



Biofuels and the Canadian Beef Cattle Industry

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Table of Contents

Executive Summary	1
Background	4
<i>Biofuels Production</i>	5
<i>Current Incentives</i>	6
CCA Policy and Recommendations	8
<i>CCA Policy</i>	8
<i>Productivity (Yields) of Feed Grains</i>	10
<i>Biofuels Co-Products and Potential Implications of Use</i>	16
<i>Impact of Biofuels on North American Beef Cattle Industry</i>	19
References	21
Appendix: Canada versus U.S. Biofuel Comparisons	22

Executive Summary

The impact of the growing North American biofuels sector has been felt acutely by the livestock sector. Governments around the world have identified this emerging industry as a solution to a number of priority issues: it is generally perceived to be a clean alternative to traditional fossil fuels, reduce greenhouse gas emissions, and provide an alternative marketing option to the grain sector. In the United States, in particular, it is primarily seen as a means to achieve energy independence. It is not completely understood what the net outcomes of investment in the biofuels industry will be, and this is an area where further investigation is warranted.

In December 2006, the CCA Board passed a motion “that CCA endorse a biofuels policy that is purely market driven and will not undermine the competitiveness of Canada’s cattle industry.” The need for a focused group to fully examine the impact of biofuels development on the Canadian beef cattle industry was identified and the Biofuels Task Force was created. In January 2007, the CCA Biofuels Task Force began work examining a number of issues relevant to the beef industry and identified the following as priority items for the Task Force to further work on.

1. Develop recommendations for CCA policy
2. Examine and identify course of action for issues related to productivity (yields) of grains
3. Examine current research to understand how biofuels co-products can be used to ensure maximum efficiency and understand potential implications of co-products use for the beef cattle sector
4. Examine economic impact of biofuels on North American beef cattle industry
5. Communicate with federal and provincial governments and other stakeholders on implications to the beef cattle sector

CCA Policy

As the national organization representing the needs of Canada’s 90,000 beef cattle producers, CCA’s approach has been to identify the best policy for the whole of the industry. Focusing on a market-driven solution is consistent with the CCA’s general principles and is a viable long-term policy. Therefore, the CCA is supporting the following policy with respect to the biofuels industry:

- That the CCA endorse a clearly defined and expeditious transition to a market based approach for the production of renewable energy that reestablishes competitive balance between sectors.
- That the CCA support the elimination of tariffs on imported biofuels.
- That the CCA emphasize that any further encouragement of the biofuels sector should focus on the production of biofuels from sources that do not impact the availability of livestock feed.

- That the CCA formally request that the government incorporate safeguard measures in the event of crop shortages, that may include the elimination of any remaining tariffs, reduction of mandates, and/or reduction of incentives.

Productivity (Yields) of Feed Grains

When we compare U.S. feed grain research and the resulting yield enhancements that have been seen in corn production there is a clear disparity with regards to the level of investment in Canadian feed grain research and development. This places Canadian feed grain users, such as the cattle industry, at a significant disadvantage to their U.S. counterparts as a result of rising relative feed grain costs. In terms of the Canadian cattle industry, increasing feed grain costs could have a significant impact on whether cattle are fed in Canada or exported and finished in U.S. feedlots.

With competition for feed grains increasing, a policy change encouraging greater investment and more efficient approval processes is essential. In order to encourage and facilitate greater investments into feed grains research, the following action items for the CCA have been identified:

1. Become involved in CFIA's current seed modernization strategy to voice the concerns of the Canadian cattle industry, a significant user of Canadian feed grains.
2. Seek involvement in the Western Grains Research Foundation's priority setting process for the \$3.5 million to be directed towards research in non-traditional areas, to bring forward the importance of feed grains research.
3. Advocate for the acceleration of the elimination of current KVD requirements, which are to be removed by 2010. Advocate that the evaluation process and/or system developed to replace KVD be responsive and efficient in order to facilitate the development of new varieties of wheat that meet the needs of end-users.
4. Develop a focused policy and research strategy based on CCA's study currently underway examining the current feed grains research and commercialization situation.
5. In order to assess research priorities and provide direction in the area of feed grains quality improvement, the industry needs to clearly identify the desired specifications for beef cattle feed grains and provide support to ensure these needs are met.
6. Work with government, researchers and funding agencies to increase forage and grazing research

Feeding of Biofuels Co-Products

Understanding the opportunities and costs that will be faced by the Canadian beef cattle industry as a result of the development of a North American biofuels industry is a complex undertaking due to the large number of factors that need to be considered. Ethanol support policies, the demand and supply of feed grains, estimated supply and demand of biofuel co-products, and the cost of biofuel co-products are only a few of the

factors that need to be considered. In addition, the cattle industry is looking to understand the capacity to which co-products can be incorporated into cattle diets without having a negative impact on animal performance, carcass quality, food safety, and the environment. With increasing knowledge on the management of distillers grains in the beef cattle diet, there could be an advantage to those producers located in close proximity to ethanol facilities. Priority needs to be placed on research in Canada to understand the following aspects of feeding wheat distillers grains:

1. Evaluation of feeding dry and wet distillers grains, understanding energy values, optimal inclusion rates, and the benefits and costs associated with each. While some small scale research trials have been done or are in progress, larger scale trials in commercial feedlots have not been completed.
2. Investigate the risk of potential toxin build-up in ethanol by-products and examine potential management strategies.
3. Examining the impact wheat distillers grains have on carcass quality, comparing the impacts of corn distillers versus wheat distillers.
4. Evaluation of the environmental impacts of feeding wheat distillers grains, understanding the impact of feeding distillers grains on nutrients and possible implications to manure management.

The CCA, through its Beef Cattle Research Council, will continue to work with the research community and with other funding agencies to ensure that these priorities are communicated.

