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**Understanding the value of commercial cow beef in Canada as
a result of the closure of the U.S. border to OTM (over 30
month) beef and cattle**

Presented to the National Beef Industry Development Fund

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December 2005

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I. Executive Summary

The primary source of income for beef ranchers comes from the sale of feeder calves and feeder cattle, while the primary source of income for dairy farmers comes from the production of milk. The salvage value from the sale of cull animals tends to be 20 percent or less of gross farm income for beef ranchers and less than 10 percent for dairy farmers. While not providing the major source of income, the value of cull animals is not unimportant to Canadian ranchers and farmers.

Market prices for cull cows tend to be highly variable, much more so than the case for fed cattle prices. To gain a better understanding of the major factors involved in determining cow prices and the main reasons for the differences in value between types of cows, the National Beef Industry Development Fund contracted with Informa Economics, Inc. to develop a cow cutout model for Canada.

The discussion of the factors influencing the cull cow market highlighted the variability of yield and quality among cows. This variability also pointed out the fact that no single cutout calculation could accurately describe all cows. In the end, two basic models were developed to be representative of Utility type cows and Canner/Cutter type cows.

Lean boneless beef for manufacturing purposes, primarily grinding, is the principal product derived from cull cow carcasses. In Canada, 85 percent lean boneless beef is considered the benchmark product in the market. However, in order to maximize returns from the sale of cow beef, packers will attempt to harvest and market several higher valued boxed beef cuts. For various quality and market reasons, not all cuts will be harvested from all cow carcasses.

The cow cutout models have the flexibility to account for variations in the harvest of cuts by individual item. The output then shows the differences in values between cows of varying carcass yield, quality level and harvesting of boxed beef cuts. **For the examples shown in this report, the variation in the meat value of cow carcasses can exceed \$300 per head.**

From the work undertaken in this project, the following comments and observations can be made:

- Lean boneless beef from cull cows is highly substitutable with imported manufacturing beef.
- Boxed beef cuts from cull cows are not necessarily substitutable with grass fed beef cuts imported from non-NAFTA countries.
- Users of “cow beef” (current and potential) have considerable concerns regarding the consistency of supply (seasonality) and the variability of quality.
- Feeding and marketing strategies to “upgrade” cull cows, potentially increasing returns and desirability of product, need to be further explored.
- Lack of price information on cow beef creates a “knowledge gap” that can result in misunderstanding of the value and variability of cull cows.

II. Background

As of January 1, 2005 the inventory of beef cows in Canada was estimated by Statistics Canada at a record 5.32 million head (up six percent from the previous year). The inventory of dairy cows was estimated at 1.065 million head, less than one percent higher than the prior year. The make-up of the cowherds are quite distinct by region, with the West being heavily dominated by beef herds and the East having more dairy farms. 86.5 percent of the beef cows are in Western Canada, which make up 95 percent of the total cow numbers in the region. 77.7 percent of the dairy cows are in Eastern Canada, which make up 53.5 percent of the total cow numbers in that region.

According to the Canadian Beef Grading Agency (CBGA), 2004 cow slaughter in federally and provincially inspected packing plants totaled 466,726 head, up 26 percent from 2003. Although the West has more than 75 percent of the total cow inventory, cow slaughter in Western Canada amounted to 222,125 head, less than half of the Canadian cow slaughter. This reflects the difference in the composition of the cowherds (more dairy cattle in the East) and the higher culling rate from dairy farms.

While more than 95 percent of fed cattle are graded, the number of cows graded by CBGA in 2004 amounted to 37 percent of total cow slaughter. Also the number of cows graded in the East was only two percent of the total cows graded on 2004.

Historically, the vast majority of live cattle exports (fed cattle and non fed cattle) have been sent to the US. Since the BSE incident in May 2003, the US and most other countries have banned live cattle from Canada¹. Prior to this, cattle exports were growing:

Exports of cows to the US for slaughter purposes:

2000	171,448
2001	257,584
2002	372,294
2003	136,161
2004	0

Source: CanFax annual reports (Statistics Canada, CBEF, AAFC)

The 2002 cow exports were especially large due to drought conditions in Western Canada. The 2003 figure consists of the time period up to the closure of the US border in late May.

Besides the exports of live cows for slaughter, there were also significant quantities of cow beef being exported to the US. There are suggestions that this amounted to fifty to

¹ In July 2005, the US lifted the ban on trade of cattle under 30 months of age (UTM).

sixty percent of total cow beef produced in Canada². At the same time, a considerable amount of manufacturing type beef was being imported from various sources, particularly Australia, New Zealand and Uruguay. Most of the beef imported from the US is boxed beef cuts from fed cattle slaughter. According to figures from Statistics Canada and AAFC, beef and beef product imports declined from 251,899 tonnes in 2002 to 222,685 tonnes in 2003, with a large drop to 90,374 tonnes in 2004. The main countries supplying manufacturing beef to Canada experienced a significant decline in shipments to Canada, particularly Australia:

	2002 (tonnes)	2003 (tonnes)	2004 (tonnes)
Australia	93,893	39,987	8,640
New Zealand	55,405	46,289	31,007
Uruguay ³	167	39,484	24,952

Prior to the May 2003 BSE incident, D1D2 slaughter cows in Western Canada were selling for mostly \$55-60 per cwt. At the same time, US cow prices were in the mid to upper \$40s in US dollars, equivalent to the mid \$60s in Canadian dollars. Following the closure of the US border to live cattle trade, all cattle prices in Canada collapsed. By August 2003, D1D2 cows were selling under \$15/cwt. Since then, there has been only partial recovery in pricing. Prices averaged in the \$18-22/cwt. area into the early summer of 2005 and have since improved mostly into the \$30s/cwt. Meanwhile, US cow prices have strengthened mostly into the mid US\$50s (currently equivalent to nearly CDN\$70). With the dramatic decline in the cost of cows to Canadian packers and the increased availability of cows due to lack of live cattle exports, many Canadian cattle producers wonder why there are still imports of manufacturing beef into Canada. There are many factors that can be discussed on this issue, including lag time in expanding slaughter capacity, seasonality/variability in supply, substitutability, quality issues, long standing business relationships, what happens if the US border is re-opened to trade, etc.

To better understand the value of commercial cow beef in Canada and to inform producers on how cull cow values are being determined, the Canadian Cattlemen's Association, through the National Beef Industry Development Fund, commissioned a study that will provide "a cow cutout value model and an analysis that determines the effect that different variables have on cow cutout values in Canada". To that end, Informa Economics, Inc. has developed a cow cutout model specifically for use by the Canadian cattle/beef industry. Through the use of this model, and its built-in flexibilities, industry participants can derive an estimate of the meat value of various types and qualities of slaughter cows. This report also delves into areas of cow beef supply/demand, imports/exports, products and substitutability. As well, discussion of future supplies, particularly from offshore sources, is included.

² "Utilization of Cow and Bull Meat in Canada: A study of the Canadian cow and bull meat market and assessment of opportunities to displace imported beef with domestic product", Alberta Agriculture Food and Rural Development, April 2004; and private sources.

³ Following a Foot-and-Mouth Disease outbreak in 2001, Uruguay lost access to the fresh/frozen beef market in Canada and regained access during 2003.

III. Purpose/Objectives

To design and develop a Canadian cow cutout value model that could be used on a regular basis to analyze and understand the value of commercial cow beef in Canada.

- establish standard yields of typical cow cuts and trim products by category/grade of cow⁴
- gather spot market information on indicative prices of cow cuts and boneless trim by category/grade
- build carcass cutout models for the various classes of cows (at least two or three)
- provide detailed explanation of the methodology and calculations involved in deriving the value of a cow carcass from the cutout models
- provide flexibility in the models for the proportion of cows within each category/grade that may not contribute products that are salable as cuts (i.e. some cows within a classification would yield cuts of such poor quality that they would be sold as beef trimmings rather than boxed cow cuts)

To enhance industry understanding regarding the variables that impact cutout values such as supply of commercial cow beef in Canada (domestic supply, imports, seasonal trends, etc.) and demand (domestic marketability, consistency/quality issues, seasonality, etc.).

- provide recent history (including five years prior to the May 2003 BSE incident in Canada) on supply variables pertaining to the marketings of cows in Canada
- supply variables would include inventory by type, cow slaughter, live cow exports, live cow imports, seasonality trends within years
- estimates of availability of slaughter cows by quality/grade type
- cow beef supply would be described in terms of supply from domestic slaughter, imports from various countries, exports (pre-BSE) and seasonality trends within years
- regulatory and trade issues impacting movement of live cattle and beef
- interview process completed for Alberta Agriculture study⁵ last year will not be duplicated. Some informal discussions with a few key industry players will be done to enhance the discussion and understanding of certain issues relevant to this project

⁴ only 36.9 percent of cows slaughtered in Canada were graded by the Canadian Beef Grading Agency in 2004

⁵“Utilization of Cow and Bull Meat in Canada: A study of the Canadian cow and bull meat market and assessment of opportunities to displace imported beef with domestic product”, Alberta Agriculture Food and Rural Development, April 2004

To examine the extent to which the variables identified in Objective #2 impact commercial cow beef values in Canada. For example, to what extent does the ability of further processors to procure competitively priced non-NAFTA imports (Australia, New Zealand, Uruguay, etc.) impact the value of commercial cow beef in Canada? What trends are emerging and what is forecasted for the future with respect to commercial cow beef imports?

- description and discussion of products derived from cow carcasses (cuts and trim products), along with their major uses and market segments
- discussion of products being imported from non-NAFTA countries (particularly Australia, New Zealand and Uruguay)
- comparison of attributes between domestic and imported cuts and trim products in terms of identifying substitutability, along with discussion of factors such as consistency of supply, quality, price differentials, pricing options
- provide a 5 year annual forecast of commercial cow beef imports and discuss factors that could result in imports exceeding or falling short of the base line forecast, including the possibility of market access for Argentina and Brazil

IV. Cow Beef in Canada

A. Canadian Cow Marketings

Traditionally, cows are not raised for the primary purpose of providing beef to consumers. The main purpose of a beef type cow is to produce a healthy calf each year that provides the bulk of income for the beef rancher. The primary purpose of a dairy type cow is to produce milk as the main source of income for the dairy farmer. For both categories, animals will be culled, or sent to slaughter, when they are deemed to be at or close to the end of their “economic life”. One or a group of factors including biological, market value and cost of production issues can determine this decision. The age and recent fertility of the animal are important considerations. Fertility involves conception, calving and survival of the calf to time of sale. In the beef cow sector, the ability to produce a live calf at weaning year after year and the size of the weaned calf are important measures of the productivity of the cow. A cow that fails to conceive (pregnancy checked), or loses a calf at the time of birth or before weaning, becomes a prime candidate for culling. Also cows that are getting on in age and are producing under-sized calves in comparison to the herd average or production standards will be seriously considered for culling. The beef rancher looks to maximize income through getting several calves of good size over a cow’s life.

The overall health and condition of the animal will also be taken into account. Thin, emaciated cows may not be felt worthwhile to keep over the winter, as the animal will require extra feed and care, yet still be more vulnerable to sickness or problems at calving time. They would also tend to produce smaller

calves. Even cows that have overcome health issues will have more difficulties in the future with conception and birth of a calf. Factors such as availability of pasture and feed, along with subsequent costs will also influence the culling decision. The carrying capacity of the land can be dramatically affected in drought years and the cost of supplemental feed may be high enough to force reduction of the breeding herd. Economic conditions, such as the value of the calf in comparison to the cost of production, will also be a determinant as to how many cows will be culled each year. Beef cow inventories tend to be cyclical, with the culling rate increasing in response to low or unprofitable calf prices and the cowherd subsequently declining. Beef ranchers will respond to favourable calf prices and the prospects of continuing good returns by reducing the culling rate and increasing the cowherd by keeping more breeding heifers. These cycles tend to be 10-12 years in length.

Some beef cows will be kept for a number of years as long as they produce healthy, growthy calves and get pregnant and stay healthy themselves. For the 15-year period prior to 2003, the beef cow-culling rate averaged just under 11 percent⁶ and has ranged from as low as seven percent to as high as 16 percent. The BSE incident in 2003 caused the culling rate to drop dramatically to the five to six percent level, due to a ban on exports and slaughter capacity constraints in Canada.

For the dairy sector, many of the previously discussed factors will apply in the culling decision. Fertility can have a significant effect on the milk production capability of a cow. Failure to conceive or having difficulties conceiving will lead to lower milk production. Calving problems will also tend to negatively affect productivity. The cost of feed is a major input in the dairy industry, but dairy farmers in Canada tend to be somewhat shielded by cost of production formulas under the quota system. Still, the quantity of milk produced by the cow is of utmost importance as producers aim toward maximizing their returns. Over time, dairy cows tend to produce less milk, increasing their likelihood to be replaced by a bred heifer. The culling rate in the dairy herd is much greater than in the beef sector, closer to one-third and tending to be less variable from year to year. Long term, the dairy herd has been reduced as per cow productivity increased to keep total milk production stable to rising.

Even though there is a significantly higher culling rate within the dairy sector, overall Canadian cow slaughter and marketings are tilted toward more beef cows than dairy cows. That is due to there being more than four times as many beef cows in comparison to dairy cows (1998-2002). The proportion has risen to nearly five-to-one in 2005. But there are significant regional differences. Beef cows dominate cow numbers in the West, averaging 15 times the number of dairy cows from 1998 to 2002 and 19 times in 2005. Thus the marketing of beef cows would far outstrip the marketing of dairy cows for slaughter purposes. In the East, there are less beef cows in the cattle inventory than there

⁶ CanFax Weekly Summary, October 28, 2005.

are dairy cows (the ratio of beef to dairy cows averaging 0.76 in 1998-2002 and 0.87 in 2005). Coupled with a higher culling rate, there are considerably more dairy cows in the marketing mix in the East than there are beef cows.

The income from cull cows is secondary to the production of feeder calves in the beef ranching sector and the production of milk in the dairy farm sector. Still, the value of a cull cow is not inconsequential. Prior to BSE, the sale of cull cows could represent 10 to 20 percent of gross revenue for cow/calf operations⁷. Dairy producers were receiving about four percent of their gross income from the sale of cull animals⁸. In the five years from 1998 through 2002, beef from cow slaughter in Canada amounted to 12 to 15 percent of total beef production on a carcass weight basis.

Cow slaughter in Canada has come primarily from the culling of animals from Canadian farms and ranches. There have been relatively small imports of US cows into Canada for slaughter, primarily into Quebec. These numbers have tended to decline from a little over 17,000 head in 1998 to less than 9000 head in 2002, and amounted to two to three percent of cow slaughter in Canada. Total cow slaughter (federally and provincially inspected) declined from a 15-year high in 1996 near 660,000 head to a low of 487,000 head in 2000. This was during a period of mostly expanding beef cow numbers and low culling rates. Western Canada has traditionally accounted for 56 to 59 percent of the cow slaughter. The years of 2001 and, especially, 2002 were characterized by drought conditions in Western Canada that led to reduced feed supplies, higher feed prices and increased cow slaughter and marketings. Canadian cow slaughter increased to 500,000 head in 2001 and nearly 530,000 head in 2002. The bulk of the increase occurred in the West, where the proportion of Canadian cow slaughter increased to 66 and 69 percent, respectively.

