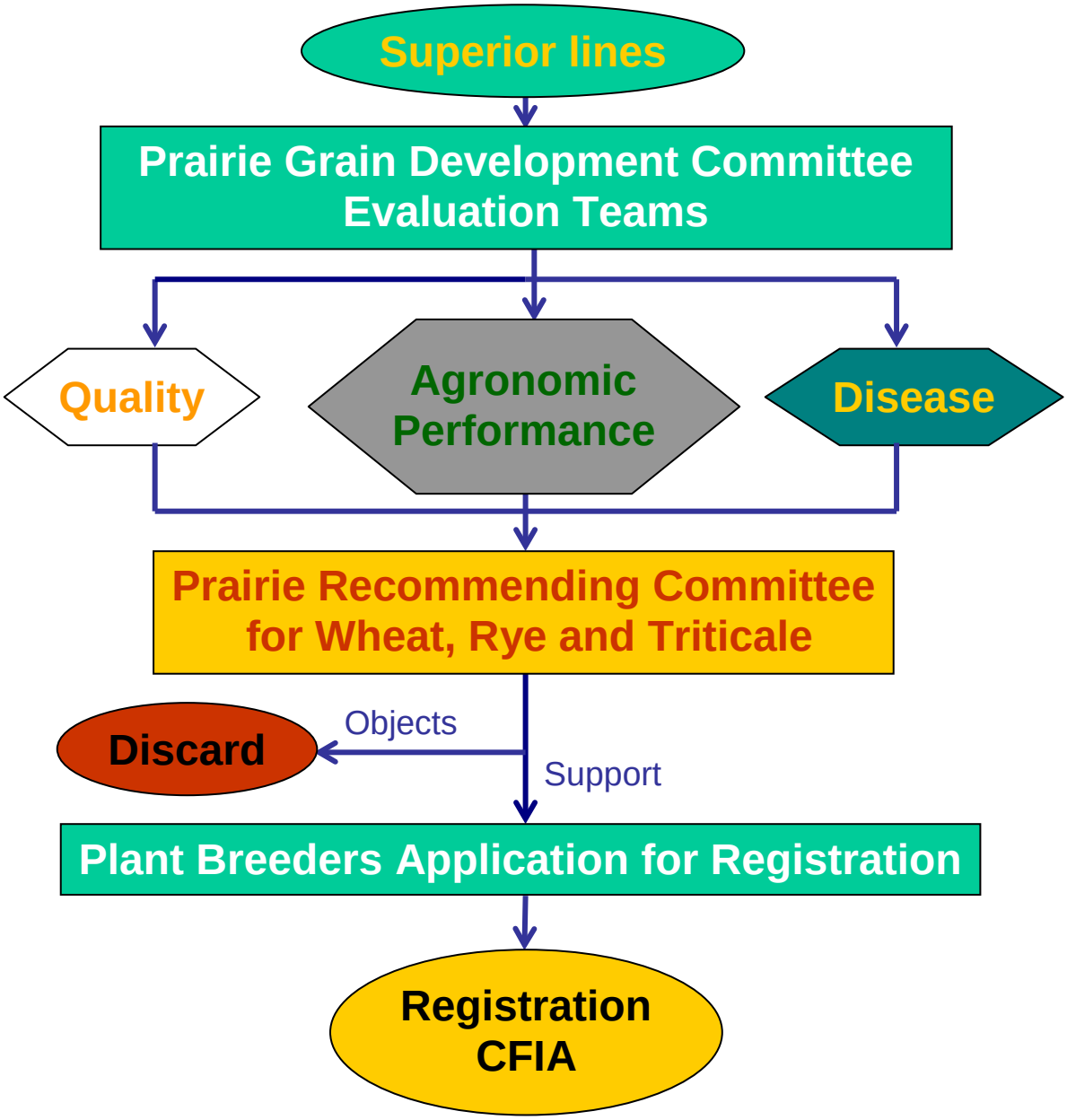

Figure 5. Prairie Grain Development Committee organizational structure and steps in the western Canadian wheat registration process.