Economic Impacts of Biofuels on the North American Beef Cattle Industry

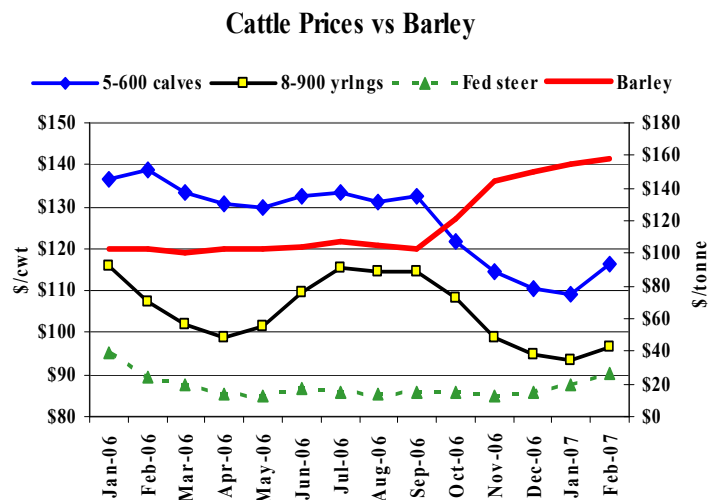
Understanding the likely impacts of growth in biofuel production on the competitiveness of cattle feeding in Canada is critically important. Research is needed to measure the potential effect that ethanol plants across Canada might have on the demand for biofuel crops and how this will affect the cattle feeding sector. Research is also needed to assess the effect of U.S. ethanol production and policies on Canadian feed-grain prices. The CCA currently is participating in a study examining the impact of the biofuels sector on the Canadian agriculture sector and in a longer term study examining the effects on the cost of feeding cattle in Canada.

Background

The impact of the growing North American biofuels sector has been felt acutely by the livestock sector. Governments around the world have identified this emerging industry as a solution to a number of priority issues: it is generally perceived to be a clean alternative to traditional fossil fuels, reduce greenhouse gas emissions, and provide an alternative marketing option to the grain sector. In the United States, in particular, it is primarily seen as a means to achieve energy independence. It is not completely understood what the net outcomes of investment in the biofuels industry will be, and this is an area where further investigation is warranted.

Increased feed grain supplies are required to keep pace with the growing demand caused by expanded ethanol production. Since the beginning of the decade corn used for ethanol in the U.S. as a percent of total corn demand has tripled, reaching 18 percent in 2006/07. In 2007/08, U.S. ethanol production is projected to account for approximately 1/3 of total corn demand. Canadian feed grain markets follow the U.S. corn price very closely and as a result substantial increases in competition for feed grains in both countries will have a large impact on Canadian feed grain prices and feed costs for the beef cattle industry.

With feed representing more than 80% of the cost of gain in a Canadian feedlot, increased competition in the feed grain market that results in increased feed grain prices has a large impact on the cattle industry in both the short run and long run. In the short run the economic impact of the current U.S. incentives to the biofuels sector has had a significant effect on the North American beef cattle industry. In October-December 2006, grain prices increased as a direct result of U.S. ethanol-driven demand for corn. The resulting effect, illustrated here, is that feedlot owners have faced increasing production costs, and in turn, contributed to lower calf and feeder prices.



Source: CanFax

Higher grain prices encourage increased conversion of land to grain production. This can include reductions in acreage for pasture, reduced fallow, and shifts from other crops. While expanded acreage is expected to alleviate some of the pressure currently being placed on feed grain supplies, corn prices are still expected to trade in the \$3-\$4/bu range in the U.S. over the next several years as compared to the 1973 to 2005 average corn price of \$2.36/bu. It is important to note that any production challenges, such as drought, could result in a significant increase in feed grain prices in the short run. The much larger

demand within feed grains markets has meant that global consumption is outstripping production, which has led to a sharp decline in ending stocks. A situation such as drought would further exacerbate the reduced ending stocks and result in sharp price increases and increased volatility in the long run.

Over the longer term higher feed grain prices are expected to result in a shift in the beef cattle industry, as some producers substitute to alternative feeds and move operations closer to sources of lower priced input such as distillers grains, a co-product of ethanol production. Meanwhile, other producers are expected to exit the industry and an overall reduction in cattle inventories is expected to occur.

In addition, the efficiency of ethanol production has been questioned on both an economic and on an environmental basis. The level to which biofuels reduce greenhouse gases has been debated and depending on the source of research, there have been both positive and a negative energy balances demonstrated. There will be continued debate in these areas and it is important for the beef cattle industry to have an understanding of the different perspectives. However, an evaluation of these studies is deemed to be outside of the scope of investigation for this report. Concerns related to biofuels production, including the potential for higher food costs associated with the higher costs for primary products, are to be examined as industry adjusts to the increased demand for feed grains. The key issue that needs to be understood is to what level increased production costs are transferred to the consumer level or have to be absorbed by the industry due to tight competition from competing proteins and lower cost imported products.

Biofuels Production

Canada currently produces about 600 million litres of ethanol annually, with an expected increase to 840 million litres in 2007. Given the current incentives, the Canadian government is projecting that ethanol production will increase to about 2.74 billion litres by the end of 2010. In order to meet the mandated requirements, Canadian production will need to increase by over 2 billion litres or utilize imported ethanol from other countries.

According to the Renewable Fuels Association, current U.S. ethanol production capacity is at 23.4 billion litres, with an additional capacity for 24.1 billion litres under construction. It is expected that in time, U.S. corn producers will be able to meet this expanding demand with increases in productivity and acreage planted to corn; however, in the short term, this shift in demand has caused significant price increases. The ability for Canadian grain producers to make similar increases in production to deal with the increased demand is much more challenging due to a lack of investment in research and development of new varieties of feed grains and regulatory impediments. In addition, Canada's climate poses significant challenges to increasing crop productivity due to its short growing season, need for moisture conservation on the prairies, and soil conservation requirements.