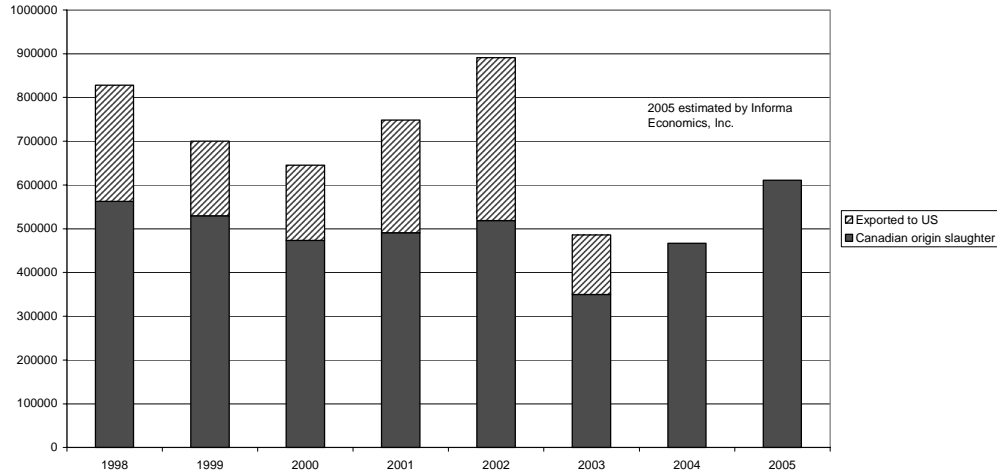
A similar pattern to the cow slaughter was also seen with exports of live cows from Canada to the US for slaughter purposes. From an export number of 266,000 head in 1998, exports declined to the 170,000 head level in 1999 and 2000. The trend then reversed to more than 250,000 head in 2001 and over 370,000 head in 2002 as the drought worsened. Thus total marketings of Canadian cows (slaughter plus exports minus imports) declined from nearly 830,000 head in 1998 to 645,000 head in 2000 and then increased to nearly 900,000 head in 2002. Just as the number of cows exported to the US has varied from year to year, so have these exports varied as a proportion of total cow marketings (slaughter plus exports minus imports). Cow exports in 1998 amounted to 32 percent of cow marketings. The proportion dropped to 24 percent in 1999, and then grew to 42 percent in 2002. The proportion was much smaller in 2003 because of the lack of cattle exports after May of that year. Cow marketings over the last two years have been entirely made up of domestic slaughter numbers. Informa Economics projects cow marketings to

⁷ Robinson, Lana, "Maximize Cull Cow Value", Texas Agriculture, July 5, 2002.

⁸ Smith, G.C. et al, "Getting the Most From Your Dairy Beef", Proceedings of the 5th Western Dairy Management Conference, April 4-6, 2001.

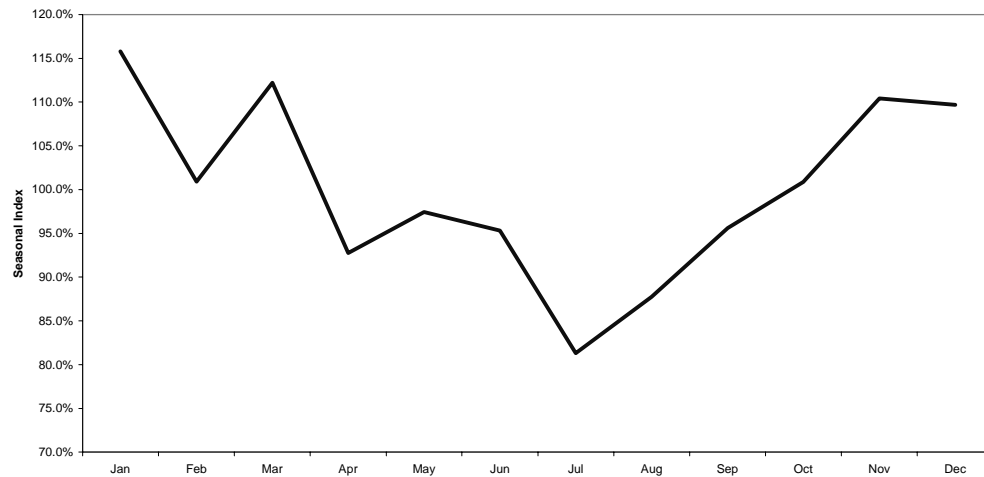
slightly exceed 600,000 head in 2005, larger than 2003 and 2004, but still considerably smaller than years going back into the 1970s.

Canadian Cow Marketings



While the volume of cow marketings can fluctuate from year to year for various reasons, there are some fairly consistent patterns within a year. Cow marketings tend to be largest in the late fall and early winter. This coincides with the tendency to wean spring born calves in the fall time period. Evaluations of the beef cows are made on factors such as whether or not the cow was able to raise a healthy calf, the size of the calf at weaning, the health and condition of the cow, results of a pregnancy check, the availability and cost of feed for the winter, etc. The peak marketing period will also be the time when beef cow marketings are at their highest in relation to culling from dairy herds. Cow marketings are at their lowest in the summer. This is the period when beef cows have calves at their side and forage is most plentiful. At this time, dairy cow marketings will be at their highest proportion to the culling of beef cows. There tends to be a less dramatic seasonality of cull among dairy cows, as producers will work to smooth out their marketings to a greater degree in order to keep milk production on a more consistent level.

Seasonality of Cow Marketings 1998-2002



On May 20, 2003, the world changed for all cattle producers in Canada. Confirmation of a case of BSE in an Alberta cow led to most countries banning Canadian cattle and beef. Prices for all classes of cattle collapsed, leading to immediate severe financial losses, particularly in the cattle-feeding sector. Exports of boneless boxed beef to the US from cattle under thirty months of age resumed in September 2003, but live cattle exports continued to be banned. In July 2005, the US border was finally re-opened to exports of live cattle under thirty months of age. However, trade of cattle and beef from cattle over 30 months of age (OTM) has not been resumed.

Immediately apparent following the BSE incident was the fact that there was insufficient slaughter capacity in Canada to handle the available slaughter cattle supply. This was true in both the fed cattle sector as well as for cow and bull slaughter (OTM cattle). The uncertainty of how Canadian consumers would react to the BSE announcement led to dramatic declines in cattle slaughter from more than 60,000 head per week in the weeks and months preceding May 2003, to a low of less than 30,000 head by mid June. Once the realization came about that Canadian consumers were not going to abandon or dramatically reduce beef consumption, which had been the case in most European and Asian countries, packers were willing to increase slaughter levels once again. Importantly, the federal and some of the provincial governments responded with financial programs to keep the producer sector from imploding. The initial programs were aimed primarily at assisting producers of fed cattle where prices had collapsed and financial losses were considerable. Government monies to provide some relief from these substantial losses prompted cattle producers to resume more normal marketings of fed cattle to Canadian slaughter plants and weekly cattle slaughter recovered to average nearly 60,000 head from August through December of that year. Further government programs were developed to cover the cow-calf sector as well. However, slaughter numbers still fell short of

available supply and a backlog of cattle developed (for both fed cattle and OTM cattle).

For the first time, Statistics Canada conducted a cattle survey in April 2005. A primary purpose of the survey was to ask additional information of Canadian cattle producers beyond the normal January and July survey questions. The information was expected to “be most useful in the analysis of the need for and impact of Cattle Set-Aside Programs, part of the federal government’s strategy for assisting the Canadian cattle industry in light of BSE.”⁹ Questions were also posed that would “aid in estimating the severity of the cull cow problem.” The survey estimated that there were 909,900 cows being held on farms that would have been culled if conditions were “normal”. This amounted to 14.2 percent of the estimated 6.4 million cows on farms as of April 1, 2005. The same proportion was found among beef farmers who were holding 759,200 cull cows out of a total on farm number of 5.3 million beef cows. More than 80 percent of the cull beef animals had either calved or were pregnant. Of the 150,700 cull dairy cows (13.9 percent of the 1.1 million total dairy cows), a little over 50 percent (77,000 head) were expected to calve through the year.

As expected, the number of cull cows held on farms was highest in the West, amounting to 680,800 cull cows or 14 percent of total cows on farms in the West. The East had 229,100 cull cows, accounting for 14.7 percent of total cows on farms in that region. While these cows may have been considered being at the end of their “economic life”, the difficulty in finding or scheduling slaughter space, the very low prices being paid for cull cows and good supplies of forage led to very low culling rates and more cows being kept on farms than would otherwise have been the case. Further, many producers decided to continue with their normal breeding programs, even with the cull cows. In this way, they could potentially get a viable calf that would have some value in the future and provide a return for keeping the cow for some extra time.

These same questions were added to the July 1 cattle survey. The number of cows that would normally have been culled by that time was estimated at 914,600 head, or 13.9 percent of the 6.6 million cows held on farms. Similarly, the number of cull beef cows grew slightly from the April survey to 763,200 cull cows, accounting for 13.9 percent of the 5.5 million beef cows held on farms. But the proportion of cull beef cows that were expected to calve had declined to 74 percent compared to nearly 82 percent in April. The percentage of cull dairy cows that were expected to calve remained the same as the April survey.

The absence of an arbitrage mechanism for Canadian cattle prices (i.e. lack of access to the US market for live cattle) led to greatly expanded margins for Canadian beef packers¹⁰. As time passed, the realization grew that the trade

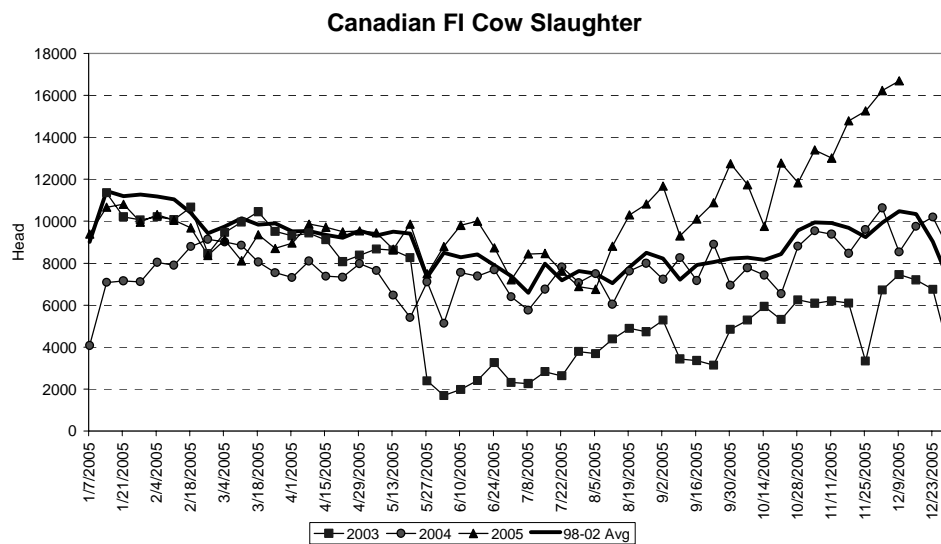
⁹ Statistics Canada, Agriculture Division, “April 2005 Cattle Statistics”, May 16, 2005.

¹⁰ Auditor General Alberta, “Report of the Auditor General on the Alberta Government’s BSE-related Assistance Programs”, July 27, 2004.

situation would continue to be disrupted. Existing packers responded to the economic incentives of the market structure by expanding capacity. There were also instances of re-opening some smaller plants that had been closed down in previous years. In some cases, these situations required considerable upgrading of the plants, mainly to comply with new regulations due to removal and handling of specified risk materials (SRM's).

A recent commentary from the George Morris Centre noted that Canada's slaughter capacity has grown to around 98,000 head per week¹¹. They also noted "Canada's current (weekly) cow slaughter capacity is just over 17,600 head". From 1998 through 2002, Canadian cow slaughter (FI and PI) averaged mostly between 9500 per week and 11,000 head per week. During the peak fall and winter periods, weekly slaughter would sometimes get up to the 12-14,000 head area.

Through mid December of 2005, federally inspected cow slaughter has averaged a little over 10,000 head per week, with PI slaughter probably averaging another 1500 head per week. This was the largest weekly average since 1997 and compares to weekly FI slaughter averaging 7600 head over the same time period in 2004 and around 6300 head in 2003. There were a couple of weeks shortly after the first BSE incident when cow slaughter dropped below 2000 head. There have already been a couple of weeks in the fall of 2005 when FI cow slaughter has exceeded 16,000 head, the highest levels since late 1996 and early 1997.



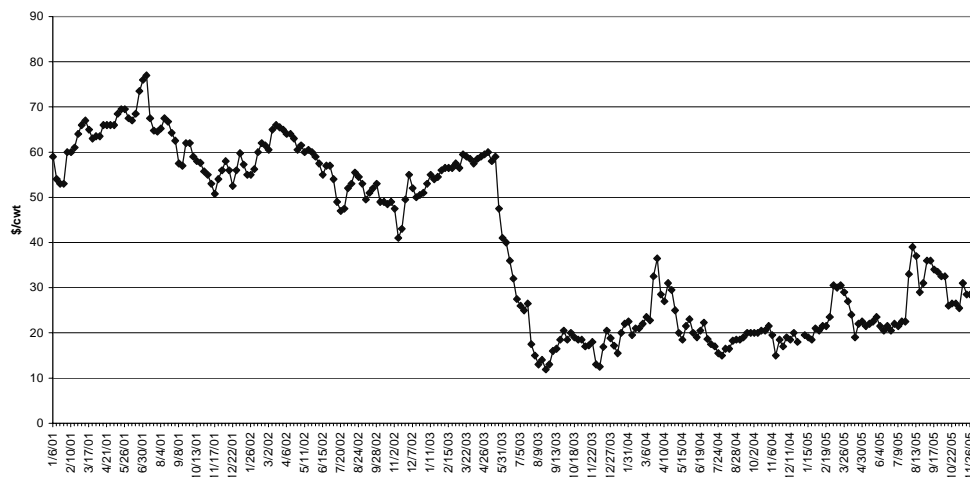
¹¹ Grier, Kevin and Larry Martin, "The Ruminant Slaughter Equity Assistance Program – Commentary", George Morris Centre, November 2, 2005.

The previously mentioned cow slaughter capacity of 17,600 head per week works out to more than 915,000 head per year¹². The largest weekly slaughter so far in 2005 would amount to nearly 95 percent of estimated slaughter capacity. The commentary from George Morris Centre alluded to further capacity increases going into (2006) that would give Canada “enough capacity to handle non-fed marketings”. There are currently seven federally inspected slaughter plants in Canada that are slaughtering cows. Some are dedicated to non-fed slaughter, while others slaughter fed cattle as well. Cargill Foods has plans to substitute a portion of the High River plant capacity toward slaughter of cows. There are also plans in the works for new operations to be built over the next one to two years. While there may be sufficient capacity to slaughter more cows at this time and enough in the near future to handle the backlog and a more normal culling rate, the question remains whether all of these cows would quickly come to market for slaughter purposes or be spread out over time.