The Canadian Food Inspection Agency (CFIA, 2008) has recognized the limitations in the Canadian registration system. In an impact analysis statement that was published in the June 2008 Canada Gazette they identified the following issue. *"The current variety registration system lacks sufficient flexibility to address the specific needs of different crop sectors in a rapidly changing agricultural environment. In some cases,*

the system imposes a disproportionate regulatory burden on developers of new crop varieties and creates impediments to innovation and to the timely availability of new varieties. An amendment to the Seeds Regulations (the Regulations) is required to increase the flexibility of the variety registration system." They also observed that producers and developers are experiencing an increased demand for niche market varieties and an increasingly competitive seed trade environment. Their solution is a *flexible registration system* that responds to the specific needs of different crop sectors in Canada and, where appropriate, reduces regulatory burden while maintaining appropriate government oversight. Basic variety registration would continue to require demonstration of conformity with minimum health and safety standards, confirmation of the identity of new varieties, verification of claims, and information required for seed certification purposes.

The winter wheat experience

Early settlers introduced winter wheat into south-western Alberta, which until recently represented the northern extent of the North American Great Plains winter wheat production region. The severity of winters and the need for snow trapping to provide over winter protection limited its expansion onto the rest of the prairies. These constraints also restricted winter wheat to minor crop status and the opinion was often expressed that it was a greater nuisance than a value to the western Canadian wheat industry.

The first winter wheat varieties available for production in western Canada had milling and baking characteristics that were considered inferior to those of CWRS wheat. Winalta, which was released for commercial production in 1961, had good milling and baking characteristics. However, the superior quality of Winalta was not rewarded in the marketplace and farmers shifted their production to newer varieties that were higher yielding and more winter hardy.

Southern Alberta accounted for nearly 98 percent of the winter wheat produced in western Canada before 1975. A small production base allowed most of the winter wheat to be disposed of on the domestic market and in foreign aid programs (Fowler, 1994). Limitations imposed by the Canadian grain handling system in the 1970's often meant that farmers could not deliver their winter wheat until the end of the crop year, almost two years after it had been seeded. Subsequent improvements in the Canadian grain handling system allowed for more timely deliveries and helped encourage winter wheat production. In the early 1980's, as production increased outside of southern Alberta, the CWB took a more active interest in developing an international market for winter wheat. However, winter wheat was on the front line of the subsidy war between the USA and EEC and export opportunities in this market environment priced CWRW similar to 3CWRS wheat. Because of inconsistent supply, exports of CWRW were often handled as a delivery option on spring wheat contracts that were more price than quality conscious.

In 1972, the Crop Development Centre at the University of Saskatchewan initiated a program to expand the traditional winter wheat production area north and east into Saskatchewan and Manitoba. Winter survival was the primary concern in this region. It quickly became evident that the maximum cold hardiness potential of wheat had reached a plateau that had not been breached for decades. Given this restriction, expansion of winter wheat production into this high winter stress region had to rely on

the use of no-till management systems that maintain a protective snow cover during the winter months. In the years immediately following 1977, Norstar dominated the variety picture. It had good winter hardiness and acceptable grain quality but it was tall, prone to lodging, and susceptible to rust. This was the starting point for winter wheat breeding programs that targeted the expanded production area.