Increased focus has also been placed on pursuing alternative methods to produce ethanol, such as non-food crops and biomass containing cellulose. Cellulosic ethanol creates fuel from crop residues, switchgrass, wood chips, and other biomass. There are several advantages to moving toward cellulosic ethanol, as it has improved energy returns relative to grain-based ethanol and provides significantly less direct competition for feedstuffs used for human and livestock consumption. However, the use of biomass still creates competition for acreage, and the use of crop residues could have a negative impact on soil fertility and moisture retention. In addition, while a pre-commercial demonstration facility exists in Ontario, there is currently no commercial production of cellulosic ethanol due to the technological and financial challenges associated with production of the necessary enzymes used to extract the fermentable sugars from the biomass.

Current Incentives

The Government of Canada has released a strategy with the goal of increasing consumption of renewable fuels. The strategy consists of the following elements:

- Developing and implementing federal regulations that will require a renewable content of 5 per cent in gasoline by 2010 and a 2 per cent renewable content in diesel fuel and heating oil by 2012.
- Establishing the ecoAgriculture Biofuels Capital Initiative (ecoABC), a four year, \$200 million federal program that provides repayable contributions of up to \$25 million per project for the construction or expansion of transportation biofuel production facilities. Funding is provided for projects that use agricultural feedstocks to produce biofuels and that have new agricultural producer equity investments in the projects equal to, at minimum, 5 per cent of the total eligible project costs. This program builds on the \$10 million budgeted for 2006-07 for the Biofuels Opportunities for Producers Initiative which provides assistance for agricultural producers to prepare business plans and conduct feasibility studies into developing and increasing production capacity for renewable fuels.
- The establishment of the Agricultural Bioproducts Innovation Program, a \$145 million, five-year program designed to promote research, development, technology transfer and the commercialization of bioproducts, including biofuels, in Canada.

According to a report from the Parliamentary Information and Research Service, Agriculture and Agri-Food Canada (AAFC) is estimating that 4.6 million tonnes of corn, 2.3 million tonnes of wheat and 0.56 million tonnes of canola will be required to meet the 5 per cent target identified in the federal strategy. Further, if all these feedstocks were grown domestically, they would represent 48-52 per cent of the total corn seeded area, 11-12 per cent of the wheat seeded area, and about 8 per cent of the total canola seeded area in Canada.

In addition to the current mandate, since the mid-90s Canada has waived its excise tax of \$0.10 per litre for ethanol blended with gasoline and \$0.04 per litre for biodiesel. Similar

incentives are provided by the provincial governments. The 2007 Budget included an investment of up to \$2 billion in support of renewable fuel production in Canada. This includes operating incentive rates of up to \$0.10/litre for renewable alternatives to gasoline and up to \$0.20/litre for renewable alternatives to diesel for the first three years, and decline thereafter. Concurrent with the implementation of these incentives, the federal excise tax exemptions will be eliminated as of April 1, 2008. The budget also makes \$500 million available for the establishment of large-scale facilities for the production of “next generation” renewable fuels such as cellulosic ethanol.

Domestically produced ethanol is also protected in many countries by import tariffs. In the U.S., imported ethanol is subject to two duties: a 2.5 per cent ad valorem tax and a secondary tariff of 54 cents per gallon (14.27 cents per litre). The secondary tariff is set to expire on January 1, 2009; however, there has been a lobby effort in the U.S. to extend this provision. In Canada, the import tariff is 4.92 cents per litre.

In the U.S., a number of mechanisms are in use to promote the production of biofuels and biodiesel. Briefly, these include federal tax incentives such as the Volumetric Ethanol Tax Credit (VEETC), which provides ethanol producers and retailers with a tax credit of US\$0.0051 per percentage point of ethanol blended (expires 2010); similar tax credits for biodiesel (expires 2008); additional tax credits for smaller ethanol and biodiesel producers; and the Renewable Fuels Standard (RFS). The RFS sets a production goal of 28.4 billion litres of renewable fuel use by 2012. The RFS also specifies that at least 946 million litres of cellulosic ethanol be produced annually by 2013. A brief comparison of U.S. and Canadian production and incentives is provided in the appendix of this document.

According to a study prepared for the Global Subsidies Initiative of the International Institute for Sustainable Development, current subsidies to biofuels in the United States are between \$5.5 and \$7.3 billion per year. In addition, with a large number of biofuels subsidies tied to output and the continued tremendous growth in output, this is expected to result in the subsidies soon reaching \$8-\$11 billion.

The National Cattlemen’s Beef Association has developed interim policy to support a transition to a market-based approach for the production and usage of ethanol produced from livestock feedstuffs. This includes support for the sunseting of the blending tax credit (VEETC) and the ethanol import tariffs as scheduled; supporting input segmentation of the Renewable Fuel Standard, with an increase in the cellulosic portion of the RFS, while holding the feed grain-based portion level; and promoting additional research and development of renewable fuels that may provide additional benefits for the livestock industry.

CCA Policy and Recommendations

In December 2006, the CCA Board passed a motion “that CCA endorse a biofuels policy that is purely market driven and will not undermine the competitiveness of Canada’s cattle industry.” The need for a focused group to fully examine the impact of biofuels development on the Canadian beef cattle industry was identified and the Biofuels Task Force was created.

In January 2007, the CCA Biofuels Task Force began work examining a number of issues relevant to the beef industry and identified the following as priority items for the Task Force to further work on.

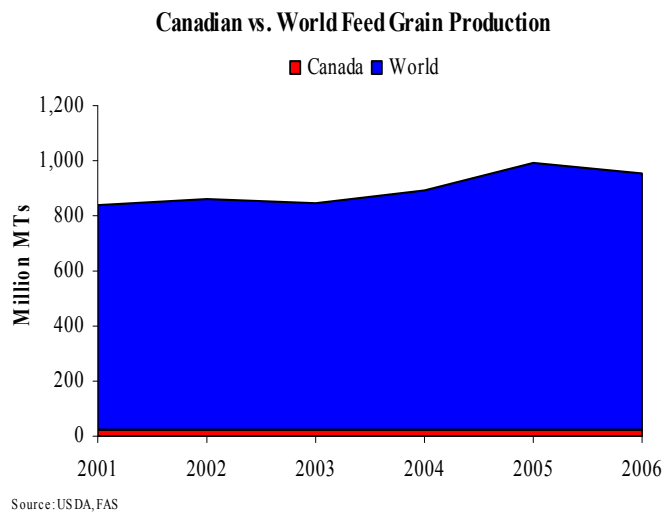
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4. *Examine economic impact of biofuels on North American beef cattle industry*
5. *Communicate with federal and provincial governments and other stakeholders on implications to the beef cattle sector*

CCA Policy

As the Canadian Government works to enact legislation that will impose the current biofuel mandates, it is important that the beef cattle industry is aware of the potential alternatives and the effect on our industry. Canada is a relatively small producer of feed grains, amounting to between 3.5 and 4 per cent of world production. Therefore, while federal government incentives to encourage biofuels production may create rural development

opportunities and some isolated advantages for feedlots located near ethanol plants, they ultimately have little effect on Canadian feed grain prices which are essentially established based on supply and demand conditions in the world feed grain market.