Since the re-opening of the US border to trade in live cattle under 30 months of age, the prices for feeder cattle and calves have risen dramatically (20-25 percent since mid June 2005 and 35-40 percent over the previous year). The cull beef cows that had a calf earlier in 2005 now offer more income to the farmer or rancher than just a few months ago. Cull cow prices fell dramatically immediately following the first BSE case in May 2003. Since then, there has been only partial recovery of prices and they still remain well behind the levels of 2001 through early spring 2003. As well, forage supplies remain abundant and relatively inexpensive. Plus the prospects are good for strong feeder prices in 2006. While the cull beef cows being held on farms would tend to be older and less productive than their herd mates, those producing a healthy calf at weaning are still providing some return to the producers. Thus there do not appear to be sufficient economic incentives from cull cow prices or enough biological, environmental or economic pressures on producer operating margins to entice all of the potential cull animals to slaughter at this time.

¹² Interestingly, that number is very close to the Statistics Canada estimate of the number of cull cows being held on Canadian farms.

Western Canada D1,D2 Cows, 2001 to mid Dec/05



B. Procurement of Cows for Slaughter Purposes

Cattle producers, both beef and dairy, tend to cull their animals in single lots or a few head at a time. An average herd size of forty some beef cows would have around three to five cull animals throughout the year. It would take a fairly large operation to have a full truckload of cull cows at any one time, and that would most likely occur at the time of weaning when the cows would be pregnancy checked. The vast majority of cull cows are sold through auction markets, or to cattle dealers with ties to packers and who would accumulate numbers from several farms to deliver them to a slaughter plant. Packers have buyers or agents situated at several auction markets throughout the countryside for the purpose of purchasing cows for the slaughter plants. The proportion of cows that are delivered directly to the plant by producers tends to be relatively small.

One company that is procuring cow supply in a nontraditional manner is Gencor Foods¹³. In late 2003, a farmer-owned genetics company, Gencor, purchased the former MGI plant in Kitchener and formed the subsidiary, Gencor Foods Inc. (GFI). The plant had been shut down a few years earlier and was renovated and re-opened. Producers wanting to market cull cows to GFI need to lease hook space and schedule a processing spot in the plant seven days in advance of delivery. Prices paid to producers are based on the carcass yield and quality, along with the value of meat sales by GFI. In late 2004, GFI claimed that prices paid by the plant on a live equivalent basis had returned an extra \$1.5 million to Ontario cattle producers in comparison to prices paid at Ontario auction markets.

¹³ <http://www.gencorfoods.ca/>

For most packers, the vast majority of cull cows are purchased on a live weight basis. The buyers will do a visual appraisal of the animal, estimating the dressing percentage or carcass yield, meat quality and potential meat yield. In buying cull cows on a live basis, the packer bears the risk on carcass yield, potential condemnations, meat losses due to bruising or abscess, etc. The condemnation rate among young cattle (fed cattle) is very low, a few tenths of a percent. However, the rate can be several percentage points among cows¹⁴. These animals are older and more susceptible to ailments, especially under the pressure of maximizing milk production, reproductive disorders, cancer and other illnesses.

According to the Canadian Food Inspection Agency (CFIA), about 0.5 percent of the cattle at federally inspected establishments are found to be unfit for human consumption. The condemnation rate is slightly higher at provincially inspected abattoirs. Information cited by CFIA¹⁵ indicated that the average condemnation rate for all ages of cattle in Ontario for the eight years prior to 2002 was 0.54 percent, while the rate for cows was 4.8 percent. The province of Quebec has a high proportion of cows in the slaughter mix. For the six years prior to 2002, the condemnation rate in Quebec was 1.3 percent for all ages of cattle and 1.8 percent for cattle over 18 months of age.

The range of carcass yield or dressing percentage among fed cattle tends to be rather narrow, usually around two to three percent difference from animal to animal. The primary purpose of feeding young steers and heifers a high-energy ration is for the production of muscle meat for human consumption. These animals tend to have yields of carcass to live animal ranging from the very high 50s to low 60s, often in a range of 59 percent to 62 percent. For beef cows, the goal is the raising of a large, healthy calf. The diet consists mostly of roughage (grass and hay or silage), with only a nominal amount of supplemental feeding at certain times of the year. The preponderance of roughage in the diet leads to more gut fill and less muscling than for fed cattle. In the case of dairy cows, the primary factor is milk production. Although being provided with some high energy feedstuffs in the ration along with forage, the concentration on milk output leads to large udders, more gut fill and less muscling, significantly lowering the potential carcass yield. With the variability of age, diet, environmental conditions, health conditions and productivity as well as reproductive stress, carcass yield is highly inconsistent among cows. A healthy cow in fairly good body condition and not too much gut fill can have a carcass yield of 50 percent¹⁶. At the other end of the spectrum can be highly emaciated animals yielding in the low 30s for dressing percentage. This type of variation in carcass yield can have considerable effect

¹⁴ Rogers, C.A. *et al*, "On-Farm Management Decisions to Improve Beef Quality of Market Dairy Cows", *Journal of Dairy Science*, 87:1558-1564, 2004.

¹⁵ Risk Assessment on Bovine Spongiform Encephalopathy in Cattle in Canada, Part A: Evaluation of Risk Factors, 2003-07-02. <http://www.inspection.gc.ca/english/sci/ahra/bseris/bserisa4e.shtml>

¹⁶ A few of the younger, better condition cows can get up to 52-53% carcass yield.

on the value of a carcass on the hook in comparison to the live weight price of the animal.

Canfax gathers price information from auction markets and packers regarding prices paid for slaughter cows. The following examples show the range of potential carcass cost to the packer in comparison to the live animal cost. For D1D2 cows in a range of \$29 to \$45 per cwt live, the variation in the carcass cost to the packer between those with a carcass yield of 50 percent and those with a yield of 42 percent would be in the area of 19 percent. For D3 cows in a live price range of \$20 to \$38 per cwt, the variation in carcass cost between a carcass yield of 43 percent and 34 percent would be more than 26 percent. Of course packers would be evaluating the performance of their buyers and want to see the higher live prices associated with the higher yielding cows. At the same time, the lower end of the live prices would tend to be associated with the poorer yielding cows. There would probably be few if any cows at the bottom end of the price range that would be at the top end of the range in carcass yield. Conversely, packers would not tolerate buyers delivering cows at the top end of the price range that were in the bottom end of the range in carcass yield. Plus there would be other factors besides estimated carcass yield involved in determining bids by the packer buyers. As mentioned before, these would include an assessment of potential meat quality and meat yield, along with consideration of the chances of meat losses due to bruising, abscesses or condemnation, as well as losses from condemnation of edible offal items. The overall availability of slaughter cows and the type of cows wanted or needed by each buyer would also come into play in determining final prices.

Examples of converting live cow price to carcass cost:

D1,D2 type cows at the upper end of the price range (\$45 per cwt) and a dressing percentage of 50 percent would have a carcass cost of $\$45/50\% = \90.00 per cwt.

If the same price were paid for a cow with a dressing percentage of only 42 percent, the carcass cost would be higher, or $\$45/42\% = \107.14 per cwt.

A live cow price at the low end of the example range (\$29 per cwt) and a dressing percentage of 42 percent would yield a carcass cost of $\$29/42\% = \69.05 per cwt.

		<u>Live cow cost \$/cwt (D1,D2)</u>		
		<u>Low</u>	<u>Mid point</u>	<u>Upper</u>
		29	37	45
<u>Yield</u>	<u>Carcass cost \$/cwt</u>			
50%	58.00	74.00	90.00	
42%	69.05	88.10	107.14	

Looking at the example prices for D3 type cows, one at the upper end of the price range (\$38 per cwt) and a dressing percentage of 43 percent would have a carcass cost of $\$38/43\% = \88.37 per cwt.

A cow costing \$38 per cwt live at the auction market but having a dressing percentage of only 34 percent would cost the packer $\$38/34\% = \111.76 per cwt.

A cow at the lower end of the price range (\$20 per cwt) and having a dressing percentage of 34 percent would yield a carcass cost of $\$20/34\% = \58.82 per cwt.

<u>Live cow cost \$/cwt (D3)</u>			
	<u>Low</u>	<u>Mid point</u>	<u>Upper</u>
	20	29	38
<u>Yield</u>	<u>Carcass cost \$/cwt</u>		
43%	46.51	67.44	88.37
34%	58.82	85.29	111.76

The preceding examples show wide variations in the potential carcass costs to the packers for cows. Declines in dressing percentage are associated with increases in carcass costs, and vice versa. In the opposite manner, lower live prices are associated with lower carcass costs. But when comparing the upper end of both the price range and dressing percentage with the mid point of the price range and the lower end of dressing percentage, the calculated carcass costs are fairly close. For instance, the D1,D2 cow costing \$90 per cwt on a carcass basis (\$45/50% yield) is only slightly more “expensive” than a D1,D2 cow at \$37 per cwt live and dressing only 42% ($\$37/42\% = \88.10). In the above matrix for D3 cows, the mid point price of \$29 per cwt live with a 34 percent dressing percentage ($\$29/34\% = \85.29) works out to about \$3/cwt less on a carcass weight basis than the upper end price of \$38 per cwt at a yield of 43 percent ($\$38/43\% = \88.37).

One would expect that most cows at the upper end of the price range would also be toward the upper end of expected carcass yield. At the other end of the spectrum, the lower prices would normally be associated with cows of the lowest carcass yields. While the dressing percentage is very important in determining the actual cost of the cow to the packer, there have been several other vital factors previously mentioned that go into the equation. The buyer’s estimate of the yield of salable boxed beef cuts and the quality of the cuts are also very significant. The chance of carcass condemnation is borne by the packer on cows bought on a live weight basis. There has to be consideration for potential carcass trimming due to bruising, abscess, injuries, etc. Often

cows at the lower end of the price range will appear or be expected to have defects that would lower their yield of salable meat, as well as the quality of the meat.

V. Canada's Beef Grades

Canada's beef grading regulations have two distinct sets of maturity characteristics. One is for youthful carcasses that would fall into the A grades (A, AA, AAA and prime) and the B grades. The more mature carcasses (cows and bulls) would exhibit the following characteristics when determining maturity classification¹⁷:

- Cartilaginous caps on the thoracic vertebrae that are more than half-ossified.
- Lumbar vertebrae that have no evidence of cartilage or of a red line present on the tips of the spinous processes.
- Spinous processes that are generally hard, white and flinty when split.
- Ribs that are wide, flat and white.
- A sternum that shows advanced ossification.

Mature cows would fall into one of the D grades (D1, D2, D3 or D4). A cow grading D1 would have muscling that would be considered excellent, fat covering that is firm and white (or only slightly tinged with a reddish or amber color) and extends well over the rib and loin primals while moderately well over the chuck and round primals. Fat thickness at the measurement site (minimum point) on the left side of the carcass, between the twelfth and thirteenth ribs will be less than 15 mm.

A D2 carcass would exhibit muscling that ranges from medium to excellent. Fat cover can be firm to slightly soft, extending moderately well over the ribs and loins and lightly over the chucks and rounds. Fat thickness is less than 15 mm.

For the D3 grade, the muscling can be deficient to the point of emaciation. As with D1 and D2 grades, the fat thickness is less than 15 mm.

A D4 carcass can have muscling that ranges from deficient to excellent and have a fat cover of 15 mm or more. Basically the D4 grade is considered to be the overfat category for cows.

From January through July 2005, there were 59,159 carcasses graded in the D categories¹⁸. Of these carcasses, 6704 were graded D1. This amounts to 11.3 percent of the D grades. The largest category was the D2 grade with 32,797 carcasses or 55.4 percent of the total. The D3 grade amounted to 16,583 carcasses, accounting for 28.0 percent of total D grades. 3075 carcasses fell into the D4 grade, which amounts to 5.2

¹⁷ Livestock and Poultry Carcass Grading Regulations, Canada Agricultural Products Act, P.C. 1991-2047 17 September, 1992.

¹⁸ Canada Beef Grading Agency

percent of the total. However, one cannot automatically conclude that this is representative of the grade/quality distribution for all cows. There were a total of 299,603 cows slaughtered in Federal and Provincial inspected packing plants in Canada over that time period. Thus the number of cows graded was only 10.7 percent of the total cow slaughter. There was also considerable variation by region. Only 1.3 percent of the cow slaughter in the East was graded, while 41.4 percent of the cows slaughtered in the West were graded.

VI. US Beef Grades

In the US, there are five levels of maturity involved in beef grading. They are designated by the letters A through E, with A being the most youthful and E being the most advanced in maturity characteristics¹⁹. Most of the feedlot cattle will fall into the A maturity group and, depending upon the level of marbling in the rib eye, can be graded Prime, Choice, Select or Standard. Some of the cattle reaching B maturity can still fit into these grades, but the minimum marbling requirements are raised in each case. Cows fall mostly into the C, D and E maturity levels.

As is the case with Canada, there are basically four grades in the US for mature cows. But the grades here have descriptive names rather than the alphanumeric system in Canada. They can be designated as Commercial, Utility, Cutter, or Canner. The description of minimum maturity for these grades is very similar to that for D grade cows in Canada. However, as the indication of advancing maturity appears in cow carcasses, as evidenced by increasing ossification of the cartilages on the end of the vertebrae, the requirement for the degree of marbling in the rib eye muscle also increases. For instance, carcasses in the youngest group permitted in the Commercial grade require a small degree of marbling. Those carcasses exhibiting the most amount of maturity would have to also exhibit marbling in the moderate to slightly abundant degrees. These types of marbling levels would equate to the marbling requirements of high Choice to Prime among youthful carcasses. Even at the minimum of marbling levels and least amount of maturity, the Commercial grade would encompass the better end of the cow category, similar to the D1 grade in Canada.

The Utility grade can encompass carcasses across the full range of maturity classifications. At all stages of maturity, the Utility grade has lower marbling requirements than the Commercial grade. In fact, in the youngest maturity group, the rib eye muscle is devoid of marbling and may be soft and slightly watery. In the oldest maturity group, the minimum degree of marbling ranges from a minimum slight amount at the beginning of the category to a maximum moderate amount of marbling in the oldest animals, with the rib eye muscle being slightly firm.

At the various maturity levels, carcasses in the Cutter grade have lower marbling requirements than those in the Utility grade. In the youngest group, the rib eye muscle is

¹⁹ United States Standards for Grades of Carcass Beef (60 Stat. 1087; 7 U.S.C. 1621-1627), revised January 31, 1997.

devoid of marbling and may be very soft and watery. Among the oldest animals, the requirement for marbling runs from traces to slight degree of marbling. The rib eye muscle is soft and slightly watery, compared to being slightly firm in the Utility grade. The Canner grade involves carcasses that are inferior to the requirements of the Cutter grade. This includes the oldest maturity group and marbling that ranges from devoid to practically devoid.

