FEASIBILITY ASSESSMENT OF CANADIAN WHOLESALE BEEF MARKET REPORTING

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EXECUTIVE SUMMARY

Canadian boxed beef reporting was discontinued in March 2020. Canfax sustained voluntary reporting with packer support for over 15 years. Confidentiality concerns, which persisted for years, and COVID-19 related disruptions were preclusions identified by Canadian beef packers which ultimately led them to cease the reporting of beef trade. Even before the reporting series was suspended in March 2020, multiple wholesale beef products frequently did not have a published weekly price quote available, and when price quotes were released, a low percentage volume of trade was represented. The main purpose of this research report was to outline options for consideration and suggestions that may help restore and improve Canadian wholesale beef market reporting.

Overall, this study concludes that multiple adjustments to the Canadian wholesale beef market information reporting system are worthy of consideration. Assessing the economic tradeoffs of moving from a voluntary reporting system to a mandatory reporting system is beyond the scope of this study. However, simply mandating the current reporting system will not be sufficient to alleviate current concerns. Rather, additional adjustments must be considered whether wholesale beef market information reporting in Canada is reinstated as voluntary or switches to mandatory status upon resumption.

Reduced beef price reporting by packers was likely due in part to evolving industry practices that did not match products included in the Canadian Boxed Beef Report. In particular, more beef was being traded in forms that were either not reported or not reportable (e.g., case ready, branded, or frozen); transacted through formula pricing or forward contracts well in advance of delivery (beyond 21 days); or destined for export markets which are generally excluded from Canadian Boxed Beef Reports. **If the goal of the Canadian Boxed Beef Report is to summarize prices and quantities representative of the Canadian wholesale beef market, then our recommendation is to create a Canadian Comprehensive Boxed Beef Report.** Such a report would be akin to the *National Comprehensive Boxed Beef Cutout - All Fed Steer/Heifer Sales* report under Livestock Mandatory Reporting (LMR) in the United States.

Another adjustment we suggest is adding beef sales destined for United States or Mexico, beyond the few items (i.e., trim, etc.) that are already included, to the Canadian Boxed Beef Report. Even if only sales that met the customary criteria of the report are included this may add sufficient volume to elevate confidence in reported prices and enable more published information to meet confidentiality guidelines. Along these same lines, adding all sales methods (negotiated 0-21 day delivery, negotiated 22 day and up delivery, formula, and forward contract), delivery periods (0-21, 22-60, 61-90, and 91 days and up), and branded products would notably increase volume and provide additional transparency. In addition, if beef × dairy crossbred cattle production continues to increase, including beef products derived from these cattle in beef market reports is advised.

Other approaches like aggregating across categories or over time, computing price indices, and supplementing Canadian voluntarily reported information with U.S. LMR data may increase the

ability to publish some items at times, however, this is likely not a long-term solution. Canadian wholesale beef market information reporting is thin and reporting frequency has worsened over time. Several avenues for increasing reporting of wholesale beef market information by packers are possible including packers and government sharing the costs of participating in the program and assurance contracts to persuade reporting. **A mandatory reporting system should be considered as a potential component of a larger framework of strategies to reinstate and improve the Canadian wholesale beef market information reporting system.** Mandatory price reporting in the United States initially faced divergent opinions by various stakeholders. Over time incremental costs to comply have become inconsequential and the confidence in representativeness and associated value of published market information from LMR has become apparent.

Net benefits to cattle producers, beef packers, and beef buyers of having a trusted and reliable wholesale beef market information reporting system must be routinely evaluated and adjustments made to optimize its value. Accordingly, this project is far from resolving the issue of wholesale beef market information reporting in Canada. Rather, this report aims to enhance ongoing discussions on the subject to further ensure an improved system can be identified, developed, and implemented to best serve the Canadian beef industry.

CHAPTER 1: INTRODUCTION AND OBJECTIVES

1.1. INTRODUCTION

Market reporting is the mechanism utilized to report prices and quantities after transactions have been completed between buyers and sellers. To the extent that the price discovery process functions efficiently within a market, the market reporting system plays an important role to insure accurate and timely communication between buyers and sellers (Lawrence, Shaffer, and Hayenga, 1996). Easily accessible and accurate market information can speed up the process for identifying prices that equate supply and demand, as better information about prices paid in similar transactions leads to faster convergence of market-clearing prices. In addition, accurate, reliable market information reduces risk and pricing errors, or pricing inaccuracy. Easily accessible and accurate market information also provides important market signals, such as value differences, which guide subsequent production and marketing decisions, giving producers incentives to produce what buyers want (Perry et al., 2005; Parcell, Schroeder, and Tonsor, 2009). In other words, the efficiency of a market in discovering price is affected by the information available to market participants (Ward, 1987).

At any point in time, cattle and beef supply and demand are unobservable and unknown. Therefore, market participants rely on market information to efficiently discover prices (Schroeder and Ward, 2006). While the Canadian fed cattle market and information reporting has been studied (Rude and Carlberg, 2006, Schroeder and Ward, 2006; Rude, Carlberg, and Pellow, 2007; Ward, Carlberg, and Brocklebank, 2007; Schulz, Schroeder, and Ward, 2011), there has been less focus on the Canadian wholesale beef market. The boxed beef value, which reflects the composite value that packers receive from grocers, restaurants, further processors, and others at the wholesale level for individual cuts of beef, reflects wholesale market price discovery. Cattle producers and retailers track published boxed beef reports to monitor how well product is moving and to better inform negotiations with packers. Packers also monitor beef market reports and use them as a benchmark in gauging their performance relative to others in the industry.

Canadian boxed beef market information reporting stopped in March 2020 causing frustration and disappointment across industry.[1] Canfax Research Services (henceforth Canfax) had sustained voluntary price reporting with packer support for over 15 years. The lack of public reports elevates costs of collecting market intelligence for firms engaged in the Canadian cattle and beef markets. Uninformed parties in a transaction face a significant risk of receiving or paying a price that is not representative of market conditions. Because of the imbalance in market concentration between many decentralized cattle producers and a few large beef packers, beef packers naturally possess much more market information than do individual cattle producers. Therefore, market transparency has the added benefit of partially counter-balancing market power (Schroeder and Ward, 2006). As a result of these concerns, industry

[1] https://www.ontariobeef.com/policy-issues/resolution/21-14

participants and observers have suggested that moving to a mandatory wholesale beef market information reporting system in Canada might reduce problems associated with past voluntary reporting and be a means of restoring reporting. Others recognize the importance of beef market information reporting but have concerns with a mandatory approach. One particular concern relates to how a mandatory approach could be enforced. Opponents of mandating reporting have encouraged industry to explore alternative options for reporting and publishing of Canadian beef market information.

It is understood that the Canadian beef market is different from the United States when it comes to market information reporting. For instance, while either an enhanced voluntary or a mandatory approach could be used to improve reporting, a voluntary approach may be more acceptable, socially and politically, in Canada. Maintaining price discovery in Canada, and not relying solely on another market (i.e., the United States), is a priority. Furthermore, confidentiality of information has been an ongoing issue in Canada as there are a limited number of players at the packing and processing stage of production. Nonetheless, much can be learned from the United States' tribulations and successes in wholesale beef market information reporting.

1.2. OBJECTIVES AND PROCEDURES

The main purpose of this study is to outline options for consideration and suggestions that may help restore and improve Canadian wholesale beef market reporting. Schroeder and Ward (2006) indicate that to be effective, market information must be timely, relevant, accurate, reliable, representative, complete and comprehensive, accessible and widely disseminated, easy to interpret, and utilized by market participants. These core factors along with requirements for data confidentiality are focal points of consideration throughout the study.

Particular objectives include:

1. To document what information (prior to March 2020) was being reported by Canadian packers about beef transactions and how this data was being summarized and published by Canfax. This objective includes assessing changes in confidentiality constraints as well as the quantity and quality of market information over time.

2. To provide a comprehensive account of the motivation for, implementation of, and changes to the Livestock Mandatory Reporting (LMR) program for beef in the United States. This objective includes providing a detailed guide to LMR beef reports.

3. To explore alternative ways to possibly aggregate reported data to enable Canfax to summarize and publish market information while not disclosing confidential information of market participants, maintaining information integrity, and meeting the needs of producers and industry.

To accomplish Objective 1, we first met virtually with Canfax staff to review details of the data, discuss project plans, and obtain needed data. Statistical analyses of the data was used to

assess changes in the quantity and quality of market information over time. We also assessed how confidentiality guidelines impacted consistency of reporting market information. This baseline analysis served as a benchmark for understanding how alternative approaches to market information reporting, summarizing, and publishing of data might impact price discovery.

Structural changes in Canadian beef markets and marketing methods tend to parallel what has happened in the United States. Therefore, a background on the LMR system is useful for understanding challenges and opportunities available for reinstating reporting of Canadian wholesale beef market information. LMR market reports provide valuable information on price and quantity trends, supply and demand conditions, and various sales methods used in the industry while protecting confidentiality of proprietary transactions. Definitions of the various terms are important for interpreting and utilizing the reports. In addition, the various reports cover different time periods, types of beef, and marketing methods. Meeting Objective 2 involves helping beef market information users understand intricacies of LMR-type data and how to get the most benefit from the wealth of data available.

Multiple adjustments to the Canadian wholesale beef reporting system are worthy of consideration. Objective 3 describes alternative reporting, summarizing, and publishing approaches to achieve confidentiality and maintain quality of information available to market participants. We first analyzed aggregating wholesale beef market information across categories or over time. Then historical wholesale market data from Canfax was used to determine thinness of reporting. There may be important volume "waiting in the wings" that could be utilized in reporting and this is discussed in the context of comprehensive market information reporting as opposed to only reporting a subset of the beef trade. Of note, additional loads could be captured by adding formula and/or export trade to Canadian Boxed Beef Reports. We then discuss options of computing price indices or supplementing Canadian information with LMR information from the United States such that a "Northern America" boxed beef report could replace a standalone Canadian Boxed Beef Report.

CHAPTER 2: THE CANADIAN WHOLESALE BEEF MARKET

2.1. THE CANADIAN BOXED BEEF REPORT

Prior to 2003-2004 U.S. boxed beef cutout values, reported by the Agricultural Marketing Service (AMS) of the U.S. Department of Agriculture (USDA), converted to Canadian dollars were used to proxy the value of Canadian beef carcasses. This was a viable measure due to integration within the North American cattle and beef industries and the availability of publically reported U.S. data. Following the closure of the U.S.-Canadian border in 2003, market integration eroded sharply (Miljkovic 2007; Rude, Carlberg, and Pellow 2007; Church and Gordon 2007) and the need for a separate Canadian boxed beef report, based on Canadian sales became apparent. Still, marketing and pricing practices in the two countries by cattle

feeders and meat packers both before and after the border closing were similar (Ward, Carlberg, and Brocklebank 2007).

The Canadian Boxed Beef model was originally developed in 2003-2004. Canfax worked in collaboration with Canadian beef packing plants and the Canadian Meat Council to collect and compile the appropriate information for the boxed beef report. Individual weighted average beef prices were provided by Agriculture and Agri-Food Canada (AAFC) who collected data weekly from domestic packers whom voluntarily reported. Cutout model yields were maintained by Canfax who published the weekly Canadian Boxed Beef Report.[2] This report was a useful tool for industry in monitoring beef prices, tracking vertical sector price spreads (i.e., farm gate to wholesale, wholesale to retail, and farm gate to retail), observing seasonality trends, and equating boxed beef prices to live animal equivalents (Canfax, 2008).

The Canadian Boxed Beef model and report was reviewed and modified several times, since its inception, to ensure the values generated accurately reflected contemporary compositions and market realities (Canfax, 2010). Of note, a revised boxed beef model was implemented starting week ending July 2, 2010. Beginning in July 2005 the Canadian boxed beef cutout was at a premium to the U.S. boxed beef cutout, converted to Canadian dollars, for a majority of the time. This triggered a review of the Canadian boxed beef model and report and subsequently a modification, where necessary, to ensure cutout values generated accurately reflected current cutout compositions and market realities. The Canadian Boxed Beef model had placed too much weight on higher priced middle meats, thereby, inflating the cutout value by approximately $10 per pound. In addition, a dozen cuts were added to the Canadian Boxed Beef report and primal yields were updated to be consistent with U.S. boxed beef reporting.

In addition to publishing information on individual beef products, Canfax calculated values for seven major beef primals (chuck, rib, loin, round, brisket, short plate, flank) that were released in weekly reports. Moreover, Canfax calculated a Canadian AAA carcass cutout and Canadian AA carcass cutout from primal prices. Price comparisons to U.S. equivalent cuts, primals, and carcass cutouts were provided.[3] The U.S. Department of Agriculture, Agricultural Marketing Service report used was the *National Weekly Boxed Beef Cutout And Boxed Beef Cuts - Negotiated Sales* (LM_XB459). Because the United States is Canada's largest competitor in the production of grain-fed beef, being able to compare cutout values is valuable to evaluate competitiveness and industry performance.

[2] The Canadian Boxed Beef report was first available on the Canfax website on October 6, 2003 (Canfax, 2008). Historical weekly reports currently available on the Canfax website date back to week ending January 1, 2016—https://www.canfax.ca/resources/reports/boxed-beef-reports/canadian-boxed-beef-report-historical.html.

[3] Canadian and U.S. cutout values are not exactly comparable simply by adjusting for the exchange rate. The hanging tender, kidney, and KPH (kidney, pelvic, and heart fat) are included in the U.S. cutout value but are excluded in the Canadian cutout. A formula was proposed (Canfax, 2010) to convert the Canadian cutout to U.S. equivalents in Canadian dollars but, unfortunately, data did not become available for the Canadian hanging tender, kidney and KPH drop credit to be calculated (personal communication, Brenna Grant, Manager of Canfax).

Canfax (2018) provides a detailed summary of the report along with the lastly used cutting yields and example calculations. Reported prices and volumes met the following criteria:

- Sales are negotiated with delivery to the domestic market within 0-21 days.
- Canadian sales only; except "*" indicates all sales, on items including export volumes.
- Prices are quoted in Canadian dollars per pound.
- Beef cut items are from non-dairy bred steer and heifer beef.
- Cut items are no older than 14 days from the date of manufacture and are limited to AAA and AA grades.[4]
- Branded product (Certified Angus Beef, Canada Gold, etc.) are excluded.
- Ground beef and beef trimmings are from both dairy bred and non-dairy bred steer/heifer beef and are no older than 7 days from the time of manufacture.
- Prices are quoted FOB the plant (delivery price minus freight cost).
- Total load counts include AAA and AA grades. One load equals 40,000 pounds.

Canadian boxed beef reporting was discontinued in March 2020. The last report was for the week ending Friday, March 20, 2020. Appendix A.1 provides the final published report. Confidentiality concerns, which had persisted for years, and COVID-19 related disruptions were preclusions identified by Canadian beef packers which ultimately led them to cease reporting of beef trade (personal communication, Brenna Grant, Manager of Canfax). Even before the reporting series was suspended in March 2020, multiple wholesale beef products frequently did not have a published weekly price quote available, and when price quotes were released, a low percentage volume of trade was represented.