Development of the regulations to implement the mandates is expected to be complex and AAFC is anticipating that it will take at least two years to develop. Consultations will



continue on the design and implementation of the regulations and the Canadian beef cattle industry will continue to work with governments for solutions.

As the national organization representing the needs of Canada's 90,000 beef cattle producers, CCA's approach has been to identify the best policy for the whole of the industry. *Focusing on a market-driven solution is consistent with the CCA's general principles and is a viable long-term policy.*

CCA's Biofuels Policy

That the CCA endorse a clearly defined and expeditious transition to a market based approach for the production of renewable energy that reestablishes competitive balance between sectors.

That the CCA support the elimination of tariffs on imported biofuels.

That the CCA emphasize that any further encouragement of the biofuels sector should focus on the production of biofuels from sources that do not impact the availability of livestock feed.

That the CCA formally request that the government incorporate safeguard measures in the event of crop shortages, that may include the elimination of any remaining tariffs, reduction of mandates, and/or reduction of incentives.

At this point in time, there is no requirement that the renewable component of the mandate is sourced from Canada. If grown domestically, the mandates would require 48-52 per cent of the total corn seeded area, 11-12 per cent of the wheat seeded area, and about 8 per cent of the total canola seeded area in Canada. This could potentially create increased pressure on the livestock industry, particularly in a situation where feedstocks are reduced such as a drought. To reduce this competition for domestically grown feedstock, it is recommended that Canada reduce its current tariff of 4.92 cents per litre. This would allow imports from other low cost ethanol producers such as Brazil while still maintaining some protection for the new ethanol facilities being constructed.

In addition, as biofuels production increases in Canada to meet the new mandates, it is recommended that any further encouragement should be targeted toward feedstocks that are not in competition with the livestock sector. While interest continues to focus on the production of cellulosic based ethanol, there may be opportunities in other non-traditional areas. As an example, there could be further incentives for new disposal options for the specified risk material resulting from the enhanced feed ban.

Issues and Recommended Course of Action Related to Productivity (Yields) of Feed Grains

The information presented below is by no means a comprehensive research and literature review. Information was obtained from multiple researchers, individuals from industry, and other sources in order to provide an initial assessment of current research activities, the opportunities and challenges, and recommendations as to what is needed moving forward.

Feed Grains Research & Development

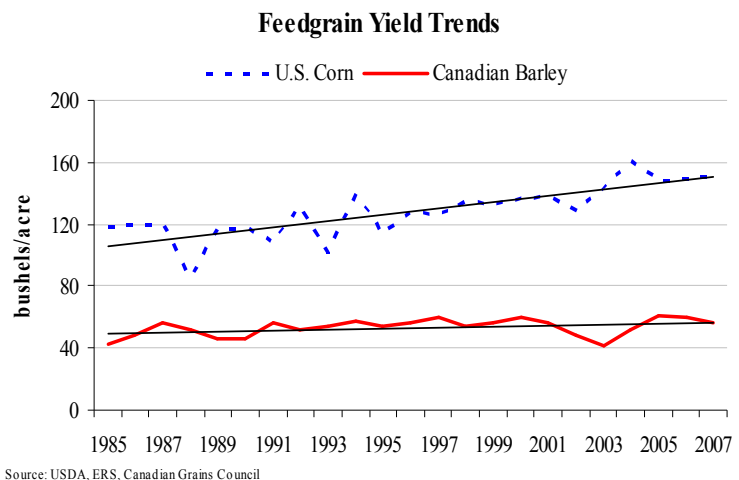
When we compare U.S. feed grain research and the resulting yield enhancements that have been seen in corn production there is a clear disparity with regards to the level of investment in Canadian feed grain research and development. This places Canadian feed grain users, such as the cattle industry, at a significant disadvantage to their U.S. counterparts as a result of rising relative feed grain costs. In terms of the Canadian cattle industry, increasing feed grain costs could have a significant impact on whether cattle are fed in Canada or exported and finished in U.S. feedlots.

Through an initial assessment it appears that a combination of factors have inhibited and deterred investment in Canadian feed grain research and variety development including current research funding priorities in the grains sector, approval and certification processes for new varieties, and feed grain's share of total Canadian crop acreage. The private sector's inability to collect a return on its

research investment in wheat and barley varieties in Canada, as a result of the fact that these are self pollinating crops that producers save year to year to use as seed, has also significantly deterred investment in Canadian feed grain research. While the level of investment in feed grains research is important, a significant challenge for the livestock industry is also ensuring that the funds targeted in this area are meeting the specific needs of the livestock sector in terms of improving nutritional composition, feed digestibility and feed efficiency.

Feed Wheat Development

Research on varietal improvements in the wheat industry has almost exclusively been focused on improvements in export classes of Hard Red Spring Wheat (CWRs). The



approval criteria for new varieties of CWRS are very stringent, with most new varieties being developed and selected for their quality attributes and disease resistance. Less focus is placed on advancing yields and in fact the potential to enhance yields has been limited, as most improvements related to quality and disease resistance have a negative impact on yields.