The official grade standards in the US for mature slaughter cattle do not reflect the trade practices for the cow beef sector. In fact, very few cows are graded in the US. This is because the quality grades (Commercial, Utility, Cutter and Canner) don't relate to the primary product, which is boneless manufacturing beef²⁰. Packers and processors will use the grade names, but depict the attributes of the cow carcasses in a somewhat different manner than the official grade description. The majority of the cow slaughter will fall into the designation of Utility or Cutter cows. Utility cows may also be called Boner or Breaker cows. A Utility cow tends to be a fleshy animal, expected to dress 42 to 50 percent (there can be a few cows getting up to 52-53 percent). The carcass will yield around 70 percent boneless beef and cuts. The lean boneless beef will be used for manufacturing purposes (e.g. grinding, further processing). Many of the cuts will be harvested and marketed into the "budget" end of the retail and HRI sectors.

Cutter carcasses tend to come from moderately fleshed cows expected to dress in the low 40s and have a boning yield in the upper 60s. A larger proportion of the meat is used for manufacturing purposes. Several of the cuts are denuded (removal of visible fat) to produce 100 percent visually lean cuts. These carcasses produce larger quantities of leaner beef than the Utility cows. Canner cows tend to be very thin, with dressing percentage in the mid 30s to low 40s. Some of these can yield in the low 30 percent area. The boning yield will be in the mid to upper 60s, with the majority of the product being lean manufacturing beef and a lower yield of cuts.

For reporting purposes, USDA tends to combine the Boner and Breaker designations (or call them Utility) and also group together the Cutter and Canner cows. Canadian packers and processors tend to utilize the same terminology as their US counterparts, talking about Utility cows and Canner/Cutter cows. To equate with the Canadian grading system, the easiest comparison is to say the term Utility cows approximates to D1D2 grade cows and the term Canner/Cutter cows approximates to D3 grade cows.

VII. Sale of Cow Beef and Products

As previously mentioned, the use of cow grades in Canada is limited (about one-third of cow slaughter for the country and less than two percent in the East). The numbers are even less in the US. Sellers and buyers of cow beef tend to use the designations of Utility and Canner/Cutter in their trade practices. The remainder of this report will make reference to these quality classifications, rather than the official Canadian grades. Some of the younger, better-conditioned cows can be designated as "white fat" cows with meat

²⁰ Harris, Terry G., "Training Manual for USDA Standards for Grading Slaughter Animals", edited by Georgia Agriculture Education Curriculum Office, July 2002.

quality closer to graded cattle (fed cattle) rather than the “tough, chewy” beef that is thought of when talking about old cows in poor condition. Some of the cuts from these cows will bring a premium to the meat from Utility and Canner/Cutter cows, but again they tend to be a small proportion of the slaughter mix.

Beef cull cows are, on average, older animals than cows culled from dairy farms. In general they would be expected to provide 50 to 60 percent Utility type carcasses over the year. But there is some seasonality. In the late fall and early winter, the proportion can drop to less than 40 percent Utility, with more than 60 percent being Canner/Cutter cows. This is after the calf has been weaned from the cow and she is dealing with the influences of harsher weather than the summer and poorer nutrition than being on lush grass. In essence, the cow’s body condition would be at its poorest state. With better-feed rations, less exposure to environmental conditions and younger average age, dairy cull cows would be thought to have the potential for producing a larger proportion of Utility type carcasses. However, the pressure of maximizing milk production will tend to “wear out” a dairy cow that has gone through several lactations, leaving a “shelly” type of animal with reduced carcass yield (often due to larger udder than beef cows) and poor meat quality. The younger dairy cows being culled for reproductive problems, low milk production or illnesses such as mastitis, have the potential for yielding larger amounts of higher quality meat. In total, the percentage of dairy cows providing Utility type carcasses would likely average close to the 50 to 60 percent expected from beef cows. These estimates are not too different from the 1999 National Market Cow and Bull Quality Audit performed for NCBA in the US. The audit looked into packer grades on market cows and estimated that a little under 35 percent were Canner/Cutter type cows. 62 percent were designated Boner or Breaker (Utility), with one percent being called “white cow” and two percent equivalent to Standard grade.

There are no hard and fast rules regarding the comparative quality of beef cows and dairy cows in regards to the meat produced from cull cows. In conversations with packers, processors and various buyers of cow beef, a consistent theme was concern regarding the wide variation in quality. The descriptions went all the way from good quality white fat cuts approaching that of young fed cattle (very small proportion) to that of very dark, “slimy” meat that would have a gamey, livery flavour when served as a cooked cut of beef (too large a proportion in most people’s opinion), and numerous depictions in between. There is not only a very wide variation in the quality of cow carcasses found in any packer’s cooler, there can also be considerable variation in the quality of beef within a box of cow cuts. Regarding a comparison of the incidence of defects between beef and dairy cows that can affect the value of the animal, the following observations were taken from a US conference presentation²¹:

- higher incidence of “low muscling” in dairy cows
- higher incidence of udder/teat problems in dairy cows
- more problems with horns among beef cows
- more problems with brands on hides among beef cows
- more stifled cattle among dairy cows

²¹ Smith, Gary C., “Marketing Beef from Dairy Cattle – Now and in the Future”, Western Dairy Management Conference, March 13-15, 1997.

The primary salable product derived from a cow carcass is boneless lean beef. This product is used mostly for manufacturing purposes, particularly for grinding. While packers will sell boneless beef in varying lean-to-fat ratios, the common benchmark in Canada is 85 percent lean boneless beef. There is also production of lean boneless beef from fed cattle slaughter. While this tends to be a lower proportion of the carcass in comparison to slaughter cows, the number of steers and heifers slaughtered in Canada in 2004 were more than seven times the number of cows. This proportion was the same in 2003, but larger than the proportion of five to six times in 1999 through 2002. The change in proportion is likely due to the large proportion of cull cows that were exported to the US in the years prior to May 2003. There has also been an ongoing trend in the beef industry to more “primal grinding”, where certain cuts and trim from specific parts of the animal are ground and named as such (e.g. ground chuck, ground round and ground sirloin). Production of primal grinds from fed cattle can be labeled and sold on their own, and some will be mixed with similar products from cow carcasses. Sales and marketing of primal grinds has increased significantly over the last several years in the retail sector, where there is a consumer impression of quality associated with these products and subsequently higher prices than the regular hamburger blends.

Lean boneless beef from Canadian cows is substitutable with manufacturing beef from non-NAFTA countries such as Australia, New Zealand and Uruguay. Prior to the border closure, live cows and boneless beef were being exported from Canada to the US. Increasing amounts of beef were being imported from non-NAFTA countries into Canada. These tonnages were well beyond Canada’s WTO commitment of allowing tariff free access to 76,409 tonnes of beef from countries other than the US and Mexico. A system of supplementary import permits was derived to grant access to Canadian distributors and further processors for importing product when sufficient quantities were not available from domestic supplies. There have been several discussions and arguments over whether these supplementary imports pushed more cows and beef into the US, or whether more attractive pricing in the US pulled the cows and beef into the US, building the necessity for more offshore imports. These discussions are beyond the scope of this report.

The supplementary import permits covered beef cuts as well as boneless manufacturing beef. Of the total beef imports from non-NAFTA countries, the proportion that would be used for grinding and other manufacturing purposes averaged in the area of 60 percent. This did vary somewhat by country, with imports from Australia usually being around two-thirds manufacturing beef and one-third beef cuts. Manufacturing beef imports from New Zealand were in a range of 55 to 60 percent. The proportion of the beef imports from Uruguay that would be designated as manufacturing beef were 63 and 66 percent in 2000 and 2001, respectively, but dropped to 52 percent in 2003.

Being the largest proportion of the cow carcass in comparison to other products, the value of lean boneless beef is very important in estimating the value of the cull cow. Utilizing data from CanFax, the prices for boneless 85% beef from January 1995 through April 2003 (pre-BSE) were compared to cull cow prices (D1D2) in Western Canada. The

correlation coefficient²² over this time period was better than 0.87. But the sale of all boneless meat from a cow carcass for manufacturing (grinding) purposes would not maximize the value of that meat. There are several cuts that can be harvested from the cow carcass and sold at higher prices than grinding meat.

From a Utility type cow carcass, there is the possibility of harvesting 23 percent of the carcass as boneless beef cuts. Using the prices in the example model, this could amount to more than 42 percent of the total meat sales from that carcass. Boneless manufacturing beef (85 percent lean and 60 percent lean) would make up nearly 47 percent of the carcass and 57 percent of the value. For a Canner/Cutter carcass, maximizing the yield of boneless beef cuts would account for less than 16 percent of the carcass weight but more than 31 percent of the meat value from that carcass. Boneless manufacturing beef would be 54 percent of the carcass weight and nearly 69 percent of the meat value. Boneless beef cuts from cow carcasses are mainly sold into the foodservice sector (particularly distribution to budget restaurants) and to further processors (cooking, deli, etc.). There are some sales made into the retail sector through distributors, mainly in Eastern Canada. A discussion of the various cuts that can be harvested from cow carcasses and their main uses are found in the following section.

VIII. Descriptions and Usage of Cow Cuts²³

Utility inside rounds: this boneless item is cut from the primal round and consists of the *pectineus*, *adductor*, *gracilis* and *semimembranosus* muscles. The inside round is separated from the bottom outside round and the knuckle through the natural seams. This is the inside muscle (medial side) of the upper leg.

Main uses: primarily inexpensive deli roast beef, also meal solutions (roast type products)

Denuded²⁴ inside rounds: same as above with all visible exterior fat removed.

Main uses: Canner/cutter insides are small, used as 100 percent lean, cooked roast product sliced very thin (sandwich shops), deli meats thin sliced in pre packaged bags, some jerky, can make a top round roast (usually at a price premium to denuded flats and eyes)

Peeled knuckles: this boneless item is cut from the primal round and consists of the posterior portion of the full knuckle comprised of the *vastus intermedius*, *vastus lateralis*, *vastus medialis* and *rectus femoris*. The *tensor fasciae latae*, fat and skin tissue are excluded. The knuckle is separated from the top inside round and bottom outside round between the natural seams. Sometimes referred to as the peeled sirloin tip, found on the front of the leg from the hip to the knee.

²² Correlation coefficient measures the strength of the linear relationship between two variables. The closer to 1, the nearer to a perfect direct correlation between the variables.

²³ Descriptions of beef cuts are mainly derived from "The Meat Buyers Guide", North American Meat Processors Association, 1997, and the Meats Cuts Manual-Beef, Canadian Food Inspection Agency.

²⁴ NOTE: for denuded product, if not used for cooking, then often blended into ground round, can be seasonal in use

Main uses: mostly ground sirloin, also jerky and diced beef

Utility flats: cut from the primal round, the outside flat is produced by separating the boneless item from the top inside round, knuckle, heel and *semitendinosus* or eye of round between the natural seams. The cut consists of the *biceps femoris* and may contain the *gluteus medius*, *gluteus profundus* and *gluteus accessorius*.

Main uses: primarily deli corned beef and pastrami, for traditional delis and sandwich use; also used in catering and mobile “lunch wagons” as cooked, thinly sliced or shaved meat for sandwiches

Utility eyes: this boneless item is cut from the primal round and consists of the *semitendinosus* muscle. The cut is produced by separating the eye of round from the top inside round and the outside flat and heel between the natural seams. This is the eye muscle of the bottom round.

Main uses: same as flats, also airlines will use them in cooked sandwiches due to shape and size

Denuded flats and eyes: the outside flats and eyes of round with the visible fat removed

Main uses: 100 percent lean, same as denuded inside rounds, some jerky

Utility top sirloin butts: this boneless item is cut from the primal loin. The cut is prepared from dorsal portion of the sirloin (posterior section of the full loin) and contains the *gluteus medius*, *gluteus accessorius*, *gluteus profundus* and the *biceps femoris*.

Main uses: traditional budget steak house, sirloin products in meal solutions

Canner/cutter top butts: same basic cut as described for utility top butts.

Main uses: mostly ground sirloin

Utility tri tip: this boneless item consists of the *tensor fasciae latae* muscle from the bottom sirloin butt and is separated from the ball tip and the flap through the natural seam. The cut is trimmed practically free of fat.

Main uses: Asian dishes, southwest cuisine, some diced beef

Utility strip loin: this boneless item is cut from the primal loin and consists primarily of the *longissimus dorsi* muscle, along with the *gluteus medius* and *multifidus dorsi* or portions thereof. The view from the rib end displays the 13th rib mark. The sirloin end is anterior to the hip cartilage, forming an approximate right angle with the length of the loin and exposing the *gluteus medius*.

Main uses: budget steak house, can use whole marinated cooked piece that is sliced thin (e.g. truck stop cafes and meal solutions)

Denuded strip loin: same as the above item with the visible exterior fat removed.

Main uses: cooked as a sirloin product, mostly ending up as a meal solution, some restaurant usage as sliced and pounded product (mostly ethnic)

Tenderloins: this boneless item is cut from the primal loin and consists mainly of the *psoas major* and *psoas minor*. The tenderloin is on the opposite side (ventral side) of the

lumbar vertebrae from the strip loin (*longissimus dorsi* muscle). It is a long tapered cut extending from the 13th rib (thoracic vertebrae) to the pelvis.

Main uses: mid priced and budget steak house, normally a small steak, breakfast steak

Flank steak: this boneless item consists of the *rectus abdominis* muscle from the flank region of the carcass (located on the underside of the animal below the primal loin).

Main uses: primarily into Asian cooking, use in meal solutions

Chuck tender: this boneless item is cut from the primal chuck and consists of the supraspinatus muscle which lies dorsal to the medial ridge of the blade bone, separated from the other muscles through the natural seams.