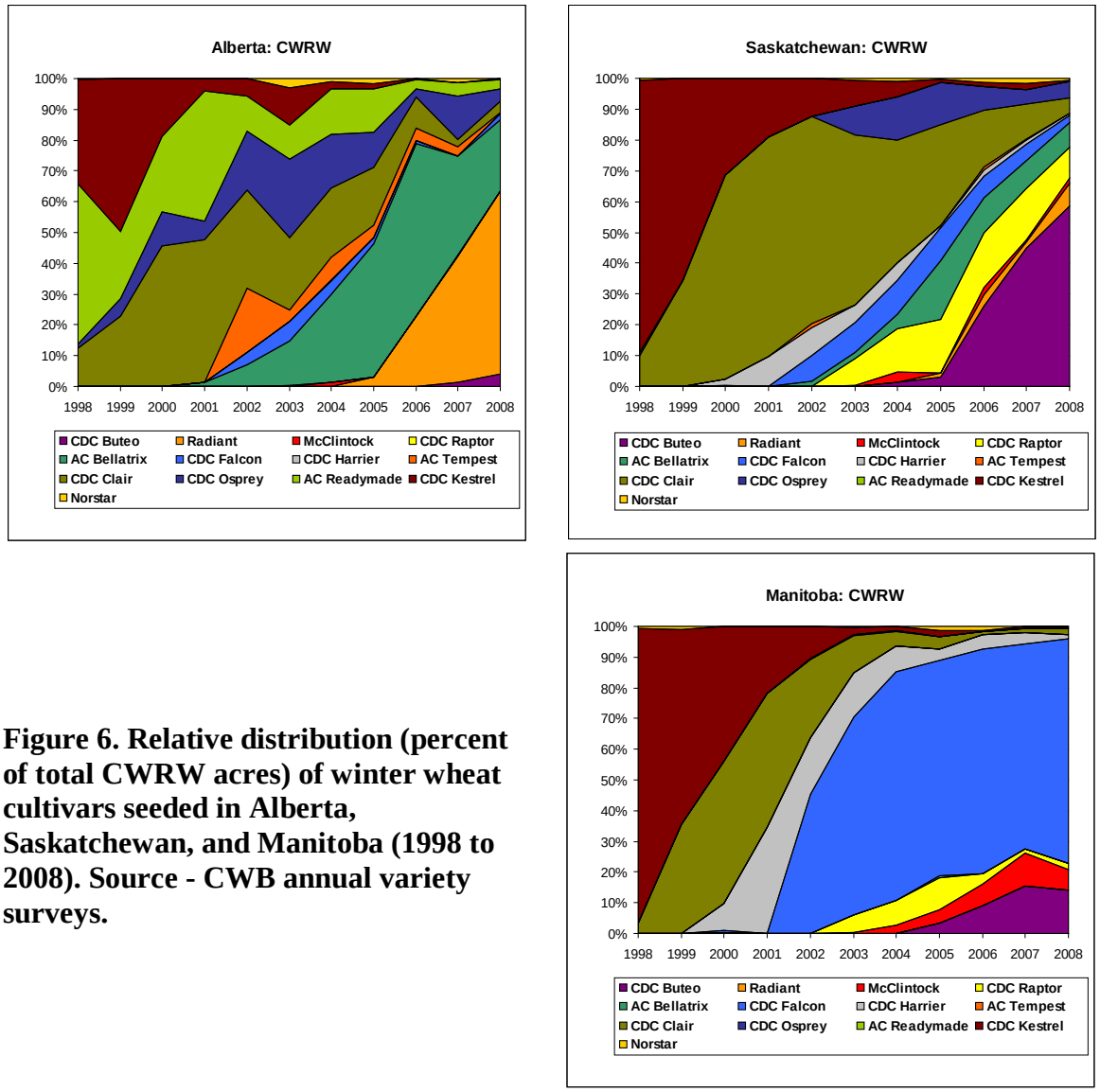

Figure 6. Relative distribution (percent of total CWRW acres) of winter wheat cultivars seeded in Alberta, Saskatchewan, and Manitoba (1998 to 2008). Source - CWB annual variety surveys.

In 1991, the medium tall, lodging resistant, semi-dwarf cultivar CDC Kestrel was released. The short strong straw of CDC Kestrel allowed for the use of higher nitrogen fertilizer rates thereby providing farmers with the opportunity to achieve greatly increased grain yield. When combined with the management packages that were developed for no-till production, farmers in higher moisture areas of the eastern prairies were able to increase yield targets from 45 to 50 bu/acre to 60 to 90 bu/acre and the true potential of winter wheat started to be recognized. However, this dramatic yield increase was accompanied by a decrease in grain protein concentration that concerned the CWB

marketing group and attempts were made on two separate occasions to have CDC Kestrel de-registered .