Researchers have indicated that new varieties of wheat have been developed that demonstrate increased yields but because they do not meet current quality specifications they have not been approved. This provides a good indication that the potential for advances in wheat yields exists, but because current selection criteria for new wheat varieties is directed towards export oriented quality attributes there has been little incentive or ability to focus on enhancing wheat yields.

Clearly economic signals would not direct all wheat research away from quality attributes given the value of wheat exports to the Canadian grains sector, but the current approval process should be evaluated to determine if revisions are necessary to better service domestic demands for feed wheat.

Recently a new class of wheat has been developed, which is labelled “general purpose” and would likely fall more in line with feed wheat requirements. The challenge is that most research funds are still directed towards the development of high quality varieties for export, which is the market focus of the Canadian Wheat Board (CWB).

Kernel Visual Distinguishability

Kernel visual distinguishability (KVD) requirements have also been an impediment to the development of new wheat varieties. Previously Canadian wheat varieties were required to conform to established visual seed characteristics (size, shape, and colour) within each class of wheat. While requirements have been removed for several lower classes of wheat, CWRS must still meet KVD requirements and other classes of wheat are not permitted to possess the same visual characteristics as CWRS. KVD requirements were previously thought to provide a low-cost and efficient basis for segregating wheat classes in the bulk handling system and was important to maintaining uniformity of quality of shipments long before other methods were considered practical.

Despite its advantages, there are significant limitations as a result of KVD requirements. KVD limits the ability of plant breeders to respond quickly to industry’s demands for increased yields and improved grain quality traits. KVD also limits plant breeders’ ability to develop new varieties with traits that differ from those in existing classes. New varieties with special traits that do not meet the established wheat class criteria may not be visually distinguishable and therefore are not registered because of KVD conflicts. In essence, the current KVD requirements for registration of new wheat varieties means that producers and end-users do not have timely access to wheat varieties that meet their demands, with specialized energy or protein contents for livestock feeding or industrial uses such as ethanol.

New variety developments in classes of wheat outside of CWRS have been significantly limited due to KVD requirements. Even though these varieties are not required to meet KVD requirements for their particular class of wheat anymore, they must be visually distinguishable from varieties within the CWRS class. It has been estimated that up to 80% of new breeding lines developed look like CWRS and even though they produce higher yields or other characteristics demanded for alternative uses, they cannot be approved. Often a breeder does not know if a breeding line does not meet KVD until after 6 to 10 years of investment. It has been estimated that if KVD did not exist, Canadian wheat varieties would yield 5 to 10 percent more and disease resistance would be significantly improved. Traits of wheat can also be influenced by the environment as well as genetics. Thus after 8 years of breeding and submitting a potential new variety for the mandatory 3 years of testing, there are cases where a variety has passed KVD requirements in the first two years of western Canadian testing and then failed at one location in the third year of testing and consequently cannot be registered.

Current KVD requirements are in need of significant revision to allow for a more responsive and efficient evaluation process that encourages the development of new varieties to meet the needs of end-users. Currently, Canada is the only grain industry in the world that markets their wheat based on KVD. Many large exporters, such as Australia, use affidavits or other processes to ensure quality specifications are met. There has also been a lot of investment in gene technology to facilitate the rapid identification of a wheat variety, which would facilitate the development of new tests for variety identification that could be done at the elevator level.

Variety Approval Process

Besides KVD requirements it is important to highlight that the current seed approval process is considered to be quite archaic, in the sense that research trials for variety approval can span up to ten years with two crops being grown per year. The Canadian Food Inspection Agency is currently going through a consultation process known as the “Seed Modernization Strategy”. This process will be important to become involved in as regulatory hurdles have limited the approval of many varieties of wheat and barley. For example, the new low phytate feed barley developed by the University of Saskatchewan has not been able to obtain registration, as it is classed as a novel feed even in light of the fact that this variety is not transgenic and was developed using traditional plant breeding methods.

Feed Barley

Investment in feed barley research is in a very similar situation to that for feed wheat. The majority of barley research is directed toward enhancing the quality characteristics of malting varieties for domestic use and export. Limited investment has been made into enhanced yields in feed barley varieties. Currently there are four major breeding programs in Canada and while some feed research is completed, most research is directed towards malting varieties at this time. Barley is further challenged by the fact that due to the relatively small acreage as compared to wheat in Canada, the allocation of research

funding is that much smaller. In terms of approval of new varieties the situation for barley is very similar to that of wheat, with lengthy and outdated approval processes that do not allow plant breeders to respond in a timely manner to new market opportunities and demands.

Research Funding

A large proportion of wheat research funding is granted through the Western Grains Research Foundation, which collects a check-off fee on all transactions through the Canadian Wheat Board. Typically funding allocations through the Research Foundation are an estimated \$2 million for wheat improvements (all classes of wheat) and approximately \$500,000 for barley. Barley is less due to the fact that less barley is marketed through the Canadian Wheat Board. As indicated previously, most research funding directed toward wheat is directed towards the development of high quality varieties for export. Similarly the majority of barley research funded through the Western Grains Research Foundation is directed towards new malting varieties. For both wheat and barley there is a relatively low level of investment on varieties that could be used for feed or the biofuels industry and none at this point in the new general purpose class of wheat. It is also important to note that the correlation between wheat yield and quality tends to be negative, and consequently investment in research around high quality varieties for export often results in limited yield enhancements.

In consulting with several individuals, there appears to be a slow change in policy toward increased research into wheat varieties for other uses such as livestock feed. This is mainly being driven by the increased demand for feed grains as a result of ethanol production. While wheat research for biofuels may alleviate some of the challenges for the livestock sector, the biofuel sector's desired research outcome of research may not be identical to the specific needs of the livestock industry. The Western Grain Research Foundation has recently received an additional \$3.5 million from the CWB, which was returned when record shipments resulted in the rail lines exceeding their allowable shipment fees. The Research Foundation has indicated that new monies will be allocated to research in non-traditional areas such as feed grain attributes and yield enhancements.