2.2. CANADIAN BEEF PACKING PLANTS AND ESTABLISHMENTS

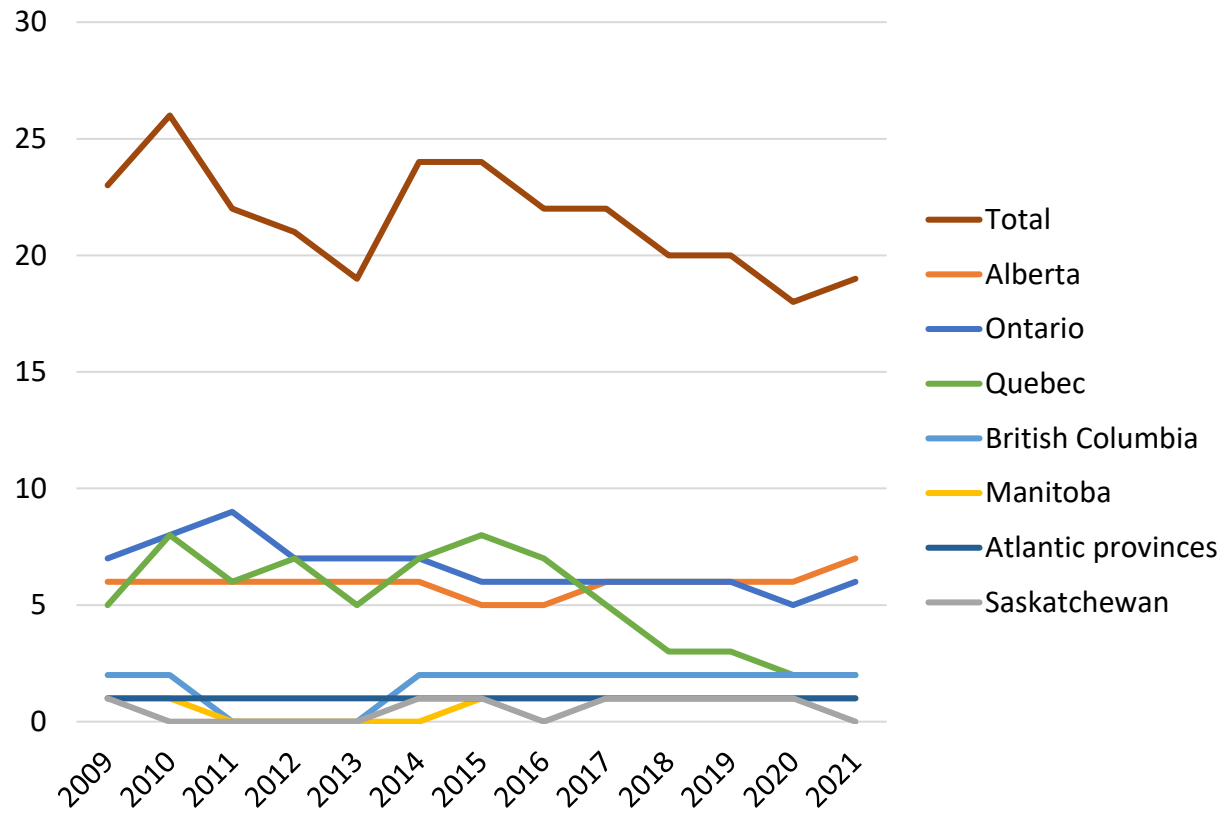
There were 19 cattle slaughter plants in Canada operating under Federal Inspection (FI) in 2021 (Canadian Food Inspection Agency, 2021a). This was an increase of one plant from 2020 but down from 26 plants in 2010 and 24 plants in 2014 and 2015 (Figure 2.2.1). Quebec has seen the largest decline in the number of FI cattle slaughter plants having eight plants in 2010 and 2015 and only two plants operating by 2021. Alberta added one plant in 2021 while Saskatchewan is down from one FI cattle slaughter plant in recent years to zero in 2021. The last full year of consistent FI cattle slaughter in Saskatchewan was 2008 at the XL Foods

[4] The Canadian beef grading system follows standards overseen by the Government of Canada based on industry and government recommendations. The Canadian Beef Grading Agency, a private, non-profit corporation, is accredited by the Canadian Food Inspection Agency to deliver grading services for beef in Canada. Trained graders visually assess the whole carcass based on several criteria and assign a grade. While the grading system is voluntary, virtually all fed beef carcasses processed commercially in Canada are graded. All carcasses graded Canada A, AAA, or AAA receive both a quality grade and a yield grade. The common quality grade specifications for Canada A, AAA, or AAA include youthful maturity (age), good to excellent muscling with some deficiencies, firm and bright red ribeye muscle, firm and white or amber fat color and texture, and 2 millimeters (mm) or more of fat measure. Canada A, AA, and AAA grades differ by the amount of marbling where A has trace marbling, AA has slight marbling, and AAA has small marbling. In 2021, the Canada A, AA and AAA grades together represented 98.4% of all graded beef from fed slaughter cattle in Canada. The U.S. equivalent grades for Canada AAA, AA and A are USDA Choice, Select, and Standard, respectively (Beef Cattle Research Council, 2022).

operation in Moose Jaw. That year FI cattle slaughter was less than 250,000 head of which over half was cows and bulls (Van Solkema and Grier, 2022). That plant stopped operations in April 2009 (Canadian Food Inspection Agency, 2021a). Since that time, there has been sporadic, very short periods, and a small volume of FI cattle slaughter in the province. However, the Government of Saskatchewan has set a goal in the provincial growth plan to double meat processing and animal feed value-added revenue to more than $1 billion by 2030 (Van Solkema and Grier, 2022).

Cattle slaughter includes steers, heifers, cows, and bulls but excludes calf slaughter. Beef from cattle slaughtered and processed under FI can be sold between provinces and exported internationally. According to the Canadian Beef Grading Agency, fed steer and heifer slaughter amounted to 86% of total FI cattle slaughter in 2021 while non-fed cows, both dairy and beef, and some bulls comprised 14%. Canadian FI cattle slaughter plants, even the largest ones, typically slaughter both fed and non-fed cattle (Serecon Inc. with Kevin Grier Consulting, 2019; Canfax, 2021). This is not a common practice in the United States where normally plants are dedicated to either steers and heifers or cows and bulls. Some Canadian cattle slaughter plants may specialize, or prefer, processing fed cattle but may still procure non-fed cattle to fill existing market obligations, especially when the supply of fed cattle is tight and prices are high. Conversely, these plants likely reduce non-fed cattle slaughter when cattle supplies increase and prices moderate.

Figure 2.2.1. Number of Canadian FI Cattle Slaughter Plants



Source: CFIA. Compiled by AAFC, Animal industry division, Market information section.

Federally-inspected cattle slaughter is predominantly in western Canada, specifically Alberta, where most of the cattle finishing capacity is located. Figure 2.2.2 shows January 1, 2022 total cattle inventory by province, FI cattle slaughter plant locations, and sizes of plants. The seven plants in Alberta, the two plants in British Columbia, and the one plant in Manitoba accounted for 79% of cattle slaughter in FI plants in 2021 (Canadian Beef Grading Agency, 2022). The six plants in Ontario accounted for 19% of the FI cattle slaughter volume. The remaining 2% was distributed across the two plants in Quebec and the one plant in Prince Edward Island.

A beef packer buys cattle for slaughter, manufactures or prepares beef or beef products for sale or shipment, or markets beef, beef products, or cattle products in an unmanufactured form, acting as a wholesale broker, dealer, or distributor.[5] A packer may have multiple plants. According to the Canadian Food Inspection Agency (2021b), 91% of the total cattle slaughtered under FI in Canada were by the four largest establishments (companies or firms) in 2021.[6] In each particular region this is all, or almost all, of the FI cattle—British Columbia/Alberta (99%), Saskatchewan/Manitoba (100%), Ontario (99%), and Quebec (100%). These shares have been relatively consistent over at least the last decade. However, these four firm calculations are somewhat misleading as there are only two major firms. Accordingly, approximately 84% of the total FI cattle slaughtered in Canada were by the two largest establishments, and three largest plants, in 2021.[7] This declined from 91%, 87%, and 89% in 2018, 2019, and 2020, respectively. Table 2.2.1 lists Canada's 19 FI cattle plants by province, their company name, slaughter type, and estimated weekly slaughter capacity.

The Cargill Ltd. plant in High River, Alberta and the JBS Food Canada Inc. plant in Brooks, Alberta dominate Canadian beef packing, each with a slaughter capacity of about 22,000 head per week (Serecon Inc. with Kevin Grier Consulting, 2019; Canfax, 2021).[8] A second size tier consists of the Cargill Ltd. Guelph, Ontario plant which has a weekly capacity of about 9,000 head and the smaller Harmony Beef Company Ltd. plant (Balzac, Alberta) that has a capacity of roughly 3,750 head per week. **For a frame of reference, these four packing plants, and three**

[5] https://www.ams.usda.gov/rules-regulations/packers-and-stockyards-act/regulated-entities/packer

[6] The four-firm concentration ratio (CR4), the combined market share of the four largest firms, is one common measure of how economically concentrated an industry or market is (Ward, 2010). For example, in 1977, the largest four beef-packing firms controlled 25% of U.S. steer and heifer slaughter, compared to 85% in 2019 (The White House, 2021; Federal Register, 2022; NAMI, 2022). The combined market share of the four largest steer and heifer slaughterers remained stable between 83% and 85% from 2010 to 2019 and dropped to 81% in 2020 (Federal Register, 2022). The North American Meat Institute (2022) suggests some clarification is needed because when factoring in non-fed cattle (cow and bull) slaughter plants they own; the four largest beef packers represent about 70% of total U.S. beef production.

[7] Estimated weekly slaughter capacity (Canfax, 2021; Canadian Food Inspection Agency, 2021a) of the two largest establishments (three largest plants) was multiplied by 51 weeks to provide an annual slaughter estimate of 2,728,500 head. According to data compiled by Agriculture and Agri-Food Canada, from the Canadian Beef Grading Agency, the number of cattle slaughtered in FI establishments in Canada was 3,258,879 in 2021, 3,057,511 in 2020, 3,149,503 in 2019, and 3,011,107 in 2018.

[8] Multinational beef packers treat their Canadian plants as part of a larger network that requires management to use Canadian-sourced cattle in ways that complement and coordinate but not necessarily compete with their U.S. based plants (Rude, Harrison, and Carlberg, 2010).

firms would be the only Canadian plants required to report boxed beef trade under the LMR program if they were located in the United States.[9]

A third size tier of Canadian packers includes the companies and plants of St. Helen's Meat Packers Ltd. (2,000 head per week) and TruHarvest Meats Inc. (1,500 head per week) in Toronto, Ontario, True North Foods (1,000 head per week) in Carman, Manitoba, and Bouvry Export Co. Ltd. (1,000 head per week) in Fort McLeod, Alberta.[10] A feasibility study completed in 2022, commissioned by the Saskatchewan Stock Growers Association, indicated that with the right marketing strategies and plant management, a facility harvesting between 500 and 1,000 head of cattle per day could be commercially viable in Saskatchewan (Van Solkema and Grier, 2022).

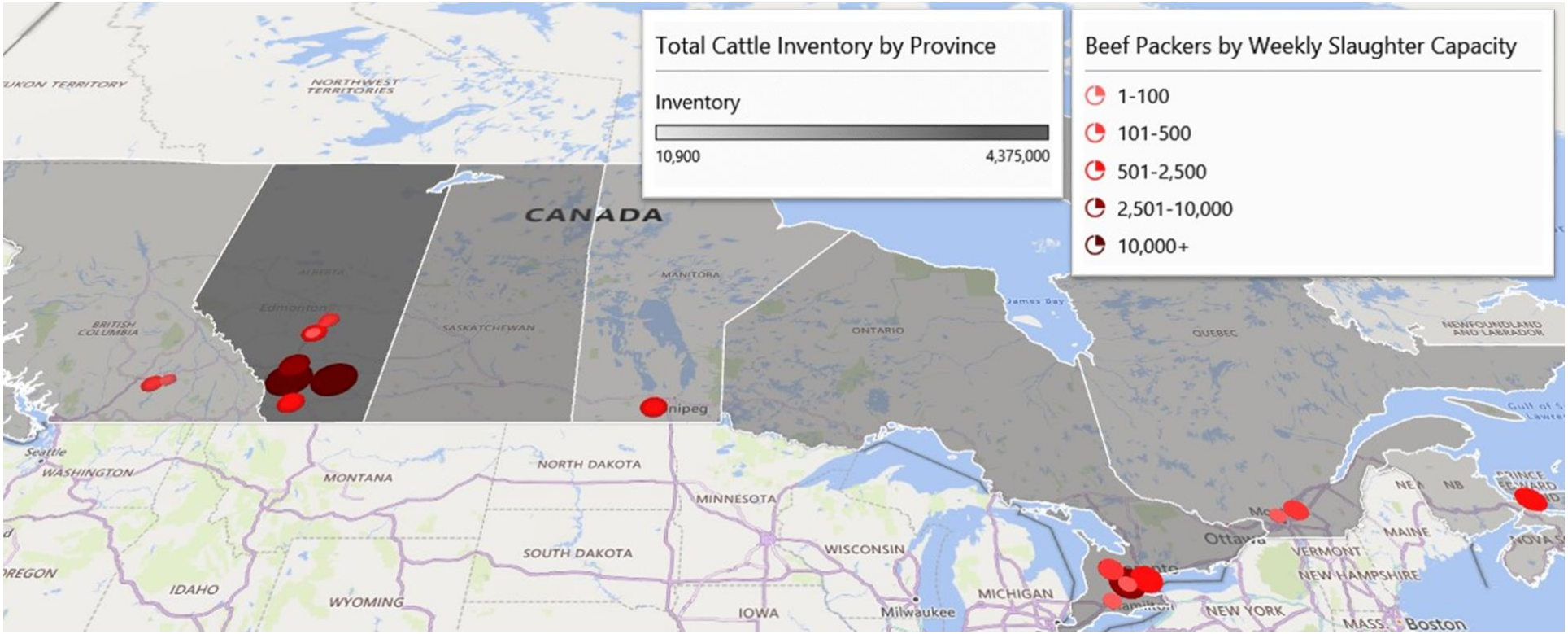
There are a number of regional FI packers that may each slaughter between 20 and 650 head of cattle per week (Table 2.2.1). In addition, Canada has hundreds of provincially inspected beef processors, but they only processed 5% (141,850 head) of the total fed cattle and 6% (197,187) of the total cattle in 2021 (Canadian Beef Grading Agency, 2022). Assuming 51 slaughter weeks per year this amounts to 2,781 head of fed cattle or 3,866 head of total cattle per week. Recent work has looked at the feasibility of small local meatpacking plants in Canada with little evidence that a less concentrated, more geographically dispersed sector would perform better (Rude, 2020). In addition, they indicated that most small start-ups would at least initially be provincially regulated because of the expense and complex process of becoming federally regulated.

Federally inspected facilities processed, on average, 54,728 head of fed cattle per week in 2021. This was up 5.9% from 2020 and the largest since 2005. Canadian cattle slaughter has a seasonal pattern and can exhibit notable week-to-week variability. For example, in 2021, weekly Canadian FI fed cattle slaughter had a coefficient of variation of 10.5% whereas weekly U.S FI fed cattle slaughter had a coefficient of variation of 6.5% demonstrating that Canadian slaughter volumes are nearly twice as variable relative to the average volume in each country. **The highly concentrated nature of the Canadian beef packing industry plus the composition (fed and non-fed at individual plants) and variability of slaughter challenges wholesale beef market reporting.**

[9] Under the LMR Act of 1999 in the United States, packers who annually process more than 125,000 cattle are required to report details of all transactions involving cattle and the details of all transactions involving domestic and export sales of boxed beef cuts. Distributors, grinders, exporters, etc. who do not slaughter, do not submit LMR sales data.

[10] St. Helen's Meat Packers Ltd. and TruHarvest Meats Inc. slaughter cattle and calves and Bouvry Export Co. Ltd. slaughters cattle, bison, and horses (Canfax, 2021).

Figure 2.2.2. Estimated 2022 Total Cattle Density by Province and Canadian Federally-Inspected Beef Packing Plant Locations and Size



Source: Author's calculations from a compilation of data including Canfax (2021) and the Canadian Food Inspection Agency (2021a).