A number of highly adapted winter wheat cultivars followed CDC Kestrel as new releases in the 1990's (Figure 6). Winter wheat breeding program objectives have always included the development of cultivars that met the CWB targets as represented by the PGDC wheat quality evaluation team reference cultivars. However, CDC Kestrel, CDC Clair, CDC Harrier, CDC Falcon, and CDC Raptor were judged as not having met CWB market standards and their production was actively discouraged. In spite of their lack of favor, these cultivars were widely accepted by farmers and, according to CWB surveys, accounted for more than 95 percent of the western Canadian winter wheat acreage in 1999 and 2000. Their improved rust resistance, lodging resistance, and yield potential made them highly adapted to the eastern prairies (Figure 7). Winter wheat was also of interest to farmers in this region because it normally reduced the problems they were experiencing with Orange Blossom Wheat Midge, herbicide resistant weeds, Fusarium Head Blight, and seeding delays due to excess spring moisture. High grain yield potential also made winter wheat a prime candidate for supplying the growing livestock feed and biofuel markets and in 2004 the net returns from these options were greater than those published for the CWB 1CWRW PRO.

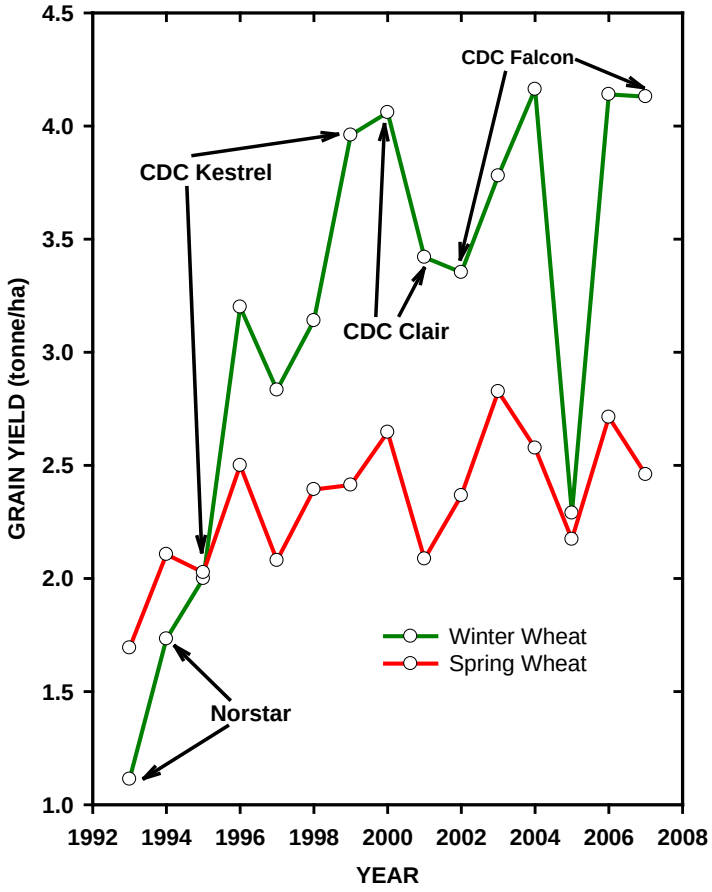

Figure 7. Average grain yield of spring and winter wheat harvested in Manitoba (1992 to 2007). Source - Statistics Canada.

The early successes in developing high yielding winter wheat cultivars that had lower protein concentration did not come as a surprise. Initial assessment of potential

quality classes for the expanded prairie production area indicated that high protein concentration was the only genetic and/or environmental barrier to the production of winter wheat cultivars suitable for all market classes (Fowler and de la Roche, 1984). However, the CWB specializes in selling into the premium high protein concentration markets. Unfortunately, there is a well established negative relationship between grain yield and protein concentration that left plant breeders with the extremely difficult challenge of improving protein concentration while maintaining and/or increasing the grain yield advantage of winter wheat.