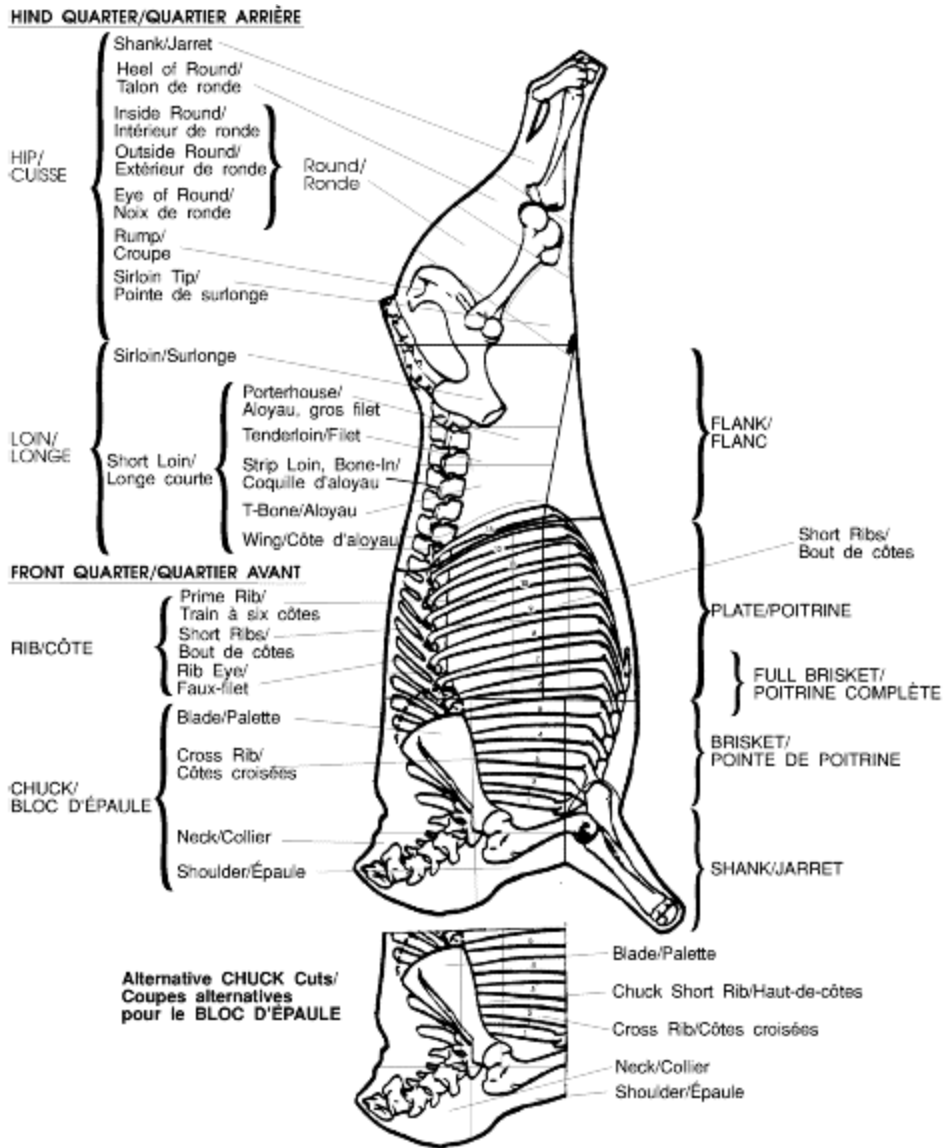
Main uses: mostly for ground chuck and diced beef

Utility rib eye: this boneless item is cut from the primal rib and consists of the *longissimus dorsi*, *spinalis dorsi*, *complexus* and *multifidus dorsi* muscles at the vertebral end of the ribs. Essentially this rib cut is a continuation from the strip loin of the primal loin region of the carcass, separated from the 6th through 12th rib bones (thoracic vertebrae).

Main uses: sliced thin and grilled, also used in sandwich shops, some rib eye dinners

Canner/cutter rib eye: same as above.

Main uses: smaller than utility but basically same main uses, some ground rib burgers



Source:

Canadian Food Inspection Agency

IX. Cow Carcass Cutout Model

A. Developing a Cow Carcass Cutout Model for Canada

Simplistically, the primary role of the packer-processor in the meat value chain is to procure live animals, slaughter them, then disassemble the carcasses into pieces and sell all of the parts of the animals for edible and inedible purposes. More than 85 percent of the final sales value of the animal is derived from the sales of edible beef cuts and trimmings. The remaining portion of the sales value comes from items such as hides, edible offals, inedible offals, tankage, fat and bones. Thus a major concern or focus of the packer is determining the amount of salable cuts and trimmings that can be taken from a carcass and the prices that can be attained for these items.

A carcass cutout model helps to determine the “meat value” of the animal. The model takes the yield of each individual cut and multiplies that yield by the price for the individual cuts. Then the value of the individual cuts is summed to establish the sales value of the entire carcass. In the US, boxed beef cutout values are calculated and reported on a daily basis by USDA (http://www.ams.usda.gov/mnreports/lm_xb403.txt). These values relate to fed cattle (steers and heifers). For cows, the USDA reports a “cutter” type cow cutout (http://www.ams.usda.gov/mnreports/lm_xb405.txt). Both of these models have been in existence for many years and have been modified over time, as needed. A boxed beef cutout model for Canada has been a relatively recent development (<http://www.canfax.ca/>). The current project involves the development of a carcass cutout model for cows in Canada. The purpose of the model is to illustrate the differences in the values of different types of cows that are slaughtered and processed in this country. This chapter of the report describes the development of the model and the method of calculating a cow carcass cutout value, along with examples of varying value scenarios by type or category of cow.

The single major salable item that is derived from a cow carcass in Canada is 85 percent lean boneless beef (boneless 85s). The primary use of this product is for manufacturing purposes, particularly ground beef. Bones are the second largest item by weight taken from the carcass, but generate very little value to the carcass in the rendering process. Then come the various cuts that can be trimmed from the carcass and sold in boxed beef form for various uses. In developing a cow carcass cutout model, it becomes immediately apparent that, due to the variability in the quality of cows and the ability to harvest cuts for sales as boxed beef rather than boneless trim, one set of yield figures is not adequate to be reflective of the value of cows in general. First there is a difference in the amount and quality of cuts that can be derived from the different grades or classifications of cows. For example, a utility type cow carcass would be expected to yield, on average, just under 40 percent of

boneless 85 percent lean beef. The amount of salable boxed beef cuts²⁵ (inside round, outside flat, eye of round, peeled knuckle, top sirloin butt, strip loin, tenderloin, flank steak, chuck tender and rib eye) amounts to a little less than 23 percent of the carcass. The balance of the carcass is made up of 60 percent lean trim (eight percent of the carcass), a small amount of fat, with bones and waste at 28 percent.

In the case of canner/cutter type cow carcasses, the yield of boneless 85 percent lean beef is expected to be close to 54 percent of the carcass. In this case, the insides rounds, outside flats, eyes of round and strip loins are denuded (all visible fat removed). The yield of salable boxed beef cuts is just under 16 percent. There is a minor amount of 60% lean trim and nearly 30 percent of bones and waste. The muscle meat from canner/cutter cows tends to be darker than in the case of the utility cows and often considered to be of poorer quality and more limited use. Thus the sales value of some of the cuts can be less in terms of price per pound. This is particularly the case for items such as tenderloins and rib eyes.

Another factor that can affect the final meat value of a cow carcass is the ability to harvest some but not all of the individual cuts for boxed beef. Not only is there variability between the categories of cows, there can also be considerable variability within a category of cows²⁶. There can be various reasons why an individual cut will not be saved and sold as that cut, but instead included in the bins of boneless manufacturing beef. Chief among the reasons would be the color and quality (texture) of the muscling. The individual cut may be deemed to be of such poor quality that the best alternative would be for grinding purposes. In this case, the value of the meat is reduced by the difference in what that piece could have been sold for as a boxed beef cut versus the price for boneless manufacturing beef.

Another issue that can cause the “devaluation” of a cut to that of boneless 85s is the necessity of trimming part of the carcass due to bruising. A beef quality audit of 26,000 Canadian slaughter cattle estimated the average loss due to bruising in cows was \$8.75 per carcass²⁷. To put this in perspective, let us take an example of bruising that causes the trimming of one pound of meat from the carcass. If the bruising is in the neck area and boneless 85s sell for \$1.45 per pound, then the loss of one pound of meat from that area reduces the value of the carcass by \$1.45. But what if the damage was on the *longissimus dorsi* muscle or in the strip loin area? As a cut, a strip loin weighing nine pounds and selling for \$2.20 per pound would be worth $9 \times \$2.20 = \19.80 . The removal of one pound of muscle due to bruising would now leave eight pounds

²⁵ Not all of the listed cuts are necessarily vacuum-packed and put in boxes. At times, some of them would be pulled from carcasses and placed in combo bins for shipping purposes. But all are sold as individual cuts, attaining higher sales prices than boneless 85 percent lean beef.

²⁶ Back to the saying, “a cow is not a cow is not a cow”.

²⁷ Canadian Beef Quality Audit, 1996. The average for fed cattle was \$2.90 per carcass and the overall average was \$3.92, illustrating the greater incidence of bruising in cows.

to be sold as boneless 85s. Now the value is only $8 \times \$1.45 = \11.60 . This is a reduction of $\$19.80 - \$11.60 = \$8.20$ per head. At the extreme would be damage to the highest priced cut, the tenderloin. At a weight of 5.5 pounds and a sales price of \$5.35 per pound, the tenderloin in this example is worth $5.5 \times \$5.35 = \29.43 . Losing a pound of tenderloin and selling the rest of the muscle as boneless 85s would reduce the value to $4.5 \times \$1.45 = \6.53 , for a reduction of $\$29.53 - \$6.53 = \$22.90$ per head. From these calculations, one can observe that losing just one pound of meat from a carcass due to bruising can reduce the meat return by a wide range, from less than \$1.50 to more than \$20, depending upon the location of the bruising and the necessity of diverting a boxed beef cut to selling it as boneless 85s.

B. Method of Calculating a Cow Carcass Cutout

In this section of the chapter, we will consider one example of an “idealized” carcass of one category of cows where all of the listed cuts are obtained at the standard yields and sold for the illustrative prices. The following yields are used to describe an average utility cow:

Boneless 85% lean	39.06%
Inside Rounds	4.86%
Outside Flats	3.08%
Eyes of Round	1.29%
Peeled Knuckles	2.93%
Tri Tips	0.59%
Top Butts	2.71%
Strip Loins	2.59%
Tenderloins	1.45%
Flank Steaks	0.53%
Chuck Tenders	0.91%
Rib Eyes	2.21%
60% trim	7.81%
Fat	1.50%
Bones	28.00%

The sum of the yield figures works out to 99.52%, indicating a “cutting loss” of 0.48%. The following prices (dollars per pound) were used on the individual cuts and trim items:

Boneless 85% lean	\$1.45
Inside Rounds	\$1.95
Outside Flats	\$1.60
Eyes of Round	\$1.90
Peeled Knuckles	\$1.95
Tri Tips	\$2.10
Top Butts	\$1.75
Strip Loins	\$2.20

Tenderloins	\$5.35
Flank Steaks	\$2.10
Chuck Tenders	\$1.65
Rib Eyes	\$2.20
60% trim	\$1.28
Fat	\$0.05
Bones	No value

We now take the yield of the individual item and multiply by the price to determine the value of the cut to the overall carcass. These values are then summed to determine the meat value of the carcass in dollars per pound.

	<u>Yield</u>	<u>\$/lb</u>	<u>Value to carcass</u>
Boneless 85% lean	39.06%	\$1.45	\$0.5664
Inside Rounds	4.86%	\$1.95	\$0.0948
Outside Flats	3.08%	\$1.60	\$0.0493
Eyes of Round	1.29%	\$1.90	\$0.0245
Peeled Knuckles	2.93%	\$1.95	\$0.0571
Tri Tips	0.59%	\$2.10	\$0.0124
Top Butts	2.71%	\$1.75	\$0.0474
Strip Loins	2.59%	\$2.20	\$0.0570
Tenderloins	1.45%	\$5.35	\$0.0776
Flank Steaks	0.53%	\$2.10	\$0.0111
Chuck Tenders	0.91%	\$1.65	\$0.0150
Rib Eyes	2.21%	\$2.20	\$0.0486
60% trim	7.81%	\$1.28	\$0.1000
Fat	1.05%	\$0.05	\$0.0008
Bones	28.00%	\$0.00	<u>\$0.0000</u>
			\$1.1619

In the above example, the meat value of the cow carcass works out to \$1.1619 per pound of carcass weight. If the carcass weighed 700 pounds, this would yield a value of \$813.33. Trimmings (boneless 85s and 60s) account for 46.87 percent of the yield of salable items and 57.35 percent of the meat value. Boxed beef cuts make up 23.15 percent of the carcass and 42.58 percent of the meat value.

Another way to look at the determination of the value of the cow beef is to look at the calculation of the values by item (using a 700 pound carcass):

	<u>Yield</u>	<u>lbs</u>	<u>\$/lb</u>	<u>Value</u>
Boneless 85% lean	39.06%	273.42	\$1.45	\$396.46
Inside Rounds	4.86%	34.02	\$1.95	\$66.34
Outside Flats	3.08%	21.56	\$1.60	\$34.50
Eyes of Round	1.29%	9.03	\$1.90	\$17.16
Peeled Knuckles	2.93%	20.51	\$1.95	\$39.99
Tri Tips	0.59%	4.13	\$2.10	\$8.67
Top Butts	2.71%	18.97	\$1.75	\$33.20
Strip Loins	2.59%	18.13	\$2.20	\$39.89
Tenderloins	1.45%	10.15	\$5.35	\$54.30
Flank Steaks	0.53%	3.71	\$2.10	\$7.79
Chuck Tenders	0.91%	6.37	\$1.65	\$10.51
Rib Eyes	2.21%	15.47	\$2.20	\$34.03
60% trim	7.81%	54.67	\$1.28	\$69.98
Fat	1.50%	10.50	\$0.05	\$0.53
Bones and waste	28.00%	196.00	\$0.00	\$0.00
Total		696.64		\$813.33

The previous examples illustrate the meat value that can be derived from what would be considered as a good utility cow carcass with a full yield of boxed beef cuts. The next section will show examples of the variability between cow carcasses as to quality and yield of cuts, along with impact on the meat value of the animal.

C. Examples of various quality/harvest scenarios

The following yield assumptions were used for developing the cutout values in Table 1:

Boneless 85% lean	39.06%
Inside Rounds	4.86%
Outside Flats	3.08%
Eyes of Round	1.29%
Peeled Knuckles	2.93%
Tri Tips	0.59%
Top Butts	2.71%
Strip loins	2.59%
Tenderloins	1.45%
Flank Steaks	0.53%
Chuck Tenders	0.91%
Rib eyes	2.21%
60% Trimmings	7.81%
Fat	1.50%
Bones	28.00%

For all of the scenarios in Tables 1 and 2, the average cow live weight was assumed to be 1400 pounds. The first set of calculations in Table 1 utilized the high end of the range of carcass yield (50%). A further adjustment of one percent is used to calculate the change from hot weight to cold weight, resulting in an average cold carcass weight of 693 pounds per cow. Using some representative prices for cuts and trimmings, along with the above yield figures, the cutout value was determined to be \$1.1619 per pound. This would put the average meat value in the first example at \$805.21 per cow.

For the second set of calculations in Table 1, adjustments were made to the harvest of cuts from the batch of cows. It was assumed that half of the inside rounds, outside flats, eyes of round, peeled knuckles, tri tips and chuck tenders were sold as boxed beef cuts and the other half of these items were put into boneless manufacturing beef sales (boneless 85s). Two-thirds of the top butts were harvested as boxed beef cuts and one-third sold as boneless manufacturing beef. Three-quarters of the rib eyes were sold as boxed beef and one quarter went into boneless beef. All of the strip loins, tenderloins and flank steaks were sold as boxed beef. These adjustments reduced the average cutout value to \$1.1276 per pound. The average meat value was reduced by \$23.80 per cow to \$781.41.