Table 2.2.1. Canadian Federally-Inspected Cattle Slaughter Plants, 2021

Province	Company name	Slaughter type	Estimated Weekly Slaughter Capacity	Average Slaughter (Top 4 Establishments)
British Columbia	Lambert Creek Organic Meats Ltd.	Steers & Heifers	50	286,090 (99%)
British Columbia	KML Meat Processed Limited	Steers, Heifers, Cows, & Bulls	250	
Alberta	Lacombe Research and Development Centre	Steers, Heifers, Cows, Bulls, Bison, Elk, & Hogs	20	
Alberta	Bouvry Export Co. Ltd.	Steers, Heifers, Cows, Bulls, Bison, & Horses	1,000	
Alberta	Canadian Premium Meats Inc.	Steers, Cows, Bulls, Bison, & Elk	650	
Alberta	Cargill Meat Solutions	Steers, Heifers, & Cows	22,000	
Alberta	Harmony Beef Company Ltd.	Steers & Heifers	3,750	
Alberta	JBS Food Canada Inc.	Steers, Heifers, Cows, & Bulls	22,500	
Alberta	Prairie Farm Food Inc.	Pork, Beef, & Bison	N/A	
Manitoba	True North Foods	Steers, Heifers, Cows, & Bulls	1,000	N/A (100%)
Ontario	Cargill Meat Solutions/Guelph	Steers, Heifers, & Cows	9,000	101,643 (99%)
Ontario	F.G.O. Organic Processing Ltd.	Hogs, Lamb, & Beef	20	
Ontario	Kinder Foods	Steers, Heifers, Cows, & Bulls	250	
Ontario	St. Helen's Meat Packers Ltd.	Steers, Heifers, Cows, Bulls, & Calves	2,000	
Ontario	TruHarvest Meats Inc.	Steers, Heifers, & Calves	1,500	
Ontario	University of Guelph	Steers, Heifers, Cows, Bulls, & Calves	20	
Quebec	Abattoir Jacques Forget Ltee	Steers, Heifers, Cows, & Calves	50	N/A (100%)
Quebec	Viande Richelieu Inc.	Steers, Heifers, Cows, & Bulls	400	
Atlantic provinces	Atlantic Beef Products Inc.	Steers, Heifers, Cows, & Bulls	600	N/A (N/A)

Source: Canfax (2021); Canadian Food Inspection Agency (2021a).

Notes: N/A—Not available due to confidentiality or unable to obtain. Average Slaughter—Average number of cattle slaughtered per establishment per year. Top 4 Establishments—Percent of total federally inspected cattle slaughtered by the four largest establishments (companies) in that province/region.

2.3. PRODUCTION REPRESENTED BY CANADIAN BOXED BEEF REPORT

The Canadian Boxed Beef Report contains the total load count for a week which is the summation of Canadian AAA and AA grades. This load count total, converted to pounds (one load equals 40,000 pounds), can be compared to the weekly pounds of Canadian FI fed cattle production to provide an indication of the volume of fed beef production represented in the Canadian Boxed Beef Report. Recall, the boxed beef load count volume includes negotiated sales with delivery to the Canadian market within 0-21 days, AAA and AA grades only, and excludes dairy breed steer and heifer beef and branded products.

For the period week ending May 30, 2008 through week ending March 20, 2020 the boxed beef volume has averaged 28.1% of FI fed beef production (Figure 2.3.1).[11] **The cutout volume represented over 30% of fed beef production during 2008-2014 and began a precipitous decline and was just over 10% before it ceased being reported in March 2020**. This was despite beef production increasing during the 2015-2020 period. There were a few very large weekly load counts reported in 2013 and 2015, especially relative to weekly fed beef production.[12] One explanation for these outliers could be that a packing plant, or plants, reported more transactions than met the specified criteria (personal communication, Brenna Grant, Manager of Canfax).[13] This could have consisted of formula or forward contract sales and/or export trade. Nevertheless, this provides some evidence, and the possible magnitude, of additional wholesale beef volume that could be conceivably, with little effort, reported by packers.

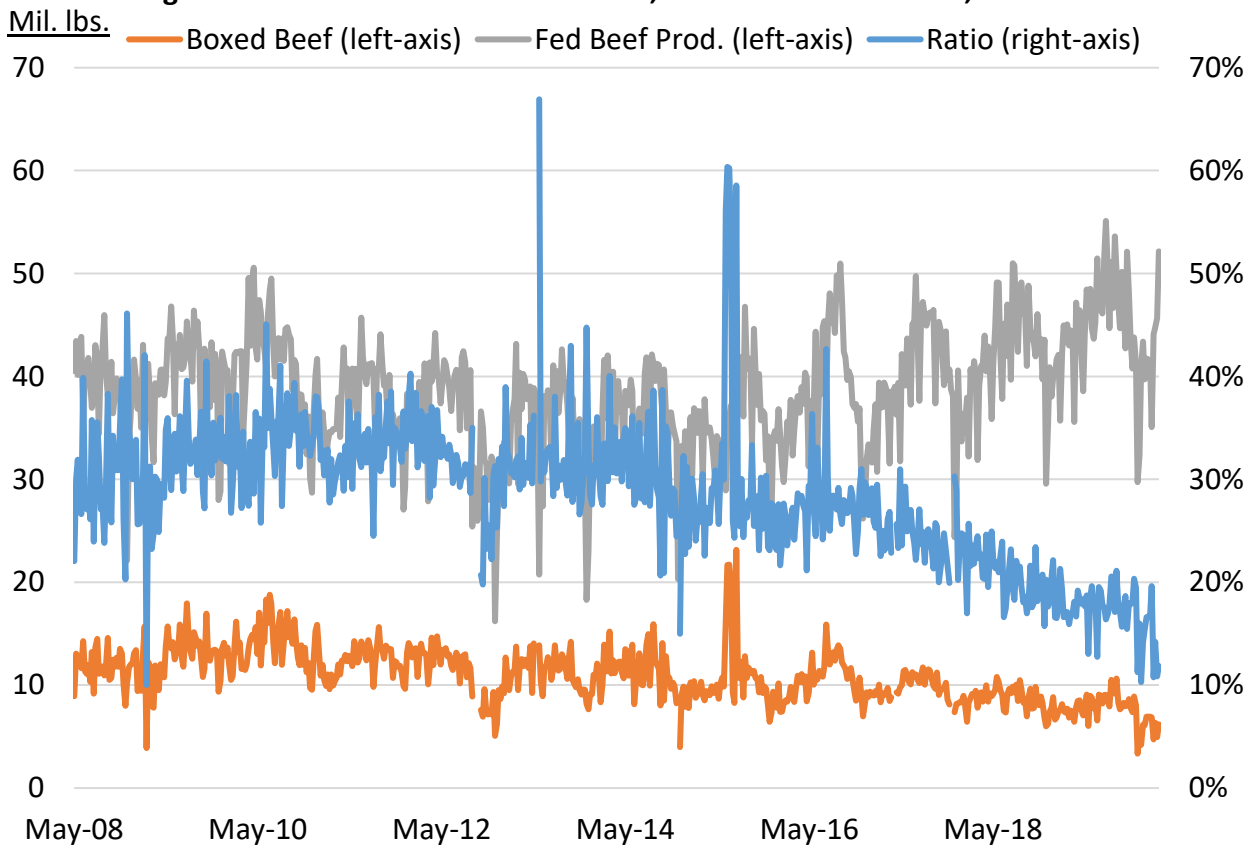
To determine, approximately, how many fed cattle were represented in the weekly Canadian Boxed Beef Report, we divide the total boxed beef pounds (total load count multiplied by 40,000 pounds) by a weighted average of steer and heifer dressed weights. Since May 2008, this weekly head count has averaged 12,755 head with a maximum of 23,411 head and a minimum of 3,804 head. During the 2008-2014 period, the average was 14,569 head while it had diminished to 9,096 head on average in 2019 and 6,511 head in during the first quarter of 2020 before the Canadian Boxed Beef Report was suspended.

[11] The Canadian Boxed Beef Report was not published for eleven week ending dates during this period. These week ending dates included 10/5/12, 10/12/12, 10/19/12, 10/26/12, 6/7/13, 6/14/13, 12/26/14, 4/28/17, 5/5/17, 12/15/17, and 12/22/17. Gaps in reporting were due to not meeting confidentiality requirements. That occurred when staff was on holidays or when trade was so thin that packers did not report.

[12] The week ending dates included June 21, 2013; July 3, 2015; July 10, 2015; July 17, 2015; July 24, 2015; and August 4, 2015.

[13] Packers were responsible to sort for negotiated sales 0-21 days out to report (personal communication, Brenna Grant, Manager of Canfax).

Figure 2.3.1. Canadian Boxed Beef Lbs., FI Fed Beef Production, and Ratio

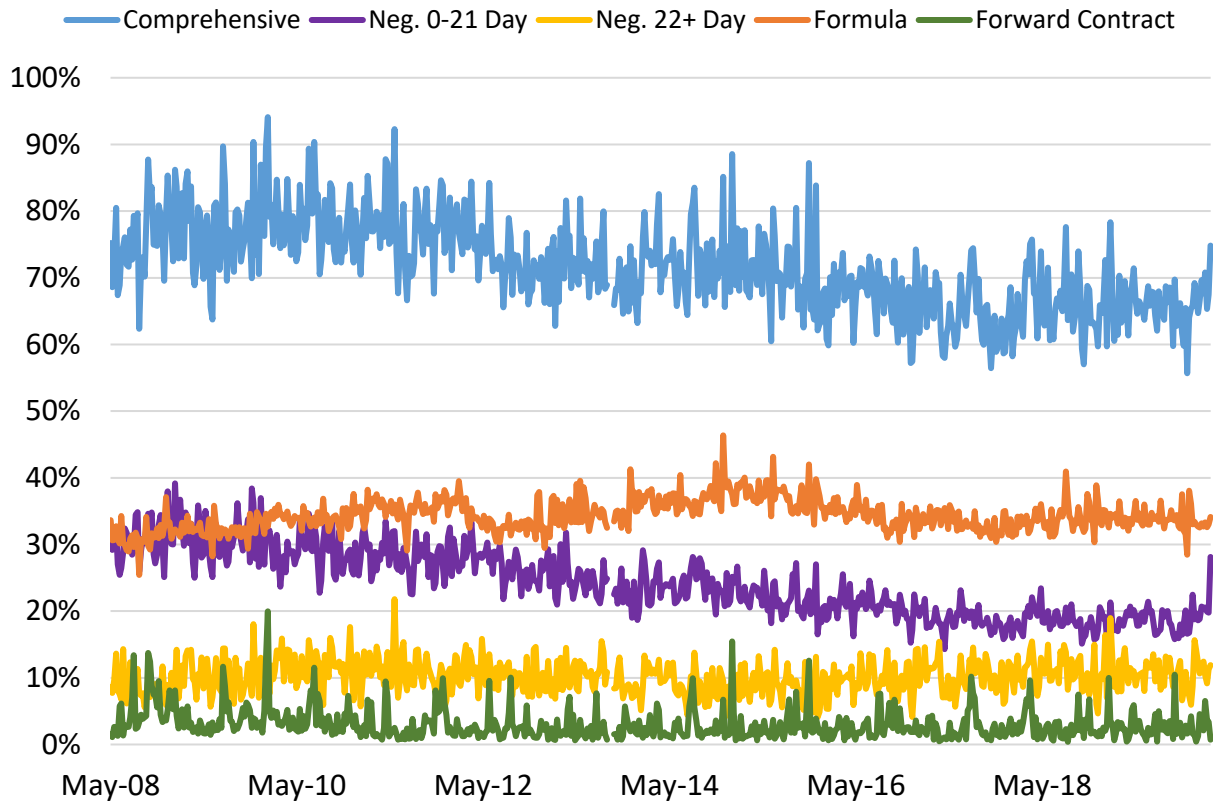


The National Comprehensive Boxed Beef Cutout – All Fed Steer/Heifer Sales (LM_XB463) published by USDA-AMS, can be used to draw comparisons for the U.S. wholesale beef market. The report includes a quality grade (prime, branded, choice, select, ungraded), sales type (negotiated for 0-21 day delivery, negotiated for 22 day delivery or longer, formula, forward contract), destination (domestic, NAFTA exports, overseas exports), and delivery period (0-21 days, 22-60 days, 61-90 days, 91 days and up) breakdown. These primal cut volumes and values are combined into a single weighted average carcass cutout equivalent. This report is released weekly.

For the week ending May 30, 2008 through week ending March 20, 2020 period, the U.S. comprehensive boxed beef load count, converted to pounds, accounted for 71.6% of U.S. FI fed beef production on average (Figure 2.3.2).[14] This share averaged 77% in 2008-2011, 70% in 2012-2018, and 66% in 2019-2020. From 2016 through March 2020 negotiated sales for 0-21 day delivery averaged 19.2% of fed beef production and negotiated sales for 22 day delivery or longer averaged 10.3%. Over this four-plus year period, formula sales accounted for 33.9% of fed beef production while forward contract sales were 2.6%.

[14] USDA-AMS publishes the pounds of FI beef production. To calculate FI fed beef production, weekly pounds of FI beef production was multiplied by the ratio of FI steer and heifer slaughter to FI cattle slaughter.

Figure 2.3.2. Ratio of U.S. Boxed Beef Lbs. to FI Fed Beef Production



Schroeder, Coffey, and Tonsor (2021) indicate that how beef packers market wholesale boxed beef influences how they prefer to purchase fed cattle. This symmetry includes several examples. If forward beef sales become more common, packers have increased incentives to likewise increase forward purchases of fed cattle. More negotiated pricing of boxed beef beyond 21 days, suggests to manage margin risk, packers will likely strive to secure purchase prices for more cattle in advance. Similarly, if boxed beef is being formula priced, this creates incentives for more fed cattle formula pricing as well since similar factors motivate this pricing method for each procurement and sales.

Given the voluntary nature of Canadian wholesale beef market reporting, it is difficult to ascertain whether the decline in reported boxed beef volume, or the share of FI fed beef production represented, is due to a decline in voluntary reporting participation by packers, a decline in trade that matches Canadian Boxed Beef Report specifications, or a combination of both. This raises concerns about representativeness of reported prices.

2.4. CONFIDENTIALITY CONSTRAINTS IN CANADIAN BOXED BEEF REPORTING

Canfax was responsible for public reporting of the Canadian wholesale beef market. The process Canfax followed was multi-faceted. The data gathering process first consisted of

information being submitted weekly by beef packers to Agriculture and Agri-Food Canada (AAFC). Participation by beef packers was entirely voluntary. Beef packers were responsible for sorting out and reporting eligible beef product quantities (load count) and average, minimum, and maximum prices from the previous week. Appendix A.2 provides a screen shot of the Microsoft Excel template that was used to submit the data.

Agriculture and Agri-Food Canada (AAFC) did not disclose sources of information. To protect beef packer identification they calculated a weighted average for each product price. They did not concern themselves with the number of packers reporting a product in a particular week. Agriculture and Agri-Food Canada (AAFC) provided Canfax with a high, low, and weighted average price for each product along with a volume (load count). Canfax imported this data into their database and if there was no high-low price range provided for a particular cut they would suppress the product price in the Canadian Boxed Beef Report. The suppressed data was still used in the primal and carcass cutout calculations.

Tables 2.4.1 through 2.4.5 summarize the number of loads reported annually by grade for individual beef products, thin meats, trim, and ground beef over the 2005-2019 period. In the Canadian Boxed Beef Report products are published by quality grade (AAA or AA) while thin meats are published as AAA/AA, trim is published as AAA & AA, and ground beef does not have a listed designation. We provide separate load count totals for each quality grade to better understand changes in reported volumes. For AAA quality grades, out of the 54 products, thin meats, trim, and ground beef, there were 10 products that had no reported load volume in 2019. This compares to the 2010-2018 period where only one to three AAA items had no reported load volume annually. Findings were similar for AA quality grade products (Table 2.4.3) while Table 2.3.4 shows that reported loads of AA quality grade thin meats, trim, and ground beef were nonexistence or very small volumes. An alternative explanation is that packers could have chosen to report data for these items all as AAA grade knowing they would be aggregated anyway when published.