In 2001, the CWB initiated market development work on varieties of CWRW with superior milling and baking qualities and the winter wheat class was divided into select and non-select cultivars in 2004. CDC Kestrel, CDC Clair, CDC Harrier, CDC Falcon, and CDC Raptor were designated as non-select and priced lower than the select cultivars. However, domestic millers continued to purchase and utilize non-select winter wheat cultivars, especially when their protein concentration was above 11 percent. The reasons for the domestic millers continued interest in non-select cultivars became clear when the flour yield for Canada Western Red Spring (CWRS) and Canada Western Red winter (CWRW) were compared on a constant ash basis (0.05%) for the 2009 PGDC Cooperative trial evaluation year. The grain quality reference cultivars for registration to the CWRW class had 5.5 percent higher flour yield than those for CWRS, which is internationally renowned for its milling and baking quality. In these comparisons, a CWRS standard considered to be "Excellent" in flour yield was 1.8 percent lower than a CWRW cultivar that was rated as "Poor". In addition, the superior flour yield for select CWRW cultivars came with a lower flour ash and better flour color than the CWRS grain quality standards. In spite of these advantages, winter wheat has been priced much lower than CWRS indicating that the unrealistically high grain quality targets for the registration of CWRW wheat cultivars do not provide a meaningful advantage in the marketplace. What was even more discouraging is the knowledge that all past and present CWRS cultivars grown in western Canada would have been considered to have unacceptably low flour yield and could not have been registered if the exceptionally high CWRW milling targets had been applied to the CWRS class. Clearly, these unrealistic quality targets provide a difficult challenge to winter wheat breeders as they not only impose major constraints on selection for milling properties, but they also severely restrict the rates of improvement that can be achieved for agronomic, disease resistance, and other end-use quality traits.

Another change to the wheat registration system came in 2007 when the Canada Western General Purpose (CWGP) class was developed. It had disease resistance and agronomic criteria but no quality or KVD requirements other than not visually resembling CWRS and durum wheat. The industrial CWGP class was put in place to accommodate new wheat lines for use in ethanol production and specialized animal feed. However, its creation also removed the CWGP cultivar option from the Canadian food market. KVD requirements were suspended in 2008 and the PGDC Grain Quality Evaluation committee does not make recommendations on the registration of candidate cultivars in the CWGP class.

As a result of these changes, CWRW cultivar registration is now limited to feed/industrial use and a single low return food option that is restricted by grain quality standards that are a photocopy of the PGDC reference cultivars. The full impact of the

creation of the CWGP class became apparent when the Canadian Grain Commission advised that the varieties CDC Clair, CDC Falcon, CDC Harrier, CDC Kestrel, and CDC Raptor would be moved from the Canada Western Red Winter Class to the CWGP class effective August 1, 2013. As mentioned earlier; 1) domestic millers were quite willing to purchase and utilize these cultivars in their products, especially when their protein concentration was above 11 percent and 2) at similar protein concentrations the milling properties of these "non-select" winter wheat cultivars compare very favorably with the CWRS cultivars leaving little question as to their acceptability in the human food market. The end result of these demotions was that an established winter wheat food market option was sacrificed because of lack of interest and effort on the part of the CWB. These changes in the PGDC winter wheat quality standards for recommendation also demonstrated that we have had a *flexible registration system* in western Canada, but only as it relates to CWB market priorities.

In the twelve year period from 1999 to 2010, the average commercial yield of winter wheat was 149, 125, and 118 percent of spring wheat in Manitoba, Saskatchewan, and Alberta, respectively (Statistics Canada Field Crop Reporting Series). Winter wheat production grew to 1.5 million acres planted in 2007 to become western Canada's third largest wheat class. *This major winter wheat expansion was achieved primarily through the production of non-select cultivars and the development of feed and fuel markets that happened more by accident than by design.* Additional opportunities exist in the food, feed/industrial and other markets and the innovation that created the recent winter wheat successes must continue to be encouraged. Limiting the potential winter wheat market to feed/industrial use and a single narrow low return food option, which is extremely difficult to breed for without reducing grain yield targets, does not promote the strengths of the crop.