In the third example of Table 1, a full harvest of cuts for boxed beef was assumed, but the average carcass yield was at the low end of the range (42%). This reduced the average carcass weight to 582 pounds per cow. With a cutout value of \$1.1619 per pound, the average meat value was \$676.38 per cow. This amounts to a difference of \$128.83 per cow in comparison to the batch of cows with higher carcass yield.

The final example in Table 1 carries the assumption of lower carcass yield, along with the adjusted harvesting of boxed beef cuts described for the second set of calculations. In this case, the lighter carcass weight (582 pounds) is associated with the lower cutout value (\$1.1276 per pound) to give an average meat value of \$656.38 per cow. This is a difference of \$148.82 per cow in comparison to a batch of cows with higher carcass yield and better harvest of boxed beef cuts.

Table 1

Meat Values from Utility Cows

Live to Hot Carcass Yield

High 50%

Low 42%

Carcass Shrink 1%

Average Live Weight per cow (lbs) 1400

High carcass yield, full yield of cuts

Average Hot Carcass Yield 50%

Average Cold Carcass Weight per cow (lbs) 693

Cutout (\$/lb) 1.1619

Average Meat Value per cow (dollars) 805.21

High carcass yield, adjusted yield of cuts

Average Hot Carcass Yield 50%

Average Cold Carcass Weight per cow (lbs) 693

Cutout (\$/lb) 1.1276

Average Meat Value per cow (dollars) 781.41

Average Difference per cow (dollars) (23.80)

Lower carcass yield, full yield of cuts

Average Hot Carcass Yield 42%

Average Cold Carcass Weight per cow (lbs) 582

Cutout (\$/lb) 1.1619

Average Meat Value per cow (dollars) 676.38

Average Difference per cow (dollars) (128.83)

Lower carcass yield, adjusted yield of cuts

Average Hot Carcass Yield 42%

Average Cold Carcass Weight per cow (lbs) 582

Cutout (\$/lb) 1.1276

Average Meat Value per cow (dollars) 656.38

Average Difference per cow (dollars) (148.82)

Table 2 summarizes the calculations of meat values for canner/cutter cows under varying assumptions. The following yield estimates were used for developing the cutout values in Table 2:

Boneless 85% lean	53.60%
Denuded Inside Rounds	2.45%
Denuded Flats & Eyes	2.50%
Peeled Knuckles	2.75%
Top Butts	1.75%
Denuded Strip Loins	1.60%
Tenderloins	1.40%
Flank Steaks	0.40%
Chuck Tenders	0.75%
Rib eyes	2.00%
60% Trimmings	0.50%
Bones and waste	29.85%

In the first set of calculations in Table 2, the carcass yield was set at the upper end of the range (43%). From an average live weight of 1400 pounds, and adjusting for one percent carcass shrink, this would produce an average cold carcass weight of 596 pounds per cow. The above yields of cuts and boneless manufacturing beef would result in a cutout value of \$1.1412 per pound. This would put the average meat value at \$680.12 per cow. This is \$125.09 per cow less than the upper end of the calculations for utility cows (Table 1).

The second scenario in Table 2 maintains the carcass yield at 43%. Adjustments are made to the harvest of boxed beef cuts, where only one-third of the peeled knuckles and one-third of the rib eyes sold as boxed beef, the other two-thirds going into boneless manufacturing beef. One-quarter of the top butts, strip loins and chuck tenders are harvested as boxed beef, with the remaining three-quarters of the product selling as boneless manufacturing beef. This reduces the average cutout value on the batch of cows to \$1.1018 per pound. The average meat value calculates to \$656.64 per cow, which is \$23.48 less than the batch of canner/cutter cows providing full harvest of boxed beef cuts. This is also \$148.57 lower than the high-end utility cows from Table 1.

The third example illustrates a set of cows with very low yields of cuts due to poor conformation (muscling) and meat color. Here, only the tenderloins are salvaged for boxed beef, with the bulk of the meat (67.80% of the carcass) going into boneless manufacturing beef. The resulting cutout value is reduced to \$1.0582 per pound. With a carcass yield of 43% and average cold carcass weight of 596 pounds, the average meat value now works out to \$630.69 per cow. This is \$49.43 per cow less than the meat value from canner/cutter cows providing full harvest of boxed beef cuts and \$174.52 lower than the upper end of the calculations for utility cows (Table 1).

The last three examples reduce the carcass yield assumption to 34%, providing an average cold carcass weight of 471 pounds. With a full yield of boxed beef cuts and a

cutout value of \$1.1412 per pound, the average meat value in the fourth set of calculations in Table 2 works out to \$537.77 per cow. The difference in average meat value in comparison to the higher yielding batch of canner/cutter cows has now widened to \$142.35 per cow. The average difference from the high-end utility cows shown in Table 1 is \$267.44 per cow.

The fifth scenario assumes the same harvesting of boxed beef cuts as the second example in Table 2 (one-third of the peeled knuckles and rib eyes, one-quarter of the top butts, strip loins and chuck tenders). With a cutout value of \$1.1018 per pound, the average meat value calculates to \$519.20 per cow. This is \$160.92 less than the average value of the higher yielding canner/cutter cows with full harvest of boxed beef cuts and is \$286.01 lower than the upper end of the utility cow calculations from Table 1.

The final example involves a batch of cows with low carcass yields and the harvest of only the tenderloins for boxed beef (most of the meat being sold a boneless manufacturing beef). With the smaller average cold carcass weight (471 pounds) and lower cutout value (\$1.0582 per pound), the average meat value amounts to \$498.65 per cow. The average difference from the higher yielding canner/cutter cows with full harvest of boxed beef cuts is \$181.47 per cow. The average difference in meat value compared to the high-end utility cows (Table 1) is \$306.56 per cow.

In summary, we have provided several examples across grades/classifications of cows, with various assumptions regarding carcass yield and harvesting of cuts for boxed beef sales. These examples illustrate that the average meat value from cows can vary greatly, in this instance from a low of \$498.65 per cow to a high of \$805.21. This is a difference of more than \$300 per cow from the bottom end of the assumptions to the top end of the assumptions. Of course, the actual figures can change with changes in prices for the various cuts and trim items. There can also be multiple other scenarios for the harvest and sale of cuts. Still, these examples demonstrate the primary reasons for the variations in the value of cull cows. At the same time, they do not take into account other factors that can and do reduce the average value of cows to the packers, including cost of procurement, transportation costs, condemnations, loss of product from bruising, problems with injection sites, etc.

Table 2

Meat Values from Canner/Cutter Cows

Live to Carcass Yield

High 43%

Low 34%

Carcass Shrink 1%

Live Weight per cow (lbs) 1400

High carcass yield, full yield of cuts

Difference from Upper End Utility

Hot Carcass Yield 43%

Average Cold Carcass Weight per cow (lbs) 596

Cutout (\$/lb) 1.1412

Average Meat Value per cow (dollars) 680.12 (125.09)

High carcass yield, adjusted yield of cuts

Hot Carcass Yield 43%

Average Cold Carcass Weight per cow (lbs) 596

Cutout (\$/lb) 1.1018

Average Meat Value per cow (dollars) 656.64

Average Difference per cow (dollars) (23.48) (148.57)

High carcass yield, low yield of cuts

Hot Carcass Yield 43%

Average Cold Carcass Weight per cow (lbs) 596

Cutout (\$/lb) 1.0582

Average Meat Value per cow (dollars) 630.69

Average Difference per cow (dollars) (49.43) (174.52)

Lower carcass yield, full yield of cuts

Hot Carcass Yield 34%

Average Cold Carcass Weight per cow (lbs) 471

Cutout (\$/lb) 1.1412

Average Meat Value per cow (dollars) 537.77

Average Difference per cow (dollars) (42.35) (267.44)

Lower carcass yield, adjusted yield of cuts

Hot Carcass Yield 34%

Average Cold Carcass Weight per cow (lbs) 471

Cutout (\$/lb) 1.1018

Average Meat Value per cow (dollars) 519.20

Average Difference per cow (dollars) (60.92) (286.01)

Lower carcass yield, low yield of cuts

Hot Carcass Yield 34%

Average Cold Carcass Weight per cow (lbs) 471

Cutout (\$/lb) 1.0582

Average Meat Value per cow (dollars) 498.65

Average Difference per cow (dollars) (181.47) (306.56)

The Canadian cow cutout model is presented in a Microsoft EXCEL workbook. The output of the model is shown in Appendices A and B. A baseline of an “idealized” Utility cow at the top end of the slaughter yield range and full harvest of boxed beef cuts is shown in Appendix A under example 1. All other examples show calculation of the carcass cutout value under varying scenarios, along with final meat value and difference from the “idealized” Utility cow. The model has the flexibility to adjust the slaughter yield and illustrate the impact on the value of the cow in comparison to the high yielding Utility cow. There is further flexibility in being able to adjust the level of being able to harvest cuts as boxed beef versus selling the product for boneless manufacturing beef. Adjustments can be made on each individual cut. A variety of scenarios can be run simultaneously, with the output in Appendix A showing four examples for the Utility category of cows.

Appendix B shows the results of varying scenarios for Canner/Cutter type cows. Again the first example in the output (labeled example 5) is at the upper end of the slaughter yield range for Canner/Cutter cows, with a full harvest of boxed beef cuts. The calculations of the carcass cutout value and the meat value per head are shown, along with the difference from the high yielding Utility cow (Appendix A). The other four examples in Appendix B can provide the calculations from inputting varying levels of slaughter yield and harvest of boxed beef cuts. New calculations of carcass cutout value and meat value are shown, along with the difference in value from the high yielding, fully harvested Canner/Cutter cow, along with the difference in value from the high yielding, fully harvested Utility cow. The model can run several simulations at once and illustrate the differences in the value of cow carcasses under various assumptions.

X. Relative Values of Cow Cuts

While the primary product derived from cow carcasses is boneless lean trim, increasing the harvest of boxed beef cuts can substantially increase the meat value of a cow carcass. The spot market prices used in the preceding examples are representative of a single point in time. Packers must be able to sell these cuts for more money than boneless lean trim in order to pay for the extra costs of labor in collecting these cuts, increased packaging costs and equipment cost of putting them in vacuum sealed bags and cardboard boxes (although a few can be sold in combo bins) and the extra effort in marketing several cuts rather than selling just one item (lean boneless beef). The customers for boxed cow cuts are often different from the major customers for lean boneless beef and tend to buy in smaller quantities or limited numbers of cuts.

Utilizing the model developed for this project, the meat value of a Utility type cow carcass with a full harvest of boxed beef cuts works out to \$805.21. However, if none of the cuts are saved and all of the product is sold as boneless lean trim, the value is reduced to \$694.91. This is a difference of \$110.29. A Canner/Cutter cow carcass with full harvest of boxed beef cuts would have a value in the preceding example of \$680.12. But if all of the product was sold as boneless lean trim, with no harvest of boxed beef cuts, the meat value would decline by \$70.75 to only \$609.37. Using the prices outlined in the previous section, the ability to collect and sell boxed beef cuts from cow carcasses can add as much as \$110 to the meat value of a Utility cow carcass and \$70 to the meat value

of a Canner/Cutter cow carcass, in comparison to selling the bulk of the meat as lean boneless beef for manufacturing purposes.

In the preceding examples, the price differentials between boneless lean beef (85% lean) and the cuts vary from as narrow as \$0.15 per pound (outside flats) to as much as \$3.90 per pound (Utility tenderloins). The differences between individual cut prices and the price for boneless lean beef can vary through different parts of the year. However, there is no publicly reported time series for cow cuts in Canada, confining the discussion to the examples shown above.

As previously mentioned, there is a small proportion of the cow slaughter that can be designated as “white fat” cows²⁸. These tend to be younger, well-muscled animals with a white or creamy fat cover over the major muscles. Boxed beef cuts from these carcasses will obtain a premium to those from Utility type cows, but still remain discounted in comparison to fed cattle (graded) cuts. At the time the information was gathered, the Utility 0x1 strip loins were priced at \$2.20 per pound (used in the model calculations). Strip loins from white fat cows were being priced at \$3.30 per pound (\$1.10 premium). AAA strip loins were averaging around \$6.30 per pound and AA strip loins at \$5.30 per pound. Utility inside rounds were priced at \$1.95 per pound in the model, while inside rounds from white fat cows were going for about \$2.10 per pound (\$0.15 premium), while graded inside rounds were selling for \$2.20 per pound. In general, the narrowest differences were in the end meats (mostly round cuts) and the widest differences were found among the middle meats. Tenderloins showed the widest variations, with the Utility tenderloins priced at \$5.35 per pound and the “white fat” cow tenderloins indicated to be selling for more than \$6.00 per pound (premium of about \$0.70). AAA tenderloins were priced around \$9.50 per pound and the AA just under \$9.00 per pound. Again, these price comparisons are only used for illustrative purposes. The actual price differentials between the various quality levels can and do vary over time and season.

Studies have shown that the feeding of high concentrate diets to cull cows can increase returns to producers through added weight and improved carcass quality (better grading)²⁹. Even the feeding of a high roughage ration to thin cull cows has the potential for increasing returns due to increased carcass weight. Some of these strategies could be used for more timely marketing of cull cows, rather than selling the bulk of them at times when marketing numbers are large (late fall and early winter) and cull cow prices are subsequently low. The economics of feeding cull cows is dependent upon the performance and quality of the cows, the cost of feed and the prices obtained for the cows³⁰. The relatively low prices for cows over the last two plus years have probably restricted the profit potential of feeding cull cows. However, such practices would warrant further consideration and investigation, particularly in the event of renewed trade in OTM cattle and beef from OTM cattle, with the ability for market arbitrage to lift the prices for Canadian cull cows.

²⁸ Proportion varies through the year and not consistent between slaughter plants.