While analyzing reported load volume is informative, it is also useful to consider volatility in reported load volume over time. The annual coefficient of variation (COV) in weekly reported load volume is shown in Table 2.4.5. The COV of weekly reported load volume is greater for 54 of the 83 wholesale beef products, thin meats, trim, and ground beef in the 2015-2019 period compared to the 2010-2014 period. For example, the coefficient of variation in weekly reported volume for a bone-in shortrib increased from 0.69% to 1.97% from 2010-2014 to 2015-2019. Thus, average load volume reported has declined and variation in load count represented has increased over time. **The key implication is that a smaller portion of wholesale beef trade was represented in weekly Canadian Boxed Beef Reports, and variation in how much trade was being reported by packers each week was increasing.**

Table 2.4.1. Number of AAA Loads by Product, 2005-2019

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Quebec Spec	0.0	0.0	0.0	0.0	0.02	92.4	50.7	27.7	30.3	24.4	20.9	12.8	3.3	2.3	0.4
Semi-Boneless	0.0	0.0	0.0	0.0	0.0	75.9	124.4	47.7	55.1	11.5	11.4	6.8	5.9	10.5	10.4
Short Cut shoulder clod	153.3	118.4	51.0	24.6	78.5	101.9	152.3	84.1	92.8	70.4	123.2	106.4	68.4	62.0	5.6
Clod Heart	0.0	0.0	0.0	0.0	0.0	2.4	5.2	6.6	12.1	5.9	10.3	17.2	3.4	0.0	0.0
Clod Tender	0.0	0.0	0.0	0.0	0.0	8.9	22.1	20.8	24.9	23.1	18.9	16.3	9.6	4.4	5.2
2 Piece Boneless Chuck	3.5	0.0	1.0	0.01	0.04	26.3	3.9	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
Chuck Roll	289.0	245.9	197.6	91.9	357.3	496.3	560.5	579.1	655.3	573.4	308.1	170.5	74.9	110.3	164.6
Chuck Roll 0x0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.5	0.5	0.5	0.5	0.3	0.0
Oven Ready Rib	38.4	26.4	30.5	37.5	27.4	8.9	24.6	10.5	6.6	14.6	26.4	24.2	6.8	1.8	1.1
Bone-in Lipon Ribeye 17 up	140.5	148.6	111.8	155.2	255.0	342.6	286.0	267.9	252.3	299.3	114.9	267.7	23.3	0.3	0.0
Bone-in Lipon Ribeye 17 dn	12.8	7.4	6.0	6.6	11.1	14.5	16.1	14.2	18.5	48.1	213.9	79.6	155.0	208.8	135.0
Boneless Lipon Ribeye 14 up	166.2	123.0	82.2	67.5	46.7	34.0	17.9	27.5	21.8	30.9	40.8	79.5	28.8	20.2	16.8
Boneless Lipon Ribeye 14 dn	27.3	16.3	15.2	11.1	10.7	22.4	18.2	12.6	8.9	9.2	8.4	1.3	0.5	0.3	0.0
Back Ribs	1.0	0.0	2.4	0.0	0.1	0.5	7.4	3.7	1.5	1.2	1.0	0.6	0.6	0.5	0.3
Short Loin 1x0	75.8	43.5	23.3	34.9	68.8	70.8	42.8	19.9	8.8	39.6	36.6	54.7	27.5	35.8	39.1
Striploin 0x1 13up	230.2	239.9	194.5	229.2	262.7	310.5	325.8	323.4	304.7	347.1	373.9	414.8	318.3	398.0	440.7
Striploin 0x1 13dn	63.3	69.9	42.2	33.3	18.1	17.1	13.7	11.4	14.1	15.9	10.0	0.9	0.5	0.3	0.0
Top Butt 13up	384.9	353.0	266.8	332.6	359.2	357.0	391.3	411.1	354.8	409.8	474.4	561.1	421.9	282.2	258.8
Top Butt 13dn	6.6	2.0	1.2	1.5	0.9	0.9	0.5	0.5	0.5	19.0	10.3	0.6	0.5	0.3	0.0
PSMO Tenderloin	192.2	168.1	135.8	154.8	187.1	213.7	197.8	181.2	175.0	212.3	234.3	236.3	172.6	217.6	209.2
Butt Tenderloin	16.1	12.3	10.1	6.9	22.5	17.8	5.6	4.3	2.7	7.8	7.9	14.3	8.0	8.0	7.3
Boneless Round	2.6	0.0	0.0	0.0	0.04	0.2	0.0	0.0	0.0	0.5	0.5	0.4	0.2	0.0	0.0
Inside Round 1"	8.2	4.3	1.0	5.1	8.3	85.6	113.8	7.4	0.5	10.8	0.6	0.6	0.5	0.1	0.0
Inside Round	235.9	213.9	172.3	184.8	297.0	246.2	216.0	245.5	170.1	234.4	320.5	285.9	256.4	301.2	368.8
Outside Flat	383.2	313.1	253.7	217.1	329.0	212.7	183.7	205.5	189.4	207.0	228.8	186.3	146.4	193.6	203.2
Eye of round	168.9	138.5	107.8	146.5	156.2	161.1	188.9	190.2	175.7	174.9	199.9	223.6	174.4	236.7	233.8
Peeled Knuckle	340.7	293.0	232.7	255.5	306.7	297.0	194.4	171.6	160.3	190.5	180.7	233.7	204.8	258.9	245.7
Gooseneck	0.0	0.0	0.0	0.0	0.0	76.6	99.6	4.7	0.5	0.5	0.5	0.7	0.5	0.1	0.0

Table 2.4.2. Number of AAA Loads, Thin Meats, Trim (Fed), and Ground Beef, 2005-2019

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Thin Meats															
Chuck Tender	202.9	171.3	127.1	148.7	170.4	172.7	183.2	147.6	205.2	167.1	148.9	221.9	185.1	188.3	201.3
Briskets 120	1009.6	799.7	773.0	826.2	794.6	881.7	889.4	831.1	834.9	611.6	821.6	324.5	208.4	132.6	204.8
Bone-in Chuck Shortrib	110.7	170.5	140.7	205.0	310.3	334.5	296.7	317.5	324.9	224.4	152.8	198.7	152.1	178.1	208.8
Flat Iron	62.3	50.8	55.6	52.6	64.9	44.7	68.6	58.1	42.7	35.2	23.4	74.3	47.8	45.8	31.3
Blademeat	332.2	325.0	232.9	254.8	293.8	309.9	281.6	262.1	321.2	283.4	246.5	382.2	347.6	300.3	289.7
Bone-in Shortrib	204.1	220.4	219.8	216.2	212.7	217.6	118.4	112.7	101.6	91.5	13.2	9.5	12.9	0.9	8.3
Outside Skirt	131.8	104.1	63.6	69.3	63.3	106.3	118.9	89.9	89.1	44.0	15.6	0.5	0.7	1.1	3.8
Inside Skirt	334.3	333.5	212.5	219.8	271.6	292.4	258.3	236.4	242.7	214.9	140.9	38.1	1.0	4.4	0.8
Flapmeat	303.9	244.5	141.5	212.4	240.6	260.6	169.6	182.3	147.9	152.1	77.3	20.4	9.5	20.9	14.7
Ball Tips	230.5	194.7	132.4	125.3	176.0	184.3	68.4	51.3	40.5	10.8	4.7	0.5	0.7	0.5	0.5
Tri Tips	365.1	253.6	162.1	182.2	225.7	216.6	159.7	191.5	159.5	192.5	112.0	22.4	1.9	1.0	1.4
Flank Steak	168.7	174.4	130.1	148.8	177.7	181.4	132.1	115.8	115.8	125.8	125.3	75.9	62.6	53.4	58.8
Pectoral Muscle	131.6	132.5	113.9	112.3	118.5	116.2	117.8	116.1	112.9	143.8	153.9	201.1	156.0	189.3	172.1
Lointails	150.9	108.1	80.0	71.3	109.9	109.8	107.8	103.8	72.8	80.5	98.8	45.2	1.0	26.8	40.2
Trim (Fed)															
Fresh 50% Lean Trimmings	3186.3	2261.2	1207.9	1367.3	1601.5	1856.4	1701.5	1423.2	1450.1	1791.2	1316.7	1987.6	1980.4	1996.9	1430.9
Fresh 65% Lean Trimmings	1722.3	1400.6	888.8	744.8	1046.3	1252.5	988.9	844.4	836.8	908.3	717.9	837.3	658.8	658.0	667.6
Fresh 75% Lean Trimmings	460.0	537.5	478.3	493.6	1021.5	1224.0	920.2	473.0	15.9	37.2	7.7	56.7	4.6	5.6	12.8
Fresh 81% Lean Trimmings	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	293.4	274.5	149.2
Fresh 85% Lean Trimmings	704.2	938.4	777.8	898.7	515.4	404.2	573.8	713.6	932.8	1106.8	1386.7	1229.3	1059.8	1052.9	781.0
Shankmeat	15.5	6.2	10.1	10.1	1.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5
Ground Beef															
Extra Lean Ground Beef	0.0	0.0	0.0	0.0	0.0	53.3	128.8	91.0	191.0	294.3	357.2	307.7	364.4	315.0	335.5
Lean Ground Beef	0.0	0.0	0.0	0.0	0.0	533.3	849.8	672.3	552.1	546.0	848.5	718.4	593.6	113.0	161.6
Medium Ground Beef	0.0	0.0	0.0	0.0	0.0	41.3	68.3	63.3	54.5	229.2	185.9	203.7	297.9	165.1	96.1
Regular Ground Beef	0.0	0.0	0.0	0.0	0.0	21.0	18.3	21.5	70.0	143.8	196.4	193.6	167.8	217.6	168.4
Ground Chuck	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Ground Sirloin	0.0	0.0	0.0	0.0	0.0	7.0	5.5	0.1	0.5	0.5	0.5	0.5	0.6	0.5	0.5

Table 2.4.3. Number of AA Loads by Product, 2005-2019

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Quebec Spec	401.9	317.5	302.5	257.6	400.0	275.3	50.7	28.0	30.3	24.4	20.9	12.8	3.3	2.3	0.0
Semi-Boneless	0.0	0.0	0.0	0.0	0.0	75.9	124.4	49.1	55.1	11.5	11.4	6.8	5.9	3.6	0.0
Short Cut shoulder clod	768.7	804.4	678.9	793.6	341.7	156.5	152.3	87.7	92.8	70.4	123.2	106.4	70.2	83.5	34.1
Clod Heart	0.0	0.0	0.0	0.0	0.0	2.4	5.2	6.6	12.1	5.9	10.3	17.2	3.8	0.0	0.0
Clod Tender	0.0	0.0	0.0	0.0	0.0	8.9	22.3	20.8	24.9	23.1	18.9	16.3	10.2	4.4	6.4
2 Piece Boneless Chuck	227.6	164.2	146.2	142.9	177.9	76.3	3.9	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
Chuck Roll	1131.1	1026.4	967.1	1129.4	923.2	852.7	560.5	594.4	655.3	573.4	308.1	170.5	74.2	51.7	16.4
Chuck Roll 0x0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.5	0.5	0.5	0.5	0.3	0.0
Oven Ready Rib	332.5	203.9	117.3	117.7	101.3	85.7	42.9	16.2	19.6	44.7	40.2	62.2	49.0	27.8	0.1
Bone-in Lipon Ribeye 17 up	388.8	302.9	242.5	252.8	442.0	520.6	440.8	348.1	317.7	340.1	110.8	217.4	111.2	122.5	155.0
Bone-in Lipon Ribeye 17 dn	43.6	37.1	42.0	42.4	102.3	17.0	24.1	12.1	19.2	60.2	282.6	119.3	224.8	203.6	215.7
Boneless Lipon Ribeye 14 up	237.9	140.7	141.4	116.5	74.3	59.5	48.5	43.2	42.9	25.7	40.7	39.4	49.5	48.6	36.0
Boneless Lipon Ribeye 14 dn	7.6	7.4	4.4	13.0	2.8	3.7	14.6	12.1	11.0	14.3	19.7	2.7	0.5	0.3	0.0
Back Ribs	61.1	85.8	120.7	100.5	80.3	68.6	60.4	44.9	46.3	48.1	53.9	17.7	1.9	2.0	1.2
Short Loin 1x0	369.9	240.9	185.3	173.7	339.2	350.1	308.9	233.4	240.4	199.9	165.1	158.4	164.3	128.0	189.3
Striploin 0x1 13up	411.1	315.5	248.5	276.0	275.9	297.6	277.9	257.3	242.0	295.2	261.2	204.9	236.3	259.0	218.1
Striploin 0x1 13dn	61.0	57.2	27.7	33.5	18.5	10.1	11.5	11.2	4.3	9.9	1.1	0.4	0.5	0.3	0.0
Top Butt 13up	698.4	515.8	454.8	486.5	536.4	524.5	462.0	377.8	356.2	390.9	394.3	358.2	369.6	320.4	360.8
Top Butt 13dn	14.2	17.9	15.9	6.8	2.7	0.6	0.7	0.5	5.5	14.2	7.1	0.5	0.5	0.3	0.0
PSMO Tenderloin	212.7	152.6	115.1	112.4	138.8	160.6	154.2	129.1	115.1	149.3	140.2	115.6	139.8	147.4	136.9
Butt Tenderloin	56.6	43.0	30.2	19.8	56.1	56.5	45.0	36.7	42.2	32.9	17.9	14.2	18.3	16.2	23.6
Boneless Round	255.9	162.4	223.0	249.7	59.2	0.7	0.0	0.0	0.0	38.5	20.0	16.8	8.2	0.0	0.0
Inside Round 1"	957.7	567.7	524.4	460.3	313.1	274.0	113.8	251.9	312.7	387.2	334.0	49.9	2.0	0.1	0.0
Inside Round	886.4	595.6	547.1	544.5	678.1	752.1	725.5	582.9	639.2	722.3	713.1	953.8	850.7	979.1	970.1
Outside Flat	510.4	420.5	308.5	447.9	462.6	528.9	515.0	504.2	494.6	491.9	505.1	565.5	428.2	436.4	399.3
Eye of round	288.2	213.3	170.5	177.8	204.6	216.3	207.7	188.2	174.2	193.3	177.8	143.7	146.2	146.0	161.8
Peeled Knuckle	539.1	399.0	308.1	302.4	377.0	414.7	188.9	134.9	156.8	177.7	91.7	111.7	91.3	91.8	111.0
Gooseneck	0.0	0.0	0.0	0.0	0.0	76.6	99.6	69.9	83.3	162.8	156.3	78.7	4.6	0.2	0.3

Table 2.4.4. Number of AA Loads, Thin Meats, Trim (Fed), and Ground Beef, 2005-2019

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Thin Meats															
Chuck Tender	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Briskets 120	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bone-in Chuck Shortrib	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flat Iron	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Blademeat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bone-in Shortrib	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Outside Skirt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Inside Skirt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01
Flapmeat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ball Tips	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01
Tri Tips	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.02
Flank Steak	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pectoral Muscle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lointails	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trim (Fed)															
Fresh 50% Lean Trimmings	0.0	0.0	0.0	0.0	0.0	42.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.8
Fresh 65% Lean Trimmings	0.0	0.0	0.0	0.0	0.0	18.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.1
Fresh 75% Lean Trimmings	0.0	0.0	0.0	0.0	0.0	21.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6
Fresh 81% Lean Trimmings	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	1.8
Fresh 85% Lean Trimmings	0.0	0.0	0.0	0.0	0.0	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	1.9
Shankmeat	0.0	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ground Beef															
Extra Lean Ground Beef	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lean Ground Beef	0.0	0.0	0.0	0.0	0.0	18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Medium Ground Beef	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Regular Ground Beef	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ground Chuck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0
Ground Sirloin	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 2.4.5. Coefficient of Variation in Weekly Wholesale Beef Load Volumes, 2005-2019