The Alberta Barley Commission does provide a small amount of research funding, but check-off dollars for feed barley research are limited. The Alberta Barley Commission check-off is voluntary and only collected on actual transactions. A significant amount of feed barley is used on-farm or in the feedlot in the form of silage or feed barley and as no transaction occurs check-off dollars are not collected. The distortion between the amount of check-off collected on feed barley and the amount of feed barley actually utilized should be examined. Options to enhance feed barley research funding should also be explored to establish an appropriate level of funding that is more representative of the actual volumes of feed barley utilized.

Investment in feed barley research occurs at AAFC Lacombe, AAFC Brandon, and the University of Saskatchewan, but at this point the programs are generally not well funded.

Forage Research

The investment in Canadian forage and grassland research has not been investigated in this report to the same extent as feed grains. It is understood that the current level of investment in forage and grazing research has diminished significantly over the last 15 years across Canada, with investments at the government and institutional levels shifting into other areas of research. The downsizing in this area of research has mainly been a result of minimal outside investment to match government funds, which has resulted in the decision makers of public programs assuming that this is not a priority area for industry and that programs can be safely downsized. However, important infrastructure in forage and grazing management research is in place at AAFC Lacombe, AAFC Brandon, AAFC Swift Current and the University of Saskatchewan (with the Western Beef Development Centre). It is believed by researchers that significant gains in efficiency and productivity can be made with the appropriate level of investment in research, which could assist in reducing costs of production.

Recommendation:

Having access to an adequate supply of feed grains is critical for the long term sustainability of the Canadian cattle industry. Without even considering ethanol production, the Canadian feed grains industry has not seen the same growth in yields as what has been seen in U.S. corn. Consequently, Canadian feed grains have become relatively more expensive than U.S. corn. When we consider the large demand ethanol is placing on feed grains in both countries, the expectation is that this will further exacerbate the Canadian feed grain situation. While the U.S. is expected to face shortages in feed grain supplies over the shortrun, the expectation is that continued yield enhancements and further investment in research will alleviate the supply crunch in the longrun. Given the current research investment and feed grain profile, Canada is not likely to see the corresponding situation where increased yields will offset increased demands from industrial users of feed grains. This could have significant negative consequences for the cattle industry, with the potential that Canadian cattle feeding costs could continue to increase relative to U.S. feeding costs.

Plant breeding is a long term investment and new resources will take 10 or more years to show a real return. While the potential rate of return for yield increases in barley are probably less than corn due to the metabolism of the plant itself, there is no doubt that significant progress could be made to increase barley yields in the long-run. In the short term research efforts should be focused on wheat yield improvement (e.g. general purpose or winter classes) and removing regulatory barriers (e.g. KVD). As previously discussed, a portion of the needs (in terms of yield and energy enhancements) for biofuels and feed grain users could be fulfilled by exploiting already developed varieties that do not meet current KVD requirements.

With competition for feed grains increasing, a policy change encouraging greater investment and more efficient approval processes is essential. As this issue is seen to be a critical factor in improving the Canadian beef cattle industry's competitiveness, it is recommended that these issues could be addressed by the Value Creation and Competitiveness committee. In order to encourage and facilitate greater investments into feed grains research, the following action items are put forward for the CCA to undertake:

1. Become involved in CFIA's current seed modernization strategy to voice the concerns of the Canadian cattle industry, a significant user of Canadian feed grains.
2. Seek involvement in the Western Grains Research Foundation's priority setting process for the \$3.5 million to be directed towards research in non-traditional areas, to bring forward the importance of feed grains research.
3. Advocate for the acceleration of the elimination of current KVD requirements, which are to be removed by 2010. Advocate that the evaluation process and/or system developed to replace KVD be responsive and efficient in order to facilitate the development of new varieties of wheat that meet the needs of end-users.
4. Develop a focused policy and research strategy based on CCA's study currently underway examining the current feed grains research and commercialization situation.
5. In order to assess research priorities and provide direction in the area of feed grains quality improvement, the industry needs to clearly identify the desired specifications for beef cattle feed grains and provide support to ensure these needs are met.

This initial overview did not investigate forage research to the same level as feed grains. It is understood that the current research infrastructure for forage research has diminished significantly, with investments at the government and institutional level shifting into other areas. Further investigation is underway in this area to understand the overall value of forage research, historic and current investment levels, and needs of the cattle industry in this area. Therefore, recognizing the enhanced production profitability that healthy forage and grasslands offer producers in offsetting some of the impacts of the current biofuels policy, the following recommendation is also being put forward:

6. Work with government, researchers and funding agencies to increase forage and grazing research

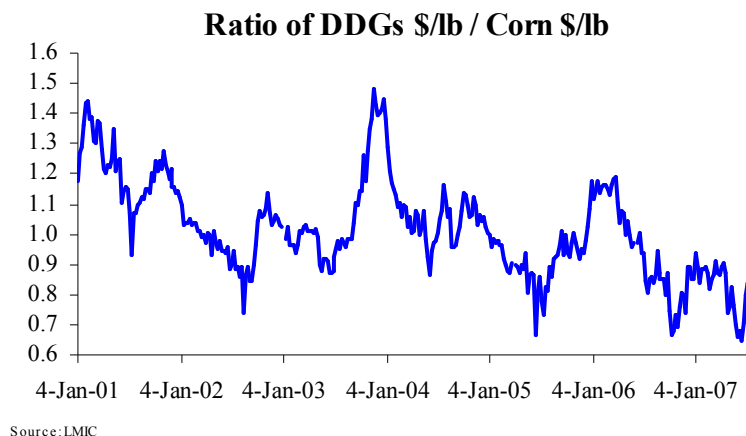
Examination of Current Research on Use of Biofuels Co-Products and Potential Implications of Use

Understanding the opportunities and costs that will be faced by the Canadian beef cattle industry as a result of the development of a North American biofuels industry is a complex undertaking due to the large number of factors that need to be considered. Ethanol support policies, the demand and supply of feed grains, estimated supply and demand of biofuels co-products, and the cost of biofuels co-products are only a few of the factors that need to be considered. In addition, the cattle industry is looking to understand the capacity to which co-products can be incorporated into cattle diets without having a negative impact on animal performance, carcass quality, food safety, and the environment. With increasing knowledge on the management of distillers grains in the beef cattle diet, there could be an advantage to those producers located in close proximity to ethanol facilities.