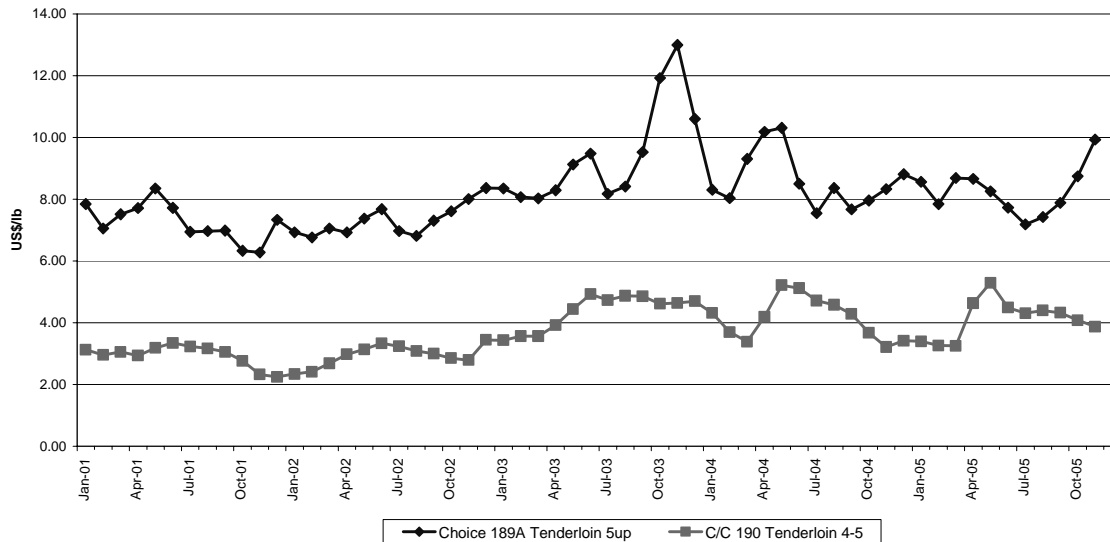
²⁹ Pritchard, R.H. and P.T. Burg. 1993. *Feedlot Performance and Carcass Traits of Cull Cows Fed for Slaughter.* Department of Animal and Range Science, South Dakota State University, BEEF REPORT, Cattle 93-20: 101-107.

³⁰ Feuz, Dillon M. 2000. *Feeding and Marketing Cull Cows.* University of Nebraska-Lincoln.

While there is not a publicly available time series on Canadian cow cuts, USDA does report on boxed cow beef cuts sales in the US. A comparison of the prices of these cuts to those from fed steers and heifers could be useful from an illustrative point of view. Prior to the BSE incident in 2003 leading to the exclusion of OTM cattle and beef from trade with the US, Canadian cow beef and cow cuts were allowed for export to the US. Thus one would assume that there were price relationships between the Canadian cow cuts and the US cow cut prices during that time.

In comparing the US cow cut prices to Choice boxed beef prices, the correlations from January 2001 through November 2005 (monthly) were rather poor, mostly in the area of 0.5 to 0.6 on individual cuts. The results were no better when comparing cow cut prices to Select boxed beef prices. The following chart shows a comparison of Choice 189A tenderloins from fed steers and heifers with a Canner/Cutter (also includes the Boner/Breaker classification) 190 tenderloin from cows. The difference between the Choice tenderloins and the cow tenderloins averaged US\$4.47 per pound over the time period. The narrowest gap was US\$2.83 (July/04) and the widest was US\$8.35 (November/03). There are some differences in the seasonality of these two products. For instance, the Choice tenderloins tend to rise in price in October and November (demand for the “holidays”). But cow tenderloins tend to decline from the summer into the fall as domestic cow slaughter increases to seasonal peaks in November.

Choice 189A Tenderloin vs Cow Tenderloin



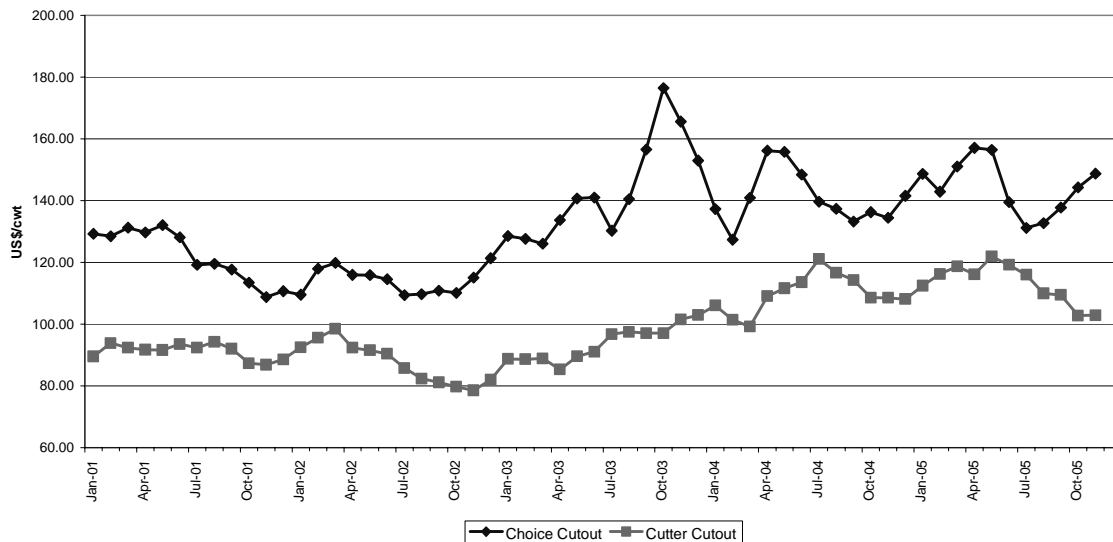
The differentials between Choice beef cuts and cow cuts vary by individual item and from month to month. The middle meats tend to show the widest spreads, with tenderloins being at the extreme. The price difference on boneless rib eyes has averaged \$3.26 per pound over the last five years when comparing the Canner/Cutter rib eye roll (lip off) with the Choice 112A boneless lip on rib eye. Looking at the Boner/Breaker rib eye roll (lip off), the difference has averaged \$2.86 per pound. For 180 strip loins, the difference between Utility cow and Choice strip loins has averaged \$2.12 per pound. For

the end cuts, a representative peeled knuckle from cow carcasses sold for an average \$0.15 per pound less than the Choice product. Utility 171C eye of round sold for an average of \$0.22 per pound below the Choice cut. A summary of representative prices by grade through mid December 2005 is shown in the following table.

	<u>Choice</u>	<u>Select</u>	<u>Cow</u>
	(US\$/cwt)		
Tenderloin	854	730	412
Rib eye	541	465	221
Strip loin	407	332	186
Peeled knuckle	176	176	168
Eye of round	205	194	184
Cutout calculation	146	136	113

The larger proportion of the carcass being sold as boneless lean beef, the lesser amounts of cuts being harvested, and the price differentials on the individual cuts lead to a considerable difference in the value of a cow carcass in comparison to a Choice beef carcass from a fed steer or heifer. Looking at the USDA calculation for the Cutter cutout, we find that the Choice cutout has averaged 35% higher (on a US dollar per cwt basis) over the last five years. On a monthly basis, the difference in value has ranged from 13% (July/05) to 82% (October/03). The correlation coefficient between these two series over the time period was only 0.64.

Choice Cutout vs Cutter Cow Cutout



XI. Future Scenarios for Value of Commercial Cow Beef in Canada

With ongoing trade disruptions between several countries regarding BSE and the uncertainty as to their resolution or timing thereof, there are probably dozens or more scenarios that could be discussed regarding the future of commercial cow beef in Canada. There are also considerations that would have to be made to other disease situations in various regions of the world, such as foot and mouth disease (FMD) in South America and Avian Influenza (AI) in Asia and now spreading into Europe. The purpose of this report is to focus in on a few key elements of the situation and provide some opinion on a possible scenario.

While trade of beef and cattle under 30 months of age has been restored with the US, cattle and beef from animals over 30 months of age continues to be restricted to domestic use only. USDA has begun the exercise of developing a new rule for trade in cattle and beef over 30 months of age. While there has been no indication of a definitive date, Informa Economics, Inc. is working under the assumption that a rule for the older slaughter cattle and beef will be put in place some time in the second half of 2006. Until that time, prices for slaughter cows and cow beef in Canada will remain well below the US equivalent.

The re-opening of the US border to trade in OTM cattle and beef will provide an arbitrage mechanism to bring Canadian and US prices closer together. Canadian prices would be expected to rise while US prices may be modestly lower. Prior to the BSE ban, Canadian slaughter cow exports to the US usually accounted for three to four percent of US cow slaughter. The figure increased in the drought year of 2002 to six percent of US cow slaughter. Exports of boneless beef and cow cuts also contributed to US beef supplies.

Since the closure of the border in May 2003, there has been increasing numbers of cows kept on Canadian farms. Many of these are animals that would have been culled under “normal” circumstances. Still, the Canadian cattle herd had been in an expansion phase since 2000 and probably would have showed continued growth. With many of these cull animals expected to calve and with the relatively strong values for feeder cattle and calves, not all of them would suddenly be “dumped” on the market once the border does re-open. Consideration also needs to be given to the increase in slaughter capacity for non-fed cattle in Canada and expectations of further expansion of capacity through next year. While cow marketings would certainly increase with the re-opening of the border, there would still be some hold back of cows for further building of the Canadian cattle herd and probably less live cow exports to the US than some would estimate. The better margins of the last two years have allowed Canadian packers to build up “war chests” and expand or build plants, while cow slaughtering operations in the US have suffered significant financial stress from lack of supplies (domestic and import). There will be some exports of live cows for slaughter in the US, but there also will likely be increased slaughter of cows in Canada along with exports of cow beef to the US.

Along with the expected shifts in live cow and cow beef exports due to a renewal of trade with the US, price changes in the Canadian market would likely make that market more

attractive to non NAFTA beef suppliers than has been the case over the last two and one-half years. While beef imports into Canada dropped dramatically after the BSE incident, they did not totally dry up. There are concerns within the processing sector in Canada about the quality, the variability in quality and the consistency of supply of Canadian cow beef. While lean boneless beef from Canadian cows is readily substitutable for imported product, there are perceptions that imported beef cuts often offer better quality and better value than Canadian cow beef cuts. Also, there have been several processors and importers who have continued to import certain quantities of beef from non-NAFTA countries in order to protect their quota allocation for the future when trade, in their minds, starts returning toward the situation before the BSE incident.

A 2004 study prepared for AAFRD³¹ involved interviews with representatives of further processors, food service and retail trade. In questions regarding comparisons of Canadian cow beef versus imported product, the authors noted that “(t)he major concerns about domestic cow product include the following:

- Lack of conformance to specifications.
- Inconsistent quality including lean content in grinding meat.
- Domestic product having higher risk of microbial contamination including E. coli 0157:H7.
- Variability and size of domestic cuts needed for the restaurant plate.
- Packer resistance to customer requests for specific cuts and trim specifications, flash frozen trim in 60 pound boxes, etc.
- Prices fluctuating from week to week, with no forward pricing opportunities.”

These types of concerns were reiterated and emphasized in the informal discussions held during the course of the current project. Some producers and industry observers may have felt that the price of Canadian cow beef had fallen to the point where the use of imported product should have been precluded or replaced. While this did happen to a fairly significant extent, there are non price factors and attributes that kept some potential users from partially or totally switching to domestic cow beef. The issues of certainty of supply and consistency of quality are extremely important. There were also anecdotal indications of imported cuts for certain specific uses that remained price competitive with particular Canadian cow cuts. There were also concerns among potential users that if and when the US border is re-opened to trade in OTM cattle and beef, domestic suppliers would abandon these users in favour of the US market.

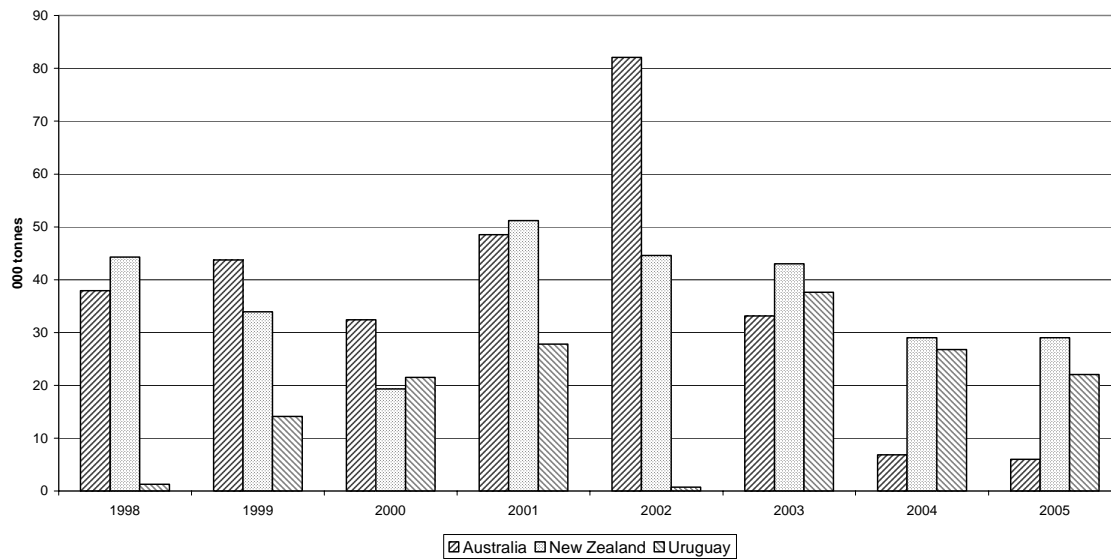
The beef industries in the major countries shipping beef to Canada are export driven, in that the bulk of their production is for export. Thus producers and packers in these countries tend to tailor their production and processing practices not only to the resources within the country but also to the needs of importing countries. The grass fed product being shipped to Canada is not just from cull cows. A considerable amount of the product comes from younger steers and heifers (as well as young virgin bulls in New Zealand), with attributes of quality consistency that are attractive to users in the importing countries. In Canada, cull cows are essentially a “residual product”.

³¹ “Utilization of Cow and Bull Meat in Canada: A study of the Canadian cow and bull meat market and assessment of opportunities to displace imported beef with domestic product”, Alberta Agriculture Food and Rural Development, April 2004.

Marketing decisions on cull cows in Canada are driven more so by observations of health status and productivity parameters rather than the market price. For beef producers, these evaluations tend to be more concentrated at certain times of the year, leading to the previously described seasonality of cull cow marketings. These fluctuations are cause for concern among current and potential users of cow beef. Further, Canada is not necessarily importing the same product that is being produced from domestic cull cows. The considerable variability in Canadian cow beef is a constraint to increasing the value of cull cows. Imported product tends to be viewed as being available as needed (or the ability to forward contract product for surety of supply), more consistent in quality and often price competitive (or at least a better perceived value due to the other attributes). The quality issue is especially pronounced when considering product from low-end Canadian cows.

Of the non-NAFTA countries, Australia experienced the sharpest drop in beef shipments to Canada following the first case of BSE in 2003. After being in the 30-40,000 MT region prior to 2001, imports from Australia reached 48,000 MT in 2001 and 82,000 MT in 2002. After dropping to 33,000 MT in 2003, Australia has been shipping only 5-6,000 MT to Canada over the last couple of years (2005 estimated by Informa Economics, Inc.). Being BSE-free, as well as free of many other trade restricting animal diseases, Australia has been the largest beneficiary of trade disruptions in Asia. This has especially been the situation since the first US case of BSE in December 2003. With US and Canadian beef shut out of the major Asian markets, Australia has experienced tremendous export growth to these regions, particularly Japan and Korea. Any renewal of beef trade between North America and Japan is expected to be limited by the restrictions on cattle age and identification, consumer perception of North American beef and moves by Australia to protect their newfound market share in the lucrative Asian markets. Still, there would likely be some beef available for increased shipments to Canada if competing beef prices increased in Canada. Australia has a cattle herd of 27 million head and was the largest global beef exporter until being overtaken by Brazil in the last couple of years. Beef exports normally run 60-65 percent of production.