	AAA			AA				AAA			AA		
	2005-2009	2010-2014	2015-2019	2005-2009	2010-2014	2015-2019		2005-2009	2010-2014	2015-2019	2005-2009	2010-2014	2015-2019
Products							Thin Meats						
Quebec Spec	11.34	1.60	1.42	0.90	1.73	1.43	Chuck Tender	0.41	0.38	0.45			
Semi-Boneless		1.31	0.84		1.31	1.28	Briskets 120	0.26	0.28	0.94			
Short Cut shoulder clod	1.02	0.60	1.02	0.46	0.56	0.86	Bone-in Chuck Shortrib	0.68	0.33	0.38			
Clod Heart		1.10	1.70		1.10	1.71	Flat Iron	0.62	0.71	0.82			
Clod Tender		0.68	1.04		0.68	1.02	Blademeat	0.33	0.36	0.34			
2 Piece Boneless Chuck	6.87	2.91		0.51	2.23		Bone-in Shortrib	0.54	0.69	1.97			
Chuck Roll	0.69	0.32	0.70	0.28	0.48	1.03	Outside Skirt	0.58	0.58	2.99			
Chuck Roll 0x0		1.02	0.64		1.02	0.64	Inside Skirt	1.04	0.34	1.83			16.12
Oven Ready Rib	1.45	2.27	2.52	0.98	1.87	1.99	Flapmeat	0.44	0.50	1.33			
Bone-in Lipon Ribeye 17 up	0.63	0.46	1.66	0.50	0.43	0.89	Ball Tips	0.46	1.00	5.25			16.12
Bone-in Lipon Ribeye 17 dn	0.88	1.49	0.79	4.37	1.52	0.90	Tri Tips	0.44	0.39	1.97			16.12
Boneless Lipon Ribeye 14 up	0.86	1.21	1.24	0.66	0.55	1.06	Flank Steak	0.54	0.38	0.56			
Boneless Lipon Ribeye 14 dn	0.82	1.03	2.91	1.91	0.81	6.85	Pectoral Muscle	0.43	0.42	0.42			
Back Ribs	10.87	2.82	0.99	0.81	0.58	1.80	Lointails	0.47	0.53	1.43			
Short Loin 1x0	1.00	1.26	0.85	0.63	0.50	0.86	Trim (Fed)						
Striploin 0x1 13up	0.38	0.28	0.35	0.42	0.37	0.55	Fresh 50% Lean Trimmings	0.45	0.29	0.36		16.03	11.66
Striploin 0x1 13dn	0.67	0.58	2.09	0.76	2.58	1.31	Fresh 65% Lean Trimmings	0.39	0.32	0.28		15.97	11.33
Top Butt 13up	0.33	0.30	0.48	0.34	0.35	0.52	Fresh 75% Lean Trimmings	0.57	1.01	3.59		15.97	16.00
Top Butt 13dn	2.88	2.89	6.86	1.19	6.21	12.08	Fresh 81% Lean Trimmings			0.51			8.47
PSMO Tenderloin	0.39	0.31	0.41	0.45	0.40	0.58	Fresh 85% Lean Trimmings	0.37	0.51	0.37		15.97	11.32
Butt Tenderloin	1.34	1.45	0.72	0.74	0.80	0.95	Shankmeat	2.72	0.00	0.54		15.97	
Boneless Round	15.82	2.95	1.27	0.61	2.81	2.08	Ground Beef						
Inside Round 1"	4.09	1.63	1.35	0.57	0.57	2.01	Extra Lean Ground Beef		0.86	0.59		15.13	
Inside Round	0.46	0.46	0.42	0.35	0.27	0.36	Lean Ground Beef		0.46	1.00		15.13	
Outside Flat	0.40	0.48	0.58	0.38	0.33	0.46	Medium Ground Beef		1.64	1.35		15.13	
Eye of round	0.36	0.29	0.33	0.38	0.33	0.50	Regular Ground Beef		1.29	0.62		15.13	
Peeled Knuckle	0.37	0.41	0.42	0.36	0.60	0.67	Ground Chuck		2.81	0.00			16.00
Gooseneck		1.82	1.35		0.96	1.94	Ground Sirloin		2.49	0.57		15.20	

Table 2.4.6 summarizes the relative contribution of individual beef cuts towards the total load counts (across both AAA and AA grades) included in weekly Canadian Boxed Beef Reports. Over time round cuts, trim, and ground beef comprised an increasing portion of total reported loads. In contrast, chuck cuts, brisket cuts, and short plate cuts provided a diminishing share of total reported loads. This trend is particularly problematic for price discovery regarding chuck cuts. For instance, note that the Canadian chuck primal to cutout yield is 29.62% (Canfax, 2018), however, during the last few years less than 10% of the total beef loads captured by in Canadian wholesale beef market reporting came from chuck trades.

Table 2.4.6. Product Groupings Relative Contributions Towards Total Load Counts, 2005-2019

	Chuck	Rib	Loin	Round	Brisket	Short Plate	Flank	Trim	Ground Beef
2005	16%	9%	18%	21%	5%	2%	1%	28%	0%
2006	18%	9%	17%	19%	5%	2%	1%	29%	0%
2007	20%	10%	16%	21%	6%	2%	1%	24%	0%
2008	20%	10%	17%	20%	6%	2%	1%	24%	0%
2009	18%	10%	19%	20%	5%	2%	1%	26%	0%
2010	16%	9%	17%	18%	5%	2%	1%	27%	4%
2011	16%	9%	17%	18%	6%	2%	1%	26%	7%
2012	16%	9%	18%	18%	6%	2%	1%	24%	6%
2013	17%	9%	16%	18%	6%	2%	1%	23%	6%
2014	13%	9%	17%	20%	4%	2%	1%	26%	8%
2015	11%	9%	17%	20%	6%	1%	1%	25%	11%
2016	10%	10%	16%	21%	2%	0%	1%	30%	10%
2017	7%	8%	16%	20%	2%	0%	1%	34%	12%
2018	8%	8%	16%	23%	1%	0%	0%	35%	7%
2019	8%	8%	19%	26%	2%	0%	1%	29%	7%

Notes: Blademeat is included in the rib primal. Ground chuck is included in the chuck primal. Ground sirloin is included in the loin primal. Trim includes fresh 50% lean trimmings, fresh 65% lean trimmings, fresh 75% lean trimmings, fresh 81% lean trimmings, fresh 85% lean trimmings, and shankmeat. Ground beef includes extra lean ground beef, lean ground beef, medium ground beef, and regular ground beef. Load counts for fat and bone were not provided.

Table 2.4.7 through Table 2.4.15, reported on the ensuing pages, summarize how confidentiality guidelines impacted the ability to publish individual items. The first three tables cover AAA products and the next three tables cover AAA grade thin meats, trim, and ground beef and the final three tables cover AA quality products. Each set of three tables consists first of a table showing the percentage of weeks individual items were publishable followed by a table showing the percentage of weeks individual items had no high-low price range which caused and individual price to not be publishable followed by a table with the percentage of weeks individual items were not reported by packers. Across the three tables these percentages sum to 100%. For example, the AAA quality grade “short cut shoulder clod” was publishable 13% of the weeks in 2019 with 87% of the weeks no high-low price range existing but there we no weeks in which the cut was not reported by a packer(s). The reason for no

price range could have been that only one packer reported this individual product for a particular week.

Beginning in July 2010, a dozen cuts were added to the Canadian Boxed Beef Report (Canfax, 2010). This is clearly shown in Table 2.4.9 and Table 2.4.12. For example, before 2010, Quebec Spec, Semi-Boneless, Clod Heart, Clod Tender, and Gooseneck were 100% not reported by packers and then were reported about 50% of the time in 2010 and then being reported almost every week after that. A similar pattern is shown for Extra Lean Ground Beef, Lean Ground Beef, Medium Ground Beef, Regular Ground Beef, Ground Chuck, and Ground Sirloin (Table 2.4.12). It also appears that at least one additional product, the AAA "Chuck Roll 0x0," was added in 2012.

The Canadian Boxed Beef Report was not published for week ending dates 10/5/12, 10/12/12, 10/19/12, 10/26/12, 6/7/13, 6/14/13, 12/26/14, 4/28/17, 5/5/17, 12/15/17, and 12/22/17. Gaps in reporting were due to not meeting confidentiality requirements. That occurred when staff was on holidays or when trade was so thin that packers did not report. The impact on 2013 and 2014 reporting is clearly shown in Table 2.4.9 and Table 2.4.12 where for many of the products 4% and 8% of the weeks, respectively, were not reported by packers.

Beginning in 2010, a higher percentage of products, thin meats, trim, and ground beef had no high-low price range as shown in Table 2.4.8 and Table 2.4.11. If there was no high-low price range provided for a particular cut, Canfax would not publish the weighted average price, because there was none, in the Canadian Boxed Beef Report. This aligns with the timing of closures of several Canadian FI cattle slaughter plants.[15,16] We are unaware if the plants that closed were voluntarily reporting wholesale beef trade, however, the past decade has seen a decline in FI cattle slaughter plants available to report. **The general conclusion of the confidentiality analysis is that most individual cuts were no longer publishable in 2018 and 2019 and although some cuts were no longer reported by packers the reason for not publishing an individual price for a particular week was that no high-low price range was reported.**

[15] The Canadian Food Inspection Agency (2021a) provides a listing of historical changes to FI cattle slaughter plants between 2002 and 2020. The XL Foods Ltd. plant in Moose Jaw, Saskatchewan was in operation until 2009. The Lawrence Meat Packing Co. Ltd. plant in Peace River, British Columbia, the Meadows Meat Ltd. plant in Pitt Meadows, British Columbia, and the Winkler Meats Ltd plant in Winkler, Manitoba were in operation until 2010. The Abattoirs Abramov Inc. plant in St-Isidore-de-Laprairie, Quebec was in operation for one year in 2010. The XL Foods Inc. plant in Calgary, Alberta was in operation until 2011. The Levinoff–Colbex plant in St-Cyrville de Wendover, Quebec and the Holly Park Meat Packers Inc. plant in Caledon, Ontario were in operation until 2012.
[16] The XL Foods/Lakeside Packers plant in Brooks, Alberta became JBS Food Canada Inc. in 2014.

Table 2.4.7. Percentage of Weeks AAA Products Publishable, 2005-2019

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Quebec Spec	0%	0%	0%	0%	0%	46%	79%	96%	88%	75%	71%	52%	2%	0%	0%
Semi-Boneless	0%	0%	0%	0%	0%	15%	65%	52%	84%	21%	12%	2%	0%	0%	0%
Short Cut shoulder clod	71%	60%	0%	0%	4%	48%	98%	98%	96%	96%	100%	98%	92%	58%	13%
Clod Heart	0%	0%	0%	0%	0%	2%	0%	0%	49%	0%	0%	0%	0%	0%	0%
Clod Tender	0%	0%	0%	0%	0%	38%	71%	75%	85%	81%	83%	87%	83%	17%	0%
2 Piece Boneless Chuck	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Chuck Roll	96%	67%	18%	16%	71%	100%	100%	98%	96%	100%	96%	88%	71%	8%	0%
Chuck Roll 0x0	0%	0%	0%	0%	0%	0%	0%	19%	96%	100%	96%	85%	0%	0%	0%
Oven Ready Rib	71%	42%	14%	25%	12%	4%	6%	0%	0%	6%	17%	23%	0%	2%	0%
Bone-in Lipon Ribeye 17 up	98%	96%	94%	96%	96%	100%	100%	98%	94%	89%	8%	71%	0%	0%	0%
Bone-in Lipon Ribeye 17 dn	67%	54%	20%	20%	8%	0%	0%	0%	0%	11%	92%	100%	19%	0%	0%
Boneless Lipon Ribeye 14 up	96%	92%	90%	80%	71%	62%	0%	0%	0%	81%	87%	29%	19%	0%	0%
Boneless Lipon Ribeye 14 dn	12%	10%	4%	14%	6%	0%	0%	0%	0%	2%	2%	8%	19%	0%	0%
Back Ribs	0%	0%	0%	0%	0%	6%	2%	0%	0%	0%	0%	0%	0%	0%	0%
Short Loin 1x0	98%	96%	92%	86%	71%	77%	33%	2%	0%	85%	100%	98%	92%	98%	98%
Striploin 0x1 13up	100%	100%	100%	100%	100%	100%	100%	100%	92%	100%	100%	100%	92%	100%	96%
Striploin 0x1 13dn	100%	96%	94%	96%	31%	2%	0%	0%	0%	0%	6%	79%	92%	58%	0%
Top Butt 13up	100%	100%	100%	100%	100%	98%	96%	100%	94%	98%	100%	100%	92%	100%	100%
Top Butt 13dn	29%	54%	53%	84%	85%	94%	94%	98%	94%	30%	73%	100%	92%	58%	0%
PSMO Tenderloin	100%	98%	98%	100%	100%	100%	100%	98%	94%	96%	100%	100%	92%	100%	100%
Butt Tenderloin	96%	98%	90%	90%	44%	23%	0%	6%	6%	81%	88%	94%	87%	100%	96%
Boneless Round	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Inside Round 1"	4%	0%	0%	2%	0%	38%	58%	63%	73%	94%	96%	35%	0%	0%	0%
Inside Round	98%	94%	90%	94%	98%	96%	100%	100%	90%	92%	100%	100%	92%	100%	100%
Outside Flat	98%	90%	88%	96%	94%	96%	100%	100%	94%	96%	94%	100%	90%	100%	100%
Eye of round	100%	96%	90%	98%	98%	98%	100%	98%	94%	100%	100%	100%	92%	100%	100%
Peeled Knuckle	100%	98%	88%	98%	96%	98%	15%	0%	0%	0%	0%	0%	0%	0%	0%
Gooseneck	0%	0%	0%	0%	0%	42%	33%	0%	0%	0%	0%	0%	0%	0%	0%

Table 2.4.8. Percentage of Weeks AAA Products Have No High-Low Price Range, 2005-2019

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Quebec Spec						4%	21%	4%	8%	25%	29%	48%	90%	56%	4%
Semi-Boneless						33%	29%	42%	12%	79%	88%	98%	92%	96%	85%
Short Cut shoulder clod	29%	40%	100%	100%	96%	52%	2%	2%		4%		2%		42%	87%
Clod Heart						42%	100%	100%	47%	92%	100%	100%	31%		
Clod Tender						12%	27%	25%	12%	19%	17%	13%	10%	69%	79%
2 Piece Boneless Chuck	27%	2%	4%			50%	17%			4%					
Chuck Roll	4%	33%	82%	84%	29%			2%			4%	12%	21%	92%	100%
Chuck Roll 0x0								2%			4%	15%	92%	58%	
Oven Ready Rib	27%	58%	86%	73%	88%	85%	62%	50%	35%	57%	77%	77%	92%	88%	92%
Bone-in Lipon Ribeye 17 up	2%	4%	6%	4%	4%			2%	2%	11%	92%	29%	92%	58%	
Bone-in Lipon Ribeye 17 dn	33%	46%	80%	80%	92%	100%	100%	100%	96%	81%	8%		73%	100%	100%
Boneless Lipon Ribeye 14 up	4%	8%	10%	20%	29%	38%	100%	98%	96%	19%	13%	71%	73%	100%	98%
Boneless Lipon Ribeye 14 dn	88%	90%	96%	86%	94%	100%	100%	100%	96%	91%	98%	92%	73%	58%	
Back Ribs	6%		12%			38%	94%	100%	96%	100%	100%	100%	90%	98%	62%
Short Loin 1x0	2%	4%	8%	14%	29%	23%	67%	98%	96%	15%		2%		2%	2%
Striploin 0x1 13up									4%						4%
Striploin 0x1 13dn	0%	4%	6%	4%	69%	98%	100%	100%	96%	92%	92%	21%			
Top Butt 13up						2%	4%		2%	2%					
Top Butt 13dn	56%	46%	47%	16%	15%	6%	6%		2%	60%	27%				
PSMO Tenderloin		2%	2%					2%	2%	4%					
Butt Tenderloin	4%	2%	10%	10%	56%	77%	100%	83%	90%	19%	12%	6%	6%		4%
Boneless Round	2%					17%				85%	94%	67%	31%		
Inside Round 1"	21%	15%	6%	6%	23%	12%	37%	35%	23%	6%	4%	65%	92%	25%	
Inside Round	2%	6%	10%	6%	2%	4%			6%	8%					
Outside Flat	2%	10%	12%	4%	6%	4%			2%	4%	6%		2%		
Eye of round		4%	10%	2%	2%	2%		2%	2%						
Peeled Knuckle		2%	12%	2%	4%	2%	85%	100%	96%	100%	100%	100%	92%	100%	100%
Gooseneck						8%	67%	100%	90%	92%	100%	100%	92%	25%	