The elimination of KVD requirements should have allowed for a much more fluid wheat marketplace based on VED. A system should have evolved that allowed for immediate assessment of potential market opportunities. The availability of cultivars with the desired quality characteristics then becomes the factor limiting our ability to capitalize on these market opportunities making it important to have a wide selection of cultivar quality options available in the system. The other option is the one we have at present, which is to restrict market opportunities. Under this option, if a potential new market is identified, we must then wait 15 or more years while plant breeders develop the necessary adapted prototype cultivars so that the true market opportunities can be established.

In today's marketplace, it is difficult to justify a registration system based on narrow and restricted cultivar options when there is a wide range of proven markets to be explored. The following are examples of the market opportunities for winter wheat. 1) Over 60 percent of the wheat traded in the world each year is winter wheat. It is used to produce a large variety of foods that include many kinds and types of breads, cakes, noodles, crackers, breakfast foods, biscuits, cookies, confectionery, etc., items. Consequently, there is a large established market for a wide range of quality types that could be tapped into if a competitive winter wheat production system could be put in place in western Canada. 2) All the select and non-select hard red winter wheat cultivars presently registered for production in western Canada can be grown and marketed in the USA where they are eligible for milling grades. This list also includes several newly registered hard red winter wheat CWGP cultivars that can only be grown for feed/industrial use in Canada. With the

creation of the CWGP class, the non-select option has ceased to exist in Canada thereby reducing opportunities for innovation in the western Canadian winter wheat industry.
3) Given the wide mix of cultural and ethnic groups that call Canada their home and the inborn interest people have in experiencing new cuisine, there is a present and expanding domestic demand for all types of wheat products on store shelves. The Quebec based Moulins-de-Soulanges and Premiere Moisson (http://www.premieremoisson.com/Home/) are an example of the successes that can be achieved in these so-called niche markets. Their research and development efforts include a systematic search for new blends of cultivar and crop management specific quality attributes to better supply ever expanding markets.
4) Food options exist for soft white, soft red, and hard white winter wheat cultivars. CDC Ptarmigan and Sunrise, soft white and soft red winter wheat cultivars, have been registered in the CWGP class. Hard white winter wheat lines are also in the advanced stages of cooperative test evaluation. The current registration system in western Canada restricts the market options of these quality types to the feed/industrial use CWGP class.
5) A hard red winter wheat line with exactly the same quality profile as CWRS wheat quality reference cultivars could not be registered for food uses in Canada. The CWB markets for winter wheat and spring wheat have different quality requirements and a winter wheat with a hard red spring wheat quality profile would not be supported for registration by the PGDC grain quality evaluation team.

The Canada Western General Purpose (CWGP) wheat class

The western Canadian wheat registration system became much more flexible with the advent of the CWGP class in 2007. As indicated earlier, the grain quality evaluation team of the PGDC is responsible for quality evaluation of all candidate cultivars that fall into the CWB market classes. The grain quality evaluation team does not conduct quality assessment of lines entered into the CWGP class and their report to the PGDC on the quality of lines in the CWGP class is a no comment. The CWGP class is a mixed bag of quality types that range from soft red and white to hard red and white spring and winter habit cultivars with a wide range of functional properties. Support for the registration of lines selected for the recently to be discontinued Canada Prairie Spring white wheat class (Figure 3) for entry into the CWGP class suggests it is also the class of last resort for quality types in which the CWB has lost interest.