Some of the specific areas that the beef cattle industry needs to evaluate and focus on in order to ensure industry participants are able to capitalize on the opportunities that exist, while minimizing the negative impacts of the biofuels industry are outlined below:

Feeding biofuels co-products (distillers grains)

Feeding distillers grains to beef cattle has been thought by many to provide cattle feeders with an opportunity to offset higher feed grain costs by substituting a portion of feed grain requirements with lower cost distillers grains. While the opportunity to feed distillers grains is there, it is not clear whether it will lower the cost of feeding. Economic analysis is required to evaluate the net benefit/cost to feeding co-products. In the short term, as producers have worked to incorporate this product into their rations, there has been a softening in the price. However, in the long term as producers learn to fully utilize the product, it can be expected that the prices will converge with corn prices on an energy basis.



The level of distillers grains fed to cattle can also impact overall animal performance, carcass quality, and the environment. At this point a significant amount of research has been done to evaluate the feeding of corn distillers grain in the U.S. focusing on determining optimal feeding levels and the impact feeding corn distillers grains have on carcass quality and the environment. While most of the research on corn distillers co-products indicates that the inclusion levels can be as high as 40 per cent of the diet dry matter, information on wheat distillers grains is limited.

	Wheat DDG (%)	Corn DDG (%)
Dry Matter	93	94
Crude Protein	30.5	23
Crude Fat	3.75	2.856
Acid Detergent Fibre	11.08	16.0
Total Digestible Nutrients	86.52	86
Calcium	0.20	0.11
Phosphorus	1.15	0.43

The type of distillers grains used is also of importance. There is a significant difference between distillers dried grains (DDG) and distillers dried grains with solubles (DDGS). To produce DDGS, liquid removed during the

production of ethanol can be dehydrated and reincorporated into distillers grains resulting in a product with significantly more protein and energy.

The majority of ethanol production in western Canada will be using wheat instead of corn. Preliminary research indicates there are significant differences between corn and wheat distillers grains and as a result research findings on corn distillers grains cannot readily be transferable to determine optimal feeding levels for wheat distillers grains.

Recommendation:

Priority needs to be placed on research in Canada to understand the following aspects of feeding wheat distillers grains:

- 1) Evaluation of feeding dry and wet distillers grains, understanding energy values, optimal inclusion rates, and the benefits and costs associated with each. While some small scale research trials have been done or are in progress, larger scale trials in commercial feedlots have not been completed.
- 2) Investigate the risk of potential toxin build-up (i.e. vomitoxin) in ethanol by-products and examine potential management strategies.
- 3) Examining the impact wheat distillers grains have on carcass quality, comparing the impacts of corn distillers versus wheat distillers.
- 4) Evaluation of the environmental impacts of feeding wheat distillers grains, understanding the impact of feeding distillers grains on nutrients and possible implications to manure management.

The Beef Cattle Research Council is currently initiating research projects in the following areas:

- Evaluation of feeding dry wheat distillers grains, understanding energy values, optimal inclusion rates, impacts on carcass quality, and the benefits and costs.
- Influence of corn distillers grains and corn processing on performance, feeding behaviour, and diet selection in feedlot cattle.

Additional research needs to be completed in the priority areas identified above, especially in examining the potential for toxin build-up, comparisons between feeding wet and dry wheat distillers grains, and the environmental impacts of feeding wheat distillers grains.

In terms of other work in progress, the Western Beef Development Centre has been evaluating the use of distillers grains in extending the grazing season. University of Saskatchewan has also been examining the variation in quality of wheat distillers grains within and between biofuels plants, focusing on the chemical and nutrient composition of distillers grain when different drying temperatures are used. University of Saskatchewan has also completed some work looking at feeding wet wheat distillers grains in backgrounding rations and the impact this has on rumen activity.

Further Challenges

The co-products of ethanol production have typically been marketed as animal feed products, primarily for ruminants. However, as ethanol production expands, this has resulted in a proportional growth of co-products available. This does not necessarily imply that a corresponding price decrease will occur as a result of an increase in availability of distillers grains as ethanol production expands. Given this is a relatively undeveloped market, it is expected that as the supply of distillers grains increases, inclusion rates in livestock feed will also increase up to the maximum, creating additional demand for the product. Additional market opportunities will also be sought for this product both domestically and on an export basis. In addition, technologies to remove the germ and fiber could result in a product more suitable for non-ruminants and reduce the supply of distillers grains available for the cattle industry. Marketing of co-products other than the distillers grains will become increasingly important in order to add value to these facilities. Research is ongoing to extract the endosperm, germ and fibre from corn for uses other than animal feed and to extract the oil from corn for biodiesel production. This may eventually result in increased competition from ethanol production without the benefit of the resulting distillers grains.

Recommendation:

Alternative feed sources and improving feed efficiency

Research that assist industry in offsetting higher feed grain costs through the evaluation of alternative feed sources, feeding strategies, use of forages, and improved feed efficiency is also critical. A comprehensive assessment of what research is currently in progress and what industry priorities are moving forward would be invaluable in directing research priorities in this area and encouraging greater investment.

Agriculture and Agri-Food Canada – Research networks

It is understood that several large research networks are being developed through the AAFC Research branch to support the development of the biofuels industry and explore untapped resources and opportunities. Based on an initial review of one of these proposed networks it is concerning that research appears to be primarily focused on advancing the grains-based biofuels industry. It is important that industry communicate its concern to AAFC that very little attention has been directed towards understanding the impacts the biofuels industry may have on other agriculture sectors and how to mitigate these impacts. In addition the cattle industry needs to encourage research networks to shift research resources more toward improvements in cellulosic based biofuel production.