Table 2.4.9. Percentage of Weeks AAA Products Not Reported, 2005-2019

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Quebec Spec	100%	100%	100%	100%	100%	50%			4%				8%	44%	96%
Semi-Boneless	100%	100%	100%	100%	100%	52%	6%	6%	4%				8%	4%	15%
Short Cut shoulder clod									4%				8%		
Clod Heart	100%	100%	100%	100%	100%	56%			4%	8%			69%	100%	100%
Clod Tender	100%	100%	100%	100%	100%	50%	2%		4%				8%	13%	21%
2 Piece Boneless Chuck	73%	98%	96%	100%	100%	50%	83%	100%	100%	96%	100%	100%	100%	100%	100%
Chuck Roll									4%				8%		
Chuck Roll 0x0	100%	100%	100%	100%	100%	100%	100%	79%	4%				8%	42%	100%
Oven Ready Rib	2%			2%		12%	33%	50%	65%	38%	6%	0%	8%	10%	8%
Bone-in Lipon Ribeye 17 up									4%				8%	42%	100%
Bone-in Lipon Ribeye 17 dn									4%	8%			8%		
Boneless Lipon Ribeye 14 up								2%	4%				8%		2%
Boneless Lipon Ribeye 14 dn									4%	8%			8%	42%	100%
Back Ribs	94%	100%	88%	100%	100%	56%	4%		4%				10%	2%	38%
Short Loin 1x0									4%				8%		
Striploin 0x1 13up									4%				8%		
Striploin 0x1 13dn									4%	8%	2%		8%	42%	100%
Top Butt 13up									4%				8%		
Top Butt 13dn	15%							2%	4%	9%			8%	42%	100%
PSMO Tenderloin									4%				8%		
Butt Tenderloin								10%	4%				8%		
Boneless Round	98%	100%	100%	100%	100%	83%	100%	100%	100%	15%	6%	33%	69%	100%	100%
Inside Round 1"	75%	85%	94%	92%	77%	50%	6%	2%	4%				8%	75%	100%
Inside Round									4%				8%		
Outside Flat									4%				8%		
Eye of round									4%				8%		
Peeled Knuckle									4%				8%		
Gooseneck	100%	100%	100%	100%	100%	50%			10%	8%			8%	75%	100%

Table 2.4.10. Percentage of Weeks AAA Thin Meats, Trim (Fed), and Ground Beef Publishable, 2005-2019

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Thin Meats															
Chuck Tender	100%	98%	100%	100%	98%	94%	98%	98%	96%	96%	92%	100%	88%	100%	100%
Briskets 120	100%	100%	98%	100%	98%	100%	100%	100%	96%	98%	100%	98%	87%	79%	100%
Bone-in Chuck Shortrib	98%	90%	29%	78%	92%	100%	98%	100%	96%	96%	90%	98%	92%	98%	100%
Flat Iron	98%	98%	98%	88%	23%	0%	2%	0%	0%	68%	50%	83%	88%	98%	98%
Blademeat	100%	96%	100%	100%	96%	96%	100%	100%	94%	70%	100%	96%	90%	98%	94%
Bone-in Shortrib	92%	96%	78%	96%	92%	81%	65%	58%	40%	40%	27%	13%	6%	4%	0%
Outside Skirt	100%	98%	96%	94%	88%	90%	96%	83%	83%	42%	8%	0%	0%	0%	0%
Inside Skirt	100%	98%	98%	100%	100%	100%	100%	92%	96%	51%	10%	2%	0%	0%	0%
Flapmeat	100%	100%	96%	98%	98%	98%	100%	100%	90%	94%	69%	10%	0%	0%	0%
Ball Tips	92%	81%	84%	78%	71%	94%	21%	0%	0%	0%	0%	0%	0%	0%	0%
Tri Tips	100%	100%	98%	100%	100%	100%	98%	98%	96%	96%	69%	12%	0%	0%	0%
Flank Steak	100%	98%	100%	100%	94%	100%	98%	100%	96%	98%	100%	98%	92%	98%	100%
Pectoral Muscle	98%	98%	92%	96%	27%	0%	0%	0%	0%	45%	100%	98%	90%	94%	79%
Lointails	71%	77%	82%	94%	27%	0%	0%	0%	0%	38%	63%	27%	0%	2%	0%
Trim (Fed)															
Fresh 50% Lean Trimmings	100%	98%	82%	100%	98%	98%	100%	81%	94%	100%	100%	98%	92%	96%	98%
Fresh 65% Lean Trimmings	100%	100%	96%	100%	98%	98%	100%	96%	96%	98%	100%	100%	92%	96%	100%
Fresh 75% Lean Trimmings	92%	96%	86%	98%	96%	88%	38%	19%	87%	72%	88%	79%	8%	8%	2%
Fresh 81% Lean Trimmings	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Fresh 85% Lean Trimmings	88%	98%	100%	100%	100%	96%	98%	94%	88%	87%	100%	96%	92%	96%	100%
Shankmeat	10%	12%	35%	0%	81%	96%	98%	94%	88%	87%	100%	96%	92%	96%	75%
Ground Beef															
Extra Lean Ground Beef	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Lean Ground Beef	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Medium Ground Beef	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Regular Ground Beef	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Ground Chuck	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Ground Sirloin	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Table 2.4.11. Percentage of Weeks AAA Thin Meats, Trim (Fed), and Ground Beef Have No High-Low Price Range, 2005-2019

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Thin Meats															
Chuck Tender		2%			2%	6%	2%	2%		4%	8%		4%		
Briskets 120			2%		2%					2%		2%	6%	21%	
Bone-in Chuck Shortrib	2%	10%	71%	22%	8%		2%			4%	10%	2%		2%	
Flat Iron	2%	2%	2%	12%	77%	100%	98%	100%	96%	32%	50%	17%	4%	2%	2%
Blademeat		4%			4%	4%			2%	30%		4%	2%	2%	6%
Bone-in Shortrib	8%	4%	22%	4%	8%	19%	35%	42%	56%	60%	73%	87%	87%	96%	100%
Outside Skirt		2%	4%	6%	12%	10%	4%	17%	13%	58%	92%	100%	92%	100%	100%
Inside Skirt		2%	2%					8%		49%	90%	98%	92%	100%	100%
Flapmeat			4%	2%	2%	2%			6%	6%	31%	90%	92%	100%	100%
Ball Tips	8%	19%	16%	22%	29%	6%	77%	100%	96%	100%	100%	100%	92%	100%	100%
Tri Tips			2%				2%	2%		4%	31%	88%	90%	100%	100%
Flank Steak		2%			6%		2%			2%		2%		2%	
Pectoral Muscle	2%	2%	8%	4%	73%	100%	100%	100%	96%	55%		2%	2%	6%	21%
Lointails	29%	23%	18%	6%	73%	100%	100%	100%	96%	62%	37%	73%	92%	85%	83%
Trim (Fed)															
Fresh 50% Lean Trimmings		2%	18%		2%	2%		19%	2%			2%		4%	2%
Fresh 65% Lean Trimmings			4%		2%	2%		4%		2%				4%	
Fresh 75% Lean Trimmings	8%	4%	14%	2%	4%	12%	62%	81%	10%	28%	12%	21%	85%	92%	98%
Fresh 81% Lean Trimmings													83%	96%	96%
Fresh 85% Lean Trimmings	12%	2%				4%	2%	6%	8%	13%		4%		4%	
Shankmeat	90%	88%	65%	100%	19%	4%	2%	6%	8%	13%		4%		4%	25%
Ground Beef															
Extra Lean Ground Beef						50%	100%	98%	96%	100%	100%	100%	92%	100%	100%
Lean Ground Beef						50%	100%	98%	96%	100%	100%	100%	92%	98%	100%
Medium Ground Beef						50%	79%	71%	92%	100%	100%	100%	92%	65%	100%
Regular Ground Beef						50%	60%	40%	94%	98%	100%	100%	92%	100%	100%
Ground Chuck							2%	21%	96%	100%	100%	100%	92%	100%	100%
Ground Sirloin						40%	23%	21%	96%	96%	100%	100%	90%	98%	100%

Table 2.4.12. Percentage of Weeks AAA Thin Meats, Trim (Fed), and Ground Beef Not Reported, 2005-2019

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Thin Meats															
Chuck Tender									4%				8%		
Briskets 120									4%				8%		
Bone-in Chuck Shortrib									4%				8%		
Flat Iron									4%				8%		
Blademeat									4%				8%		
Bone-in Shortrib									4%				8%		
Outside Skirt									4%				8%		
Inside Skirt									4%				8%		
Flapmeat									4%				8%		
Ball Tips							2%		4%				8%		
Tri Tips									4%				10%		
Flank Steak									4%				8%		
Pectoral Muscle									4%				8%		
Lointails									4%				8%	13%	17%
Trim (Fed)															
Fresh 50% Lean Trimmings									4%				8%		
Fresh 65% Lean Trimmings									4%				8%		
Fresh 75% Lean Trimmings									4%				8%		
Fresh 81% Lean Trimmings	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	17%	4%	4%
Fresh 85% Lean Trimmings									4%				8%		
Shankmeat									4%				8%		
Ground Beef															
Extra Lean Ground Beef	100%	100%	100%	100%	100%	50%		2%	4%				8%		
Lean Ground Beef	100%	100%	100%	100%	100%	50%		2%	4%				8%	2%	
Medium Ground Beef	100%	100%	100%	100%	100%	50%	21%	29%	8%				8%	35%	
Regular Ground Beef	100%	100%	100%	100%	100%	50%	40%	60%	6%	2%			8%		
Ground Chuck	100%	100%	100%	100%	100%	100%	98%	79%	4%				8%		
Ground Sirloin	100%	100%	100%	100%	100%	60%	77%	79%	4%	4%			10%	2%	

Table 2.4.13. Percentage of Weeks AA Products Publishable, 2005-2019

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Quebec Spec	87%	88%	94%	82%	81%	94%	79%	96%	88%	75%	71%	52%	2%	0%	0%
Semi-Boneless	0%	0%	0%	0%	0%	15%	65%	52%	84%	21%	12%	2%	0%	0%	0%
Short Cut shoulder clod	100%	98%	98%	100%	96%	90%	100%	100%	96%	96%	100%	98%	92%	85%	17%
Clod Heart	0%	0%	0%	0%	0%	2%	0%	0%	49%	0%	0%	0%	0%	0%	0%
Clod Tender	0%	0%	0%	0%	0%	38%	71%	73%	85%	81%	83%	87%	83%	17%	0%
2 Piece Boneless Chuck	100%	98%	86%	82%	85%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Chuck Roll	100%	100%	100%	100%	100%	100%	100%	100%	96%	100%	96%	88%	69%	6%	0%
Chuck Roll 0x0	0%	0%	0%	0%	0%	0%	0%	21%	96%	100%	96%	85%	0%	0%	0%
Oven Ready Rib	98%	90%	84%	86%	50%	31%	15%	2%	0%	8%	38%	13%	12%	0%	0%
Bone-in Lipon Ribeye 17 up	100%	100%	98%	100%	100%	100%	100%	100%	96%	85%	8%	42%	4%	0%	0%
Bone-in Lipon Ribeye 17 dn	90%	90%	98%	90%	27%	0%	4%	2%	0%	11%	90%	96%	92%	96%	98%
Boneless Lipon Ribeye 14 up	96%	98%	100%	100%	92%	98%	85%	100%	96%	94%	90%	54%	92%	100%	98%
Boneless Lipon Ribeye 14 dn	17%	25%	4%	29%	69%	58%	0%	0%	2%	0%	2%	31%	90%	58%	0%
Back Ribs	81%	98%	100%	100%	56%	52%	4%	0%	0%	8%	0%	0%	0%	0%	0%
Short Loin 1x0	100%	98%	90%	100%	98%	100%	100%	100%	96%	96%	100%	96%	92%	98%	100%
Striploin 0x1 13up	100%	98%	100%	100%	100%	98%	100%	100%	96%	100%	100%	96%	92%	98%	100%
Striploin 0x1 13dn	98%	83%	94%	96%	29%	0%	0%	0%	8%	9%	33%	54%	79%	56%	0%
Top Butt 13up	100%	100%	100%	100%	98%	98%	96%	100%	96%	100%	100%	96%	92%	98%	100%
Top Butt 13dn	54%	83%	69%	84%	23%	10%	37%	98%	73%	74%	98%	96%	92%	56%	0%
PSMO Tenderloin	100%	100%	100%	100%	98%	100%	100%	100%	96%	100%	100%	96%	92%	100%	98%
Butt Tenderloin	100%	100%	96%	98%	92%	100%	100%	100%	96%	96%	92%	10%	46%	90%	92%
Boneless Round	100%	90%	96%	98%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Inside Round 1"	96%	83%	90%	98%	85%	87%	58%	65%	73%	100%	96%	35%	0%	0%	0%
Inside Round	100%	96%	100%	98%	96%	98%	100%	100%	96%	96%	100%	96%	90%	100%	100%
Outside Flat	100%	98%	98%	98%	96%	100%	100%	100%	96%	100%	100%	96%	92%	100%	100%
Eye of round	100%	100%	100%	100%	98%	100%	100%	100%	96%	100%	100%	96%	90%	100%	100%
Peeled Knuckle	100%	100%	92%	100%	98%	100%	31%	0%	0%	0%	0%	2%	2%	0%	0%
Gooseneck	0%	0%	0%	0%	0%	42%	33%	0%	0%	0%	0%	2%	0%	0%	0%

Table 2.4.14. Percentage of Weeks AA Products Have No High-Low Price Range, 2005-2019

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Quebec Spec	13%	12%	6%	18%	19%	6%	21%	4%	8%	25%	29%	48%	90%	56%	
Semi-Boneless						33%	29%	42%	12%	79%	88%	98%	92%	58%	
Short Cut shoulder clod		2%	2%		4%	10%				4%		2%		15%	83%
Clod Heart						42%	100%	100%	47%	92%	100%	100%	31%		
Clod Tender						12%	27%	27%	12%	19%	17%	13%	10%	77%	94%
2 Piece Boneless Chuck		2%	14%	18%	15%	100%	17%			4%					
Chuck Roll											4%	12%	23%	94%	100%
Chuck Roll 0x0											4%	15%	92%	58%	
Oven Ready Rib	2%	10%	16%	14%	50%	63%	63%	54%	37%	68%	42%	77%	52%	17%	4%
Bone-in Lipon Ribeye 17 up			2%							15%	92%	58%	88%	100%	100%
Bone-in Lipon Ribeye 17 dn	10%	10%	2%	10%	73%	100%	96%	98%	96%	81%	10%	4%		4%	2%
Boneless Lipon Ribeye 14 up	4%	2%			8%	2%	15%			6%	10%	46%			2%
Boneless Lipon Ribeye 14 dn	62%	75%	96%	71%	31%	42%	100%	100%	94%	92%	98%	69%	2%		
Back Ribs	19%	2%			44%	48%	96%	100%	96%	92%	100%	100%	92%	98%	96%
Short Loin 1x0		2%	10%		2%					4%		4%		2%	
Striploin 0x1 13up		2%				2%						4%		2%	
Striploin 0x1 13dn	2%	17%	6%	4%	71%	100%	100%	100%	88%	83%	65%	46%	13%	2%	
Top Butt 13up					2%	2%	4%					4%		2%	
Top Butt 13dn	40%	17%	31%	16%	77%	90%	63%		23%	17%	2%	4%		2%	
PSMO Tenderloin					2%							4%			2%
Butt Tenderloin			4%	2%	6%					4%	8%	90%	46%	10%	8%
Boneless Round		10%	4%	2%	73%	67%				85%	94%	67%	31%		
Inside Round 1"	4%	17%	10%	2%	15%	13%	37%	35%	23%		4%	65%	92%	25%	
Inside Round		4%		2%	4%	2%				4%		4%	2%		
Outside Flat		2%	2%	2%	4%							4%			
Eye of round					2%							4%	2%		
Peeled Knuckle			8%		2%		69%	100%	96%	100%	100%	98%	90%	100%	100%
Gooseneck						8%	67%	100%	90%	92%	100%	98%	92%	35%	52%