At the moment, cultivars in the CWGP class are restricted to use for feed and fuel and there is little or no support for alternative market assessment. They cannot enter the food market unless they go through a buy-back program and the CWB is extremely reluctant to let anyone pursue these niche food markets. Also, because the grain quality evaluation team does not conduct quality assessment on CWGP lines, it is difficult to imagine how the CWB could establish a fair buy-back price. *The CWB has no plans for involvement in the marketing of cultivars in the CWGP class for food, so why not allow others to build opportunities in these market niches where the CWB is too big to play?*

Canada imports flour and wheat products from countries like France (Figure 8) and the USA where they do not have similar food, fuel, and feed restrictions on cultivar registration and use. Ironically, Canada has been the largest importer of USA flour, accounting for nearly 50% of their flour exports in 2008. Unless the wheat was imported

from western Canada for milling in these countries, the Canadian marketing and registration system prevents the quality types of essentially all of the cultivars used to produce this imported flour from being grown and marketed for food use by Canadian farmers.

Most CWGP wheat cultivars registered in Canada are grown in the USA where they are not discriminated against in the food market. There are no special restrictions on these cultivars entering Canada from the USA as flour or in baked goods, or for that matter as grain for milling. The border appears to have a an unexplained discriminatory effect on wheat quality for human consumption where the USA farmer can access Canadian food markets with wheat registered in the CWGP class while the Canadian farmer is limited to the fuel and feed market - *a sort of Country of Origin Labeling (COOL) marketing restriction in reverse*. The net result is that, while the CWGP class has created the opportunity for a wider range of market options, efforts to develop these niche markets for wheat are actively being discouraged and the food market for Canadian grown wheat has become even more restricted.

Figure 8. Baguette made from 100% imported flour from France and sold across Canada.

RECOMMENDATIONS

1) The Canadian Wheat Board (CWB) should continue marketing all classes of wheat, but its monopoly should be restricted to Canada Western Red Spring and Amber Durum. These two classes account for nearly 90 percent of western Canadian wheat production (Figure 3) and they are the focus of CWB marketing efforts.

2) The Canadian Wheat Board has shown no interest in market development of the different cultivar quality types within the Canada Western General Purpose (CWGP) wheat class for food use. The CWB monopoly should not be allowed to prevent others from actively operating in potential niche food markets where the CWB has no interest. For this reason, *the federal government should make immediate use of its power to grant Governor in Council licenses to encourage market exploration and provide the opportunity to expand the markets for western Canadian produced wheat. This action would provide farmers in the CWB area of western Canada the same competitive access to both Canadian and international markets presently available to farmers elsewhere in the world.*

3) Encourage innovation. The institutions responsible for managing the wheat industry need to rethink their decision-making paradigm and create a more innovative market responsive approach. Recent attempts to create a more flexible wheat cultivar registration system must be encouraged. The elimination of KVD requirements and the use of variety eligibility declarations (VED) now allows for greater flexibility and the development of a more fluid marketplace. The present 'dog in the manger' approach that restricts market access must be abandoned. Instead, our objective should be to develop and release cultivars with the special quality attributes that create as many food product and other market options as possible so that ever changing market opportunities can be quickly and accurately assessed on a continuing basis.

4) Pre-registration testing that meets official guidelines should be the responsibility of the originating wheat breeding programs. Once a potential cultivar reaches the seed increase stage, it should be evaluated in appropriate third party regional trials.

5) Establish an independent western Canadian regional cultivar evaluation system that employs recognized protocols to generate the databases farmers and their advisors require when identifying the cultivars that best fit the farmers' individual production systems. These databases could also be used to provide recommended cultivar lists for industry guidance (agronomic performance, disease reaction, and grain quality profile), as is the approach followed in most countries. However, they should not be used to restrict release or farmer choice of cultivars that meet health, safety and environmental regulations. The large differences in the mix of registered winter wheat cultivars grown in Alberta, Saskatchewan, and Manitoba in recent years (Figure 6) demonstrates that farmers are capable making their own post-registration decisions based on environmental limitations and differences in disease prevalence and market opportunities. *It is the farmers' money on the line and it is important that they have the necessary information and the freedom to make the decisions that determine the cultivars they will grow.*

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