Impact of Biofuels on North American Beef Cattle Industry

Understanding the likely impacts of growth in biofuels production on the competitiveness of cattle feeding in Canada is critically important. Research is needed to measure the potential effect that ethanol plants across Canada might have on the demand for biofuels crops and how this will affect the cattle feeding sector. Research is also need to assess the effect of U.S. ethanol production and policies on Canadian feed-grain prices.

Economic modelling is currently being done through Agriculture and Agri-Food Canada to assess the regional impacts of the biofuels industry on different agriculture sectors. Results from this modeling illustrate that the effect of changing world prices from increasing biofuels production on producer income is much larger than the effect of the domestic policy on its own. While this modelling is of interest, it is fairly broad-based and not directly applicable to the beef industry.

CCA is currently participating through funding from the National Beef Industry Development Fund (NBIDF) in a multi-client study on “Canadian Agriculture: The Impacts of the Emerging Ethanol Sector.” This study’s key objective is to determine the direct and indirect impacts of large scale ethanol production on Canadian agriculture. The study will examine the following:

- What impacts will the anticipated expansion of ethanol production have on feedgrain, other crop and co-product markets?
- Which sectors and players will be helped and which will be harmed by an expanded ethanol industry?
- What are the implications of an expanded ethanol industry for Canada’s grain handling and transportation infrastructure?
- What are the related challenges and opportunities that will emerge?

- How will various market factors affect the profitability of the ethanol sector?
- How will government policy support development and sustainability of the industry?

The BCRC is also initiating a longer term study with the University of Guelph to evaluate the effect of the growing biofuels sector on the cost of feeding cattle in Canada. This study's key objective is to assess the possible and likely impacts of growth in ethanol production on the competitiveness of cattle feeding in Canada. The objectives of the project are:

- To measure the potential effect that ethanol plants across Canada might have on the demand for biofuels crops (price and basis) particularly in the locality of the plant by measuring economic benchmarks indicating the demand for corn for use as ethanol versus beef.
- To assess the effect of U.S. ethanol production and policies on Canadian feed-grain prices.
- To use this information to develop a model that will extrapolate the effects of ethanol on the cost to feed cattle in Canada. From the outset it is expected that the model will be developed so that western and eastern Canadian sets of scenarios are developed.
- To use the model(s) and forecast the future effects of the expected increasing pressures from the bio-fuels industry on the cost to feed cattle in Canada.

Deliverables expected are:

- A Canadian regional mathematical programming model of the feed-grain and cattle feeding sectors.
- A set of scenarios for the possible and likely development of ethanol production as a new source of demand for feed-grain in North America.
- Assessment of the likely effects of increased ethanol production on competitiveness of the cattle feeding industry.
- An estimate of the competitive value of DDG for cattle feed.

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Appendix: Canada versus U.S. Biofuel Comparisons¹

	Canada	United States
Ethanol Production	600 M litres (2007 proj. - 840 M litres)	23.4 B litres
Estimated Future Production	2.74 billion litres by 2010	Additional capacity under construction will result in a total of 47.5 B litres
Incentives		
Grants, subsidized credit, and tax concessions related to capital investment	<i>\$200 million – ecoABC²</i> <i>\$500 million – nextgen fuels³</i>	<i>\$6 million/yr – Insular areas energy security (funds decentralized energy sources)</i> <i>\$125 million – Renewable Fuel Research and Production Grants (primarily to states that don't have large ethanol base)</i> <i>\$650 million – Cellulosic Biomass Ethanol Conversion assistance (for non-profit sites)</i> <i>\$750 million – Producer owned Cellulosic Plants</i> <i>Several loan guarantees programs. Most significant of these is a program targeted at advanced energy projects capped at \$2 billion.</i>
Mandates	5% renewable fuel content by 2010 2% renewable in diesel and heating oil by 2012	Renewable Fuel Standard: 2006 - 4.0 B gallons (15.1 B litres) in 2006 2012 ⁴ - 7.5 B gallons (28.4 B litres)
Operating Incentives	\$0.10/litre renewable fuel \$0.20/litre renewable diesel (For the 1 st three years and declining after) Ethanol - \$0.10/litre excise tax waived; Biodiesel - \$0.04/litre excise tax waived ⁵	Volumetric Excise Tax Credit ⁶ \$0.51/gallon for ethanol \$1.00/gallon for biodiesel Production incentive for cellulosic ethanol ⁷
Tariff	\$0.0492/litre	2.5% ad valorem tax; secondary tariff of 54 cents per gallon (\$0.1427 per litre) ⁸

¹ For simplicity, this table focuses on federal programs. One estimate is that state subsidies comprise less than 10% of the total value, however it is thought that this number may be low with a lack of comprehensive data available on credit support for new plant construction.

² ecoABC is designed to provide an opportunity for agricultural producers to diversify their economic base and participate in the biofuels industry through equity investment/ownership in biofuels production facilities. It consists of repayable contributions for the construction or expansion of transportation biofuel production facilities. Funding is conditional upon agricultural producer investment in the biofuel projects, and the use of agricultural feedstock to produce the biofuel.

³ To be managed by Sustainable Development Technology Canada (SDTC) for investment with the private sector in establishing large-scale facilities for the production of next-generation renewable fuels.

⁴ Post-2012 increases are meant to occur at the same rate of increase as for gasoline demand. Higher credits are available for cellulosic ethanol and biodiesel (2.5 times and 1.5 times, respectively) until 2012. After 2012, cellulosic ethanol must account for 250 million gallons of the RFS.

⁵ Implemented in the mid 90s, set to expire in April 2008, to be replaced by the operating incentive

⁶ Is the single largest subsidy to ethanol production. Cost to the U.S. due to tax losses is estimated at about \$2.5 billion in 2006, and based just on the RFS, will rise to \$3.8 billion in 2012.

⁷ Designed as a production incentive for cellulosic biofuels to deliver the first billion gallons by 2015.

Annual auctions of 100mmgy of capacity, with incentive going to lowest requested subsidy per gallon delivered. Winning bid gets subsidy for 6 years. Limit of no more than \$100m/yr.

⁸ Set to expire on January 1, 2009