Table 2.4.15. Percentage of Weeks AA Products Not Reported, 2005-2019

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Quebec Spec									4%				8%	44%	100%
Semi-Boneless	100%	100%	100%	100%	100%	52%	6%	6%	4%				8%	42%	100%
Short Cut shoulder clod									4%				8%		
Clod Heart	100%	100%	100%	100%	100%	56%			4%	8%			69%	100%	100%
Clod Tender	100%	100%	100%	100%	100%	50%	2%		4%				8%	6%	6%
2 Piece Boneless Chuck							83%	100%	100%	96%	100%	100%	100%	100%	100%
Chuck Roll									4%				8%		
Chuck Roll 0x0	100%	100%	100%	100%	100%	100%	100%	79%	4%				8%	42%	100%
Oven Ready Rib						6%	21%	44%	63%	25%	19%	10%	37%	83%	96%
Bone-in Lipon Ribeye 17 up									4%				8%		
Bone-in Lipon Ribeye 17 dn									4%	8%			8%		
Boneless Lipon Ribeye 14 up									4%				8%		
Boneless Lipon Ribeye 14 dn	21%								4%	8%			8%	42%	100%
Back Ribs									4%				8%	2%	4%
Short Loin 1x0									4%				8%		
Striploin 0x1 13up									4%				8%		
Striploin 0x1 13dn									4%	8%	2%		8%	42%	100%
Top Butt 13up									4%				8%		
Top Butt 13dn	6%							2%	4%	9%			8%	42%	100%
PSMO Tenderloin									4%				8%		
Butt Tenderloin					2%				4%				8%		
Boneless Round						33%	100%	100%	100%	15%	6%	33%	69%	100%	100%
Inside Round 1"							6%		4%				8%	75%	100%
Inside Round									4%				8%		
Outside Flat									4%				8%		
Eye of round									4%				8%		
Peeled Knuckle									4%				8%		
Gooseneck	100%	100%	100%	100%	100%	50%			10%	8%			8%	65%	48%

2.5. CORRELATION OF CANADIAN AND U.S. BOXED BEEF PRICES

The weekly Canadian Boxed Beef Report is structured to compare Canadian prices with U.S. prices. U.S. prices are converted to Canadian dollars using the weekly exchange rate. Weekly carcass cutouts are shown in Figure 2.5.1 for the 2006-2019 period. The first panel contains the Canadian AAA cutout compared to the U.S. Choice cutout. The second panel contains the Canadian AA cutout compared to the U.S. Select cutout. The price series trend together with correlation coefficients of 0.989 and 0.990, respectively. Appendix C contains the equivalent figures for the seven primals. The chuck, rib, loin, and round primals have separate Canadian AAA and Canadian AA values while the brisket, short plate, and flank primal values are equivalent for Canadian AAA and Canadian AA as shown in the Canadian Boxed Beef Report.

While carcass cutouts and most primals have high correlation coefficients over the 2006-2019 period, individual years are lower with some being much lower. From 2006 to 2010 the Canadian boxed beef cutout was at a premium to the U.S. boxed beef cutout. After a review was conducted it was found that the Canadian boxed beef model was placing too much weight on higher priced middle meats, thereby, inflating the cutout value by approximately $0.10 per pound. Annual correlation coefficients generally improved after a revised model was implemented in 2010 and peaked in 2016 and 2017. Yearly correlations between Canadian and U.S. carcass cutouts and primals generally declined from 2017 to 2018 and remained at these lower levels in 2019 (Table 2.5.1). This aligns with lower Canadian reporting levels in 2018 and 2019.

Values that are more stable, or follow some pattern, are more easily predicted than values that have higher variance. The coefficient of variation allows for measuring price dispersion while accounting for the absolute level of prices. A four-week rolling average coefficient of variation for the AAA and AA cutouts is presented in Figure 2.5.2. Data from January 2011 to March 2020 were used to visually observe price dispersion of each series. Trend lines indicate both AAA and AA carcass cutouts have higher price variability over time. If the increased variability is justified by market conditions, then it is appropriate that the coefficient of variation has increased. If instead, the increased variability is due to noise being introduced into the price series due to the reporting, collection, summarizing, and publishing of the data then the higher coefficient of variation is a concern because it is associated with data collection and reporting and not reflective of actual market behavior.

Figure 2.5.1. Canadian and U.S. Carcass Cutouts, Canadian Dollars, 2006-2019

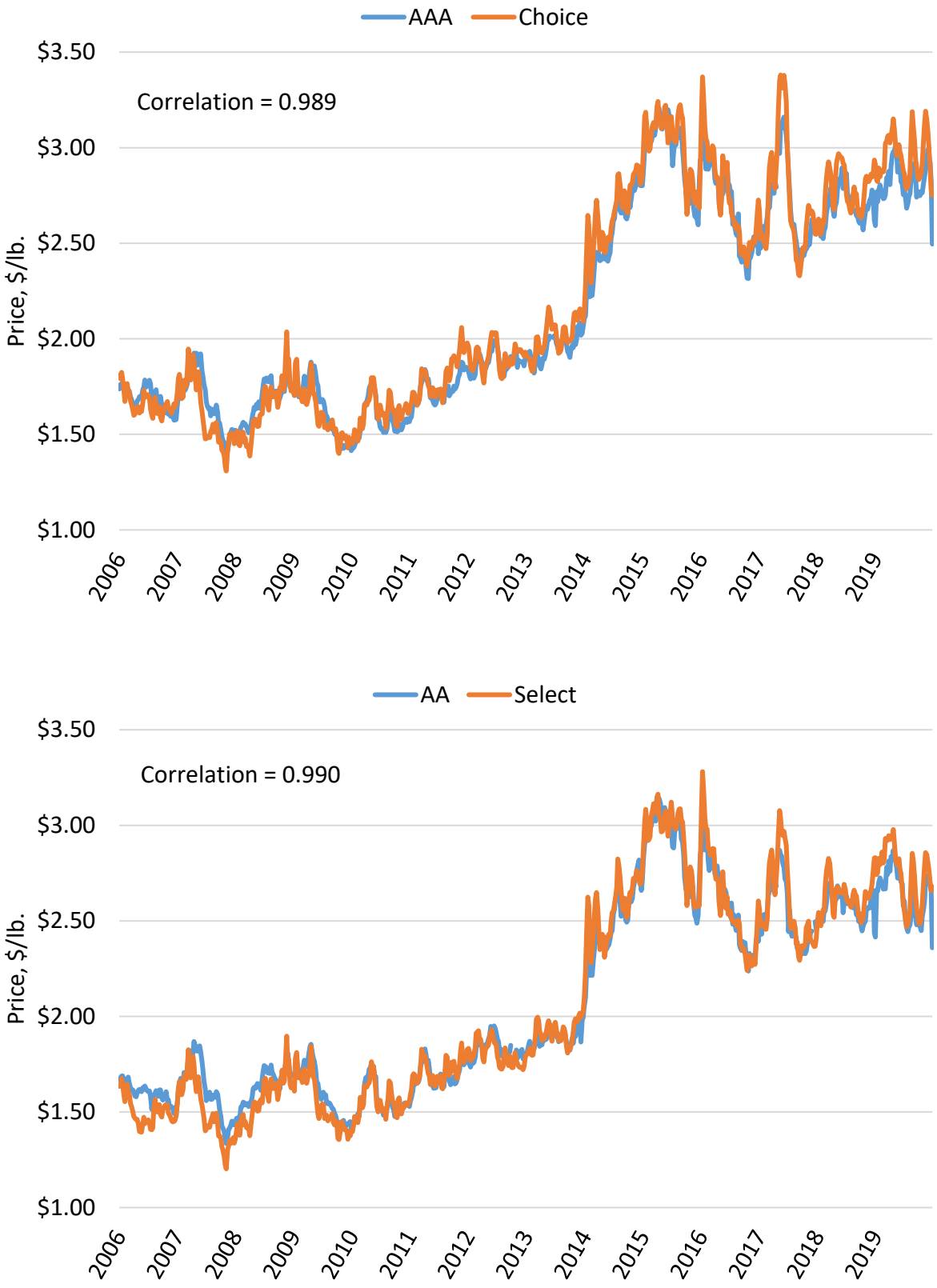
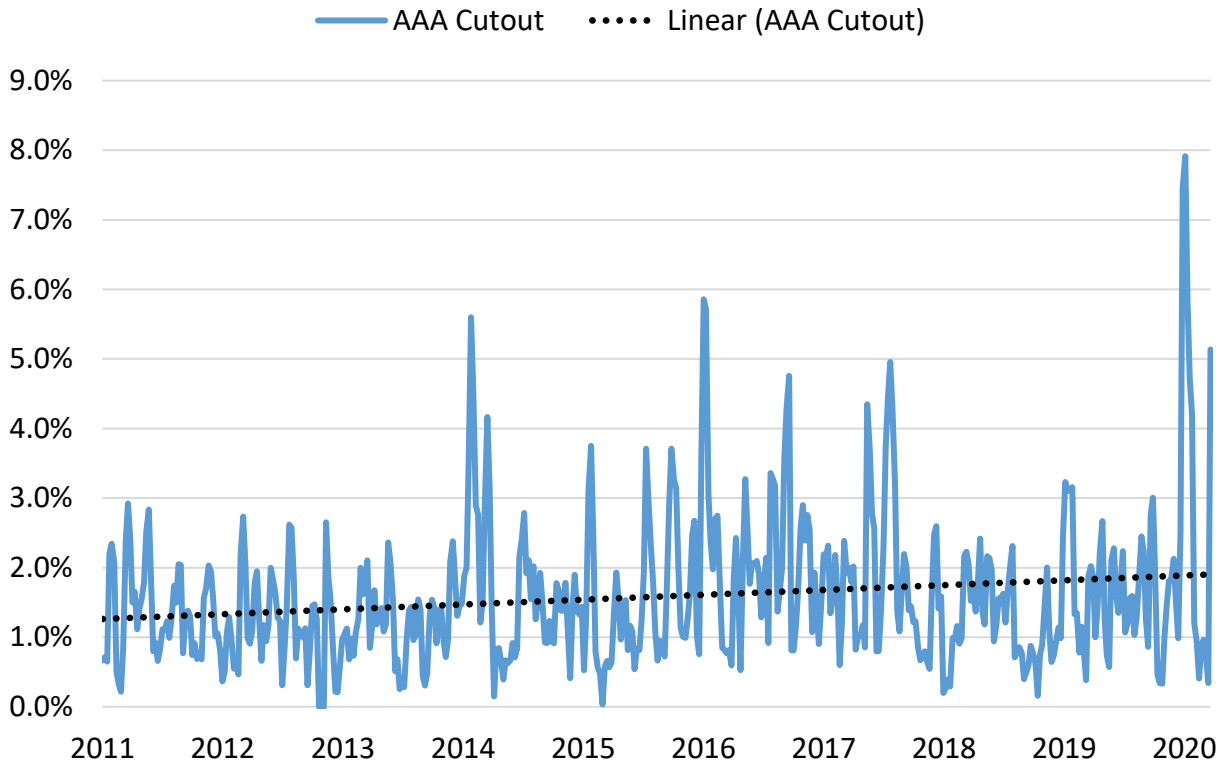
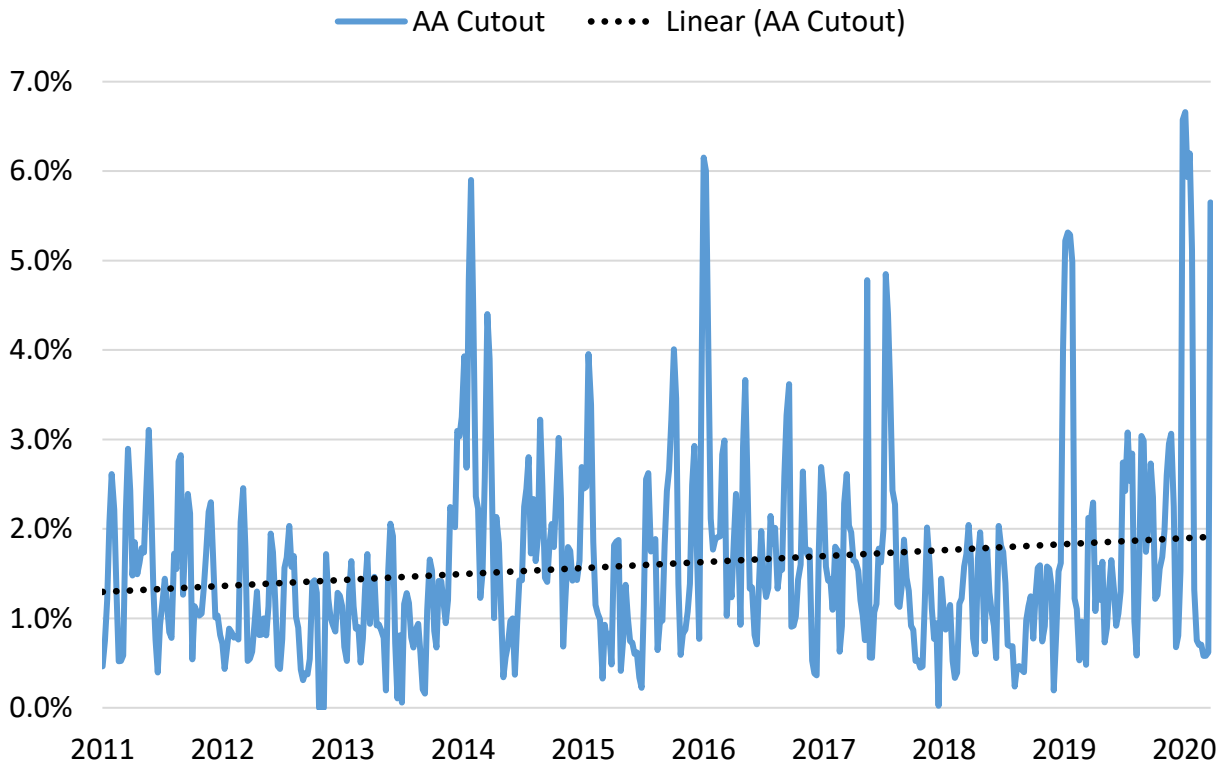


Table 2.5.1. Correlation Coefficients between Canadian and U.S. Carcass Cutout Prices and Primals, 2006-2019