Canada's Beef Imports from Major non NAFTA Countries



Other than the drop in 2000, beef imports from New Zealand were mostly in the range of 40-50,000 MT per year. The decline following the May 2003 BSE incident was far less harsh than for Australia, dipping down to 29-31,000 MT for 2004 and 2005. Part of the reason for the less harsh decline is probably due to New Zealand shipping a larger proportion of beef cuts in comparison to Australia. Around 55 percent of the product coming from New Zealand would be designated as boneless beef for manufacturing purposes (directly substitutable and competing with Canadian lean boneless beef) than Australia's proportion of around two-thirds. Further, New Zealand ships a fair amount of highly lean (90-95 percent lean) beef from virgin bulls that has developed a fairly solid niche market in Canada. Also some of the cuts from these young virgin bulls work well in producing lean deli products. While beef exports from New Zealand to Asia has increased over the last two years, the change has been far less dramatic in terms of quantity and market share in comparison to Australia. New Zealand has a much smaller cattle herd of 9.5 million head. But beef exports account for 85 percent of production and were the fourth largest globally in 2003.

After reaching nearly 28,000 MT in 2001 and then being shut out of the Canadian market in 2002 due to FMD, beef imports from Uruguay were over 37,000 MT in 2003. These levels have since dropped back in the last two years to the 27-29,000 MT range. Uruguay has been quite successful in the North American beef markets since gaining access for fresh/frozen beef. In fact, the US now accounts for nearly 70 percent of total beef exports from Uruguay, while Canada has accounted for better than 10 percent of the total. The export success has been accomplished despite tariff duties, implying the low cost of production in Uruguay and the attractiveness of the North American market. Domestic cattle prices in Uruguay, that used to be at a discount to Argentina and Brazil, have been running at premiums to those two countries over the last couple of years. Uruguay's beef exports account for better than three-quarters of production and were ninth largest globally in 2003. The cattle herd is 12.5 million head.

Canada's Beef Imports

	<u>Total</u>	<u>non-NAFTA</u>
	(000 tonnes product weight)	
1998	171.0	86.7
1999	198.4	106.2
2000	191.1	101.4
2001	215.7	133.6
2002	212.8	130.9
2003	201.4	121.8
2004	86.9	65.1
2005*	111	64

* estimated by Informa Economics, Inc.

Sources: AAFC, Statistics Canada

Beef imports from non-NAFTA countries took a large jump in 2001-02 in comparison to the previous couple of years. This was coincident with the larger numbers of cows exported to the US during those two years (drought conditions), along with record large total beef exports to all countries. Product was being shifted to the US in the form of live cattle and beef, leaving room for more product to be imported into Canada. Of course, trade declined dramatically following the 2003 BSE incident. Last year's beef imports were the smallest since 1986.

Beef imports from Argentina and Brazil are primarily thermo-processed products (cooked/canned) due to FMD restrictions. Argentina had gained access for fresh/frozen beef in 1999 and saw beef shipments to Canada climb to 26,000 MT in 2000. But new outbreaks of FMD in that country have since ceased shipments of fresh/frozen beef to North America. Thus Argentina has been looking to other areas of the world to recover export levels. Argentina has a large production capability with a cattle herd of 50 million head. About 20 percent of production is exported. While Argentina was eighth largest in global exports in 2003, a jump in 2004 exports and the decline in US exports (formerly third largest) led to Argentina gaining to fourth largest last year. Argentina is once again seeking FMD free status from US and Canadian animal health officials, but there is no indication as to when a decision will be made.

Brazil has the largest commercial cattle herd (over 170 million head) and had recently supplanted Australia as the largest beef exporter. Yet exports only account for 20-25 percent of production. With the recent FMD outbreaks in one of the major cattle producing states, fresh/frozen beef from Brazil has been totally or partially banned from approximately 50 countries. Prior to this occurrence, Brazil had been pushing animal health officials in both Canada and the US for recognition of FMD-free status on a

regional basis. This effort will no doubt be delayed until well after the current outbreaks are cleaned up and the OIE reinstates Brazil's FMD-free position. Going forward, either or both of these beef giants being allowed access to the fresh/frozen sector of the markets in North America will impose significant competition on product from Australia and New Zealand, as well as some competition to domestic product.

A. Potential Baseline Scenario for Beef Imports

As previously mentioned, USDA is developing a new trade rule for OTM cattle and beef from Canada. A representative of Informa Economics, Inc. interviewed Secretary of Agriculture Mike Johanns in early December³² and asked about progress on the rule. Secretary Johanns was quoted as saying "By the end of 2006 we should have a rule released, and the public would then be given an opportunity to comment on that" and USDA's economic analysis. When asked about the length of the comment period, Johanns said no decision has yet been made about that timeframe. There also has to be consideration given to the likelihood of legal challenges to the proposed rule, as there were in the case of the rule for UTM cattle and beef. How wide open or how restrictive the rule will be, adds further dimensions of imprecision in developing an outlook. Due to the uncertainties regarding the potential change in the trade situation on OTM cattle and beef in terms of timing and conditions of trade, a five-year baseline forecast was constructed for beef imports into Canada with the major assumption that there would be no change in the trade situation on OTM cattle and beef over the time period. The scenario is described below, along with the major factors that could result in imports exceeding or falling short of the baseline forecast.

Since the re-opening of the US border last July to trade in UTM cattle, there has been a slowdown in the pace of fed cattle slaughter and an increase in non fed slaughter, particularly cows. Some of the changes are due to seasonality and some due to the labour disruption (three week strike) in October/November at the Tyson/IBP plant in Brooks, Alberta. But there was also a response to a narrowing of the spread between Canadian and US fed cattle prices once the border re-opened and the subsequent effect on packer margins. Those plants continuing to slaughter mostly fed cattle saw their margins narrow considerably, while margins on slaughtering cows remained fairly healthy and robust. Canadian packers shifted the kill mix to a larger proportion of cows, above and beyond what would be expected from a "normal" seasonal increase in cow marketings through the fall time period. Live cow prices increased in a contra-seasonal manner from the summer into the fall as packers bid up prices to attract more numbers. Still, margins on cow slaughter remained positive through the fall and were apparently much better than those for fed cattle slaughter.

³² Informa Economics, Inc. Morning Comments, December 9, 2005.

Under the baseline scenario, Canada's imports of beef are expected to grow at a modest pace, increasing by mostly three to four percent per year. Much of this growth is expected to come from the US, in the form of boxed beef cuts from fed cattle (mostly Select grade or no roll). Due to the sheer size of the industry, US packers are better able to offer large volumes of certain cuts that are desired at times by some retailers, particularly in Eastern Canada.

According to Canfax³³, fed beef production (domestic slaughter plus live cattle exports) was up four percent in 2005, while non fed beef production increased by 31 percent over 2004. Steer and heifer slaughter at FI plants was up four percent through the first half of 2005, but down nearly 15 percent in the second half of the year³⁴. Cow slaughter increased by 26 percent in the first half of the year and more than 40 percent since July. Under a status quo scenario regarding trade issues, we would expect the elevation of the cow proportion of the slaughter mix in Canada to continue in 2006. A further increase in non fed beef production is expected to displace some of the imports from non-NAFTA countries. A very modest rebound is anticipated to begin in 2007, with beef imports from non-NAFTA countries not recovering to 2004 levels until the latter part of the decade. A summary of the baseline scenario for beef imports is shown below:

Canada's Beef Imports*
(assuming no OTM trade)

	Total	non-NAFTA
	(000 tonnes product weight)	
2003	201.4	121.8
2004	86.9	65.1
2005	111	64.0
2006	114	60.0
2007	120	61.0
2008	125	63.0
2009	130	65.0
2010	132	66.0

* 2005 onward estimated by Informa Economics, Inc.

B. Major Factors That Will Affect Baseline Scenario

While there are numerous factors that could and will affect the previously depicted baseline scenario, for the purpose of brevity, Informa has restricted discussion to the description of three major issues. Probably the leading issue

³³ Canfax Weekly Summary, December 23, 2005.

³⁴ More than 300,000 head of slaughter steers and heifers were exported to the US.

that could affect the baseline projections for beef imports into Canada would be the potential renewal of trade in OTM cattle and beef. As mentioned in previous sections, such an event would be expected to result in exports of live cows and bulls to the US for slaughter, as well as exports of non-fed beef from cull cows and bulls. Market arbitrage will work in lifting Canadian cow prices and encouraging producers to market some of the older cows that have been held back in the herd. But as previously explained, Informa does not look for a deluge of cattle numbers and product to be flowing across the border. Although Canadian packer margins will narrow, there will be abundant capacity in Canada to slaughter cows and ship some of the beef to the US. The export of live cull cows and cow beef will take product away from the Canadian market. This, along with improved prices, will provide room for more imports from non-NAFTA countries. The result could be imports from these countries being one-third to one-half larger than the baseline forecast, with resultant increases in total beef imports. But the timing and conditions of the renewal of OTM trade remains uncertain.

Both Argentina and Brazil have considerable potential for exporting chilled/frozen beef into the lucrative North American markets. While the recent FMD outbreaks in Brazil has temporarily setback that country's efforts, both of these major exporters will be pushing hard over the next couple of years to gain market access to the US and Canada. In the event of this occurring, much of the penetration into the Canadian market would likely be at the expense of current non-NAFTA countries shipping beef to Canada. This would particularly be the case for New Zealand and Uruguay (the two largest of the non-NAFTA suppliers) and to a lesser extent, Australia. But New Zealand would still be expected to maintain a significant presence with the supply of very lean beef from young virgin bulls. Even with the relatively low prices for Canadian cows, some product from Argentina and/or Brazil could be competitive with domestic product. The overall effect of Argentina and/or Brazil gaining access to the Canadian market for chilled/frozen beef on beef import volumes would be less than that of renewal of OTM trade with the US.

Another factor that could come into play over the course of the forecast period is the possibility of a drought affecting some of the major cattle production areas of Canada. Depending upon the severity and expanse of a drought, such an occurrence would lead to increased marketings of cows due to significant declines in forage supplies and carrying capacity of rangelands. Without the "safety valve" of being able to ship excess cows and cow beef to the US, all of the extra production would be forced into the domestic market with consequent negative effects on cow and cow product prices. This would lead to a decline in the need for beef imports, particularly from non-NAFTA countries. The potential timing for a drought is probably more difficult to forecast than the timing of changes in the trade policies and situation. While the first two factors described in this section would have ongoing consequences to trade from the time of inception, the effects of a drought would be more short-lived and would tend to dissipate over one to two years after the drought ended.

While there is no certainty that there would be a widespread drought during the five-year period under consideration, there is a reasonable degree of probability that one or both of the first two factors will come to fruition.

Appendix A

Example of Model Output: Utility Cows

	<u>1</u>		<u>2</u>		<u>3</u>		<u>4</u>	
Category:	Utility		Utility		Utility		Utility	
Live Weight:	1400 lbs		1400 lbs		1400 lbs		1400 lbs	
Slaughter Yield:	50%		50%		42%		42%	
Carcass shrink	1%		1%		1%		1%	
Cold Carcass Weight:	693 lbs		693 lbs		582 lbs		582 lbs	
<u>Harvest of Cuts:</u>	<u>Price/lb</u>	<u>Boxed</u>	<u>Boxed</u>		<u>Boxed</u>		<u>Boxed</u>	
Boneless 85s	\$1.45							
Inside Rounds	\$1.95	100%	50%		100%		50%	
Outside Flats	\$1.60	100%	50%		100%		50%	
Peeled Knuckles	\$1.95	100%	50%		100%		50%	
Eyes of Round	\$1.90	100%	50%		100%		50%	
Tri Tips	\$2.10	100%	50%		100%		50%	
Top Butts	\$1.75	100%	67%		100%		67%	
Strip Loins	\$2.20	100%	100%		100%		100%	
Tenderloins	\$5.35	100%	100%		100%		100%	
Flank Steaks	\$2.10	100%	100%		100%		100%	
Chuck Tenders	\$1.65	100%	50%		100%		50%	
Rib Eyes	\$2.20	100%	75%		100%		75%	
60 Trim	\$1.28							
Carcass Cutout	\$1.1619 /lb		\$1.1276 /lb		\$1.1619 /lb		\$1.1276 /lb	
Meat value	\$805.21 /head		\$781.41 /head		\$676.38 /head		\$656.38 /head	
Difference			(\$23.80) /head		(\$128.83) /head		(\$148.82) /head	

Appendix B

Example of Model Output: Canner/Cutter Cows

	<u>5</u>		<u>6</u>		<u>7</u>		<u>8</u>		<u>9</u>	
Category:	Canner/Cutter		Canner/Cutter		Canner/Cutter		Canner/Cutter		Canner/Cutter	
Live Weight:	1400 lbs		1400 lbs		1400 lbs		1400 lbs		1400 lbs	
Slaughter Yield:	43%		43%		34%		34%		34%	
Carcass Shrink	1%		1%		1%		1%		1%	
Cold Carcass Weight:	596 lbs		596 lbs		471 lbs		471 lbs		471 lbs	
<u>Harvest of Cuts:</u>	<u>Price/lb</u>	<u>Boxed</u>	<u>Boxed</u>	<u>Boxed</u>	<u>Boxed</u>	<u>Boxed</u>	<u>Boxed</u>	<u>Boxed</u>	<u>Boxed</u>	<u>Boxed</u>
Boneless 85s	\$1.45									
Denuded insides	\$2.35	100%	100%	100%	100%	100%	100%	100%	0%	0%
Denuded flats & eyes	\$2.10	100%	100%	100%	100%	100%	100%	100%	0%	0%
Knuckle	\$1.95	100%	33%	100%	100%	33%	100%	33%	0%	0%
Top butt	\$1.75	100%	25%	100%	100%	25%	100%	25%	0%	0%
Strip loin	\$3.00	100%	25%	100%	100%	25%	100%	25%	0%	0%
Tenderloin	\$4.00	100%	100%	100%	100%	100%	100%	100%	100%	100%
Flank Steak	\$2.00	100%	100%	100%	100%	100%	100%	100%	0%	0%
Chuck Tender	\$1.50	100%	25%	100%	100%	25%	100%	25%	0%	0%
Rib eye	\$2.00	100%	33%	100%	100%	33%	100%	33%	0%	0%
60s	\$1.28									
Carcass Cutout	\$1.1412 /lb		\$1.1018 /lb		\$1.1412 /lb		\$1.1018 /lb		\$1.0582 /lb	
Meat value	\$680.12 /head		\$656.64 /head		\$537.77 /head		\$519.20 /head		\$498.65 /head	
Difference			(\$23.48) /head		(\$142.35) /head		(\$160.92) /head		(\$181.47) /head	
Difference from Utility	(\$125.09) /head		(\$148.57) /head		(\$267.44) /head		(\$286.01) /head		(\$306.56) /head	