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2006-2019
Carcass Cutouts															
AAA | Choice	0.57	0.84	0.91	0.86	0.86	0.86	0.75	0.80	0.93	0.90	0.93	0.94	0.73	0.72	0.989
AA | Select	0.61	0.90	0.92	0.95	0.91	0.81	0.62	0.79	0.88	0.92	0.95	0.94	0.59	0.80	0.990
AAA | Choice															
Chuck	0.92	0.85	0.95	0.91	0.50	0.87	0.72	0.72	0.89	0.89	0.92	0.76	0.24	0.59	0.987
Rib	0.37	0.58	0.85	0.59	0.51	0.79	0.70	0.83	0.90	0.67	0.81	0.82	0.83	0.70	0.968
Loin	0.86	0.77	0.68	0.94	0.69	0.81	0.90	0.83	0.87	0.93	0.96	0.94	0.88	0.80	0.894
Round	0.91	0.93	0.94	0.96	0.58	0.82	0.60	0.81	0.86	0.88	0.87	0.79	0.50	0.66	0.983
Brisket	-0.14	-0.26	0.85	0.88	-0.17	0.95	0.70	0.72	0.97	0.96	0.85	0.84	0.43	0.32	0.976
Short Plate	0.87	0.88	0.96	0.95	0.48	0.81	0.21	0.58	0.91	0.97	0.98	0.85	0.81	0.86	0.973
Flank	0.71	0.89	0.78	0.62	0.34	0.91	0.86	0.85	0.95	0.96	0.92	0.86	0.81	0.66	0.368
AA/A | Select															
Chuck	0.92	0.91	0.96	0.92	0.59	0.85	0.68	0.69	0.87	0.91	0.93	0.76	0.23	0.63	0.986
Rib	0.49	0.74	0.84	0.84	0.80	0.81	0.38	0.71	0.84	0.65	0.71	0.67	0.69	0.85	0.973
Loin	0.44	0.85	0.80	0.97	0.78	0.85	0.89	0.90	0.80	0.93	0.96	0.94	0.80	0.83	0.870
Round	0.96	0.95	0.95	0.97	0.70	0.83	0.72	0.88	0.84	0.88	0.95	0.88	0.58	0.72	0.988
Brisket	-0.16	-0.27	0.86	0.87	-0.18	0.92	0.68	0.66	0.96	0.96	0.86	0.84	0.41	0.45	0.976
Short Plate	0.87	0.90	0.96	0.96	0.53	0.82	0.25	0.62	0.91	0.96	0.98	0.85	0.81	0.86	0.973
Flank	0.81	0.96	0.79	0.54	0.42	0.91	0.79	0.76	0.93	0.96	0.90	0.89	0.81	0.73	0.345

Figure 2.5.2. Weekly Rolling 4-Week Coefficient of Variation for Canadian Carcass Cutouts, January 2011 to March 2020





Comparing price instability coefficients between markets has been proposed as an alternative to price correlation coefficients or cointegration models for measuring market integration (Honfoga et al., 2018). This approached is proposed as a step towards advancing spatial price analysis when price time series are relatively short, not uniform and missing data exist. As was shown in Tables 10, 13, and 16 several of the products, thin meats, and trim were not reported in some weeks. With a revised boxed beef model being implemented in 2010 and cuts being added we conduct the analysis on the data beginning in 2011 through week ending March 20, 2020. The price instability coefficient for a given market expresses the average price deviation from the trend in percentage of the mean price, such that:

$$I(\%) = 100 * \left(\left(\sqrt{\sum\left(\ddot{Y}_i - Y_i\right)^2}\right)/(T * \bar{Y})\right)$$

where $\ddot{Y}_i$ is the predicted price on the trend line ($\ddot{Y}_i$ = a + bt), t is the time or market day number; Y_i is the actual price on market date t, and $\bar{Y}$ is the average price over T number of market days or periods (weeks in this study) (Heidingsfield et al., 1974). This provides a unit free measure of relative dispersion.

The price spread between two integrated markets is assumed to be approximately constant over time (Delgado, 1986). If the price spread is not constant, the price instability coefficient will be high and market integration would be low. In other words, the greater is the difference in price instability coefficients, the less likely will price movements be parallel and the less will the markets be integrated.

Table 2.5.2 shows differences in price instability coefficients between comparable pairs of Canadian and U.S. carcass cutouts, primals, products, thin meats, and trim. For example, Canadian AAA “Striploin 0x1 13 up” is comparable to U.S. Choice “Loin, strip, bnls, 0x1 (180 3).” The differences are sorted in ascending order for ease in interpretation. The lower the difference between the price instability coefficients of two items, the greater the integration among prices from these items. Low volume markets may not be integrated with higher volume markets because of problems associated with "thin" markets (Tomek, 1980). This explains why market integration is the lowest for Canadian AAA “Gooseneck” and U.S. Choice “Round, bottom gooseneck (170 1)” within AAA and Choice products as Canadian AAA “Gooseneck” had only 361 weeks of the 482 weeks reported. Also, with respect to Canadian AAA “Striploin 0x1 13 up” and Canadian AAA “Striploin 0x1 13 dn” the former had 12 weeks not reported whereas the latter had 103 weeks not reported so the integration with the comparable U.S. product was lower for AAA “Striploin 0x1 13 dn.” However, for products like Canadian AAA “PSMO Tenderloin” and Canadian AAA “Butt Tenderloin” where only few weeks were not reported, Canadian AAA “Butt Tenderloin” is more integrated with the comparable U.S. product.

This measure of market integration, provides support for using some U.S. items as an estimate of the value of Canadian items. For example, U.S. Choice “Loin, ball-tip, bnls, heavy (185B 1)” converted to Canadian dollars is a better estimate of Canadian AAA and AA “Ball Tips” than U.S. Choice and Select “121C 4 Plate, Outside Skirt” is of Canadian “Outside Skirt.”

Table 2.5.2. Differences in Price Instability Coefficients between Canadian and U.S. Cutouts, Primals Products, Thin Meats, and Trim

	AAA | Choice		AA | Select		AA | Select
Carcass Cutout (470, 482)	0.395	Carcass Cutout (470, 482)	0.493		
Primals		Primals		Products (continued)	
Loin (470, 482)	0.097	Chuck (470, 482)	0.061	Chuck Roll (470, 482)	1.102
Brisket (470, 482)	0.220	Brisket (470, 482)	0.118	Gooseneck (402, 481)	3.089
Rib (470, 482)	0.238	Loin (470, 482)	0.305	Semi-Boneless (379, 481)	3.339
Chuck (470, 482)	0.852	Round (470, 482)	0.410	Boneless Round (340, 69)	4.135
Round (470, 482)	1.531	Rib (470, 482)	0.708		
Short Plate (470, 482)	1.590	Flank (469, 482)	1.857		
Flank (470, 482)	2.155	Short Plate (470, 482)	2.121		
Products		Products		Thin Meats (AAA/AA)	
Striploin 0x1 13 up (470, 482)	0.034	Short Loin 1x0 (470, 482)	0.013	Ball Tips (469, 482)	0.086
Butt Tenderloin (465, 482)	0.070	Short Cut Shoulder Clod (470, 482)	0.074	Flank Steak (470, 482)	0.154
Short Cut Shoulder Clod (464, 482)	0.121	Clod Tender (462, 480)	0.081	Tri tips (470, 482)	0.211
Bone-in Lipon Ribeye 17 dn (465, 482)	0.122	Butt Tenderloin (470, 482)	0.110	Flapmeat (470, 482)	0.266
Top Butt 13 up (470, 482)	0.139	Striploin 0x1 13 up (470, 480)	0.130	Briskets 120 (470, 482)	0.296
Peeled Knuckle (470, 482)	0.296	Inside Round (470, 481)	0.133	Pectoral Muscle (469, 482)	0.336
Short Loin 1x0 (470, 482)	0.303	PSMO Tenderloin (470, 482)	0.135	Chuck Tender (470, 482)	0.340
Boneless Lipon Ribeye 14 up (468, 482)	0.335	Boneless Lipon Ribeye 14 up (470, 482)	0.163	Blademeat (470, 482)	0.400
Chuck Roll (470, 482)	0.343	Bone-in Lipon Ribeye 17 up (469, 482)	0.356	Inside Skirt (470, 482)	0.495
PSMO Tenderloin (470, 482)	0.356	Top Butt 13 up (470, 482)	0.437	Bone-in Shortrib (470, 482)	0.964
Striploin 0x1 13 dn (379, 482)	0.466	Bone-in Lipon Ribeye 17 dn (466, 482)	0.445	Bone-in Chuck Shortrib (470, 481)	1.318
Top Butt 13 dn (378, 482)	0.506	Top Butt 13 dn (378, 482)	0.514	Outside Skirt (470, 482)	1.875
Boneless Lipon Ribeye 14 dn (379, 482)	0.584	Eye of Round (470, 482)	0.653		
Eye of Round (470, 482)	0.599	Peeled Knuckle (470, 482)	0.661	Trim (AAA & AA) (Fed)	
Oven Ready Rib (362, 53)	0.742	Outside Flat (470, 482)	0.665	Fresh 85% Lean Trimmings (469, 481)	0.253
Bone-in Lipon Ribeye 17 up (383, 482)	0.798	Clod Heart (317, 475)	0.776	Ground Sirloin (392, 468)	1.341
Inside Round (470, 482)	0.886	Striploin 0x1 13 dn (376, 480)	0.780	75% Trim (469, 480)	4.039
Outside Flat (470, 482)	0.988	Boneless Lipon Ribeye 14 dn (379, 482)	0.810	Fresh 50% Lean Trimmings (470, 482)	6.909
Gooseneck (361, 481)	3.714	Inside Round 1" (363, 482)	0.961		

CHAPTER 3: LIVESTOCK MANDATORY REPORTING IN THE UNITED STATES

3.1. HISTORY OF LIVESTOCK MANDATORY REPORTING

The United States LMR Act of 1999 was enacted in 2000 and reporting was implemented in April 2001. The LMR Act was the most substantial meat and livestock market information collection and reporting effort ever undertaken in the United States. Under LMR qualifying packers are required to report transaction prices and volume information on wholesale boxed beef, fed cattle, wholesale lamb, market sheep, wholesale pork (added in 2012), and market hogs to the United States Department of Agriculture (USDA). The Agricultural Marketing Service (AMS) manages data collection and compiles and publishes market information in morning and afternoon daily reports as well as weekly and other summary reports.

The LMR Act occurred because of industry appeals during the 1990s to improve market transparency. Prior to the Act, AMS market reporters collected livestock and wholesale meat market information voluntarily mostly through phone visits with meat packers and livestock producers.[17] Concerns about voluntary reporting included the information not being representative of the market, selective reporting, and almost exclusive focus on negotiated cash market reporting at a time when contracts and marketing agreements were becoming common. **An important charge of LMR was to collect data on non-cash types of transactions to provide market information on private contract livestock and meat trade. This has become an ever more important component of LMR as use of contracts and marketing agreements has expanded substantially in the livestock and meat sectors over the last 20 years.**

During debate about the LMR Act, major producer associations including the National Cattlemen's Beef Association, National Pork Producers Council, and American Farm Bureau Federation publicly supported the legislation. The producer associations cited a need for more market transparency especially relative to alternative marketing arrangements that were evolving beyond negotiated cash trade. In contrast, the American Meat Institute, representing the beef packing industry, were proponents of the Act citing added costs associated with compliance and they perceived little benefits likely to accrue from LMR. Packers generally favored price reporting, but felt the existing voluntary reporting system was sufficient.

Table 3.1.1 summarizes a timeline of noteworthy LMR authorization and related events. Approximately every five years LMR is subject to reauthorization by Congress. Several events in the timeline are worth highlighting:

1. As discussed further below, a few months after LRM launched the guidelines originally used to maintain confidentiality of reported market information were modified. The original 3/60 guidelines were overly restrictive and resulted in considerable nonreportable market information. Basically, the data were being provided by the

[17] Some USDA AMS livestock and meat market information is still collected by marketing reporters in a similar voluntary fashion today on items not covered under LMR such as variety meats, offal, hides, and several others.

packers to the USDA, but the adopted confidentiality guidelines precluded USDA from publishing summary market information.

2. Despite beef packers being proponents of LMR prior to enactment, they voluntarily continued to supply market information to AMS during the 2005 lapse in the LMR Act. Though the lapse only lasted a few days before reauthorization, packers were not required by law to report transactions to USDA during the lapse. They did so anyway, which enabled AMS to continue to publish most market reports. This suggests despite early resistance to LMR by packers, by 2005, the main costs of compliance were likely fully incurred and marginal costs of continuing to report daily market information to USDA were minimal.

3. In 2013, when the U.S. federal government shut down due to the federal budget not being approved, USDA AMS was shut down as well and market reporting paused. A study reviewing LMR prior to reauthorization conducted in 2016 concluded discontinuance of USDA market reporting during the 16-day 2013 federal government shutdown was immensely disruptive to livestock markets and associated participants (Parcell, Tonsor, and Schroeder, 2016). During the shutdown market participants struggled to access important information necessary for price discovery and several other uses (discussed further below). The livestock industry had become dependent on information provided by LMR.

4. In 2018, after considerable industry lobbying USDA AMS market reporting under LMR was deemed an essential government service. As such, when another federal government shutdown occurred in December 2018, AMS market reports continued to be compiled and published despite the shutdown.

5. Recently, LMR reauthorization has been pushed down the road rather than being reauthorized. In September 2020, when reauthorization was due during the COVID-19 pandemic, congress extended it until December 2020. Reauthorization was again extended multiple times and is currently set to be reauthorized in September 2022.

Over time as market information reports associated with LMR became more established, the use of LMR information became institutionalized and used for several purposes beyond the original emphasis on price discovery. In particular, LMR published market information has gained considerable trust across industry stakeholders as well as other government agencies to where today it is used for:

1. Enhancing price discovery by industry participants
2. Providing a source for base prices used in marketing agreements
3. Serving as settlement indexes on CME futures contracts
4. Establishing insurance contracts
5. Indemnity loss payment determination
6. Foundational data for research

7. Central information for market outlook and forecasting
8. Policy analysis

The markets and processing systems responsible for the production and sale of beef in the United States were disrupted by two major shocks in 2019 and 2020. The first occurred when the Tyson Fresh Meats beef packing plant in Holcomb, Kansas closed for four months following a fire at the facility on August 9, 2019. This was followed by major supply chain disruptions and packing plant operational capacity constraints associated with COVID-19 in 2020. These shocks reinforced the importance of LMR to the U.S. cattle and beef industry, commerce, and consumers. The availability of this information allowed market participants to better understand disruptions and anticipate impacts (Tonsor and Schulz, 2020). Looking back at the data provided a way to investigate, document, and corroborate impacts (USDA-AMS, 2020; Lusk, Tonsor, and Schulz 2021).

Table 3.1.1. Summary of LMR Authorization and Other Important Event Timeline in U.S.

Year	Month	Action
1999	October	LMR Act passed
2001	April	LMR implemented
2001	August	3/70/20 confidentiality guidelines replace 3/60 guidelines used by AMS in reporting
2005	September	LMR statutory authority lapsed for three days and packers continued reporting
2005	October	LMR reauthorized
2008	May	Final Rule reestablished LMR
2010	September	LMR reauthorized
2013	October	LMR discontinued reporting during 16-day October government shutdown
2013	September	LMR began for wholesale pork
2015	September	LMR reauthorized
2018	December	LMR deemed essential government service
2020	September	LMR reauthorization extended until December 2020
2020	December	LMR reauthorization extended until Dec. 2021, later to Feb. 2022, and later to Sept. 2022
2022	September	LMR deadline for reauthorization September 30, 2022

Recently USDA-AMS released two new reports. On August 9, 2021 USDA-AMS began publishing a *National Daily Direct Formula Base Cattle* report, which allows correlations between negotiated trade and reported formula base prices to be assessed. Also by comparing formula base and net prices, the net impact of premium and discount adjustments can be better understood. Daily morning, afternoon, and summary formula base price reports will be national in scope to ensure confidentiality. Weekly and monthly reports will be at the national and regional levels and include forward contract base purchase prices. A *National Weekly Cattle Net*

Price Distribution report was first issued on August 10, 2021. The data represent the distribution of average net prices in increments of $2/cwt from the weighted average net price of each purchase type. Purchase types include negotiated, negotiated grid, formula, and forward contract. These new reports are yet another example of USDA-AMS receiving stakeholder feedback and making enhancements to reports and published data to reflect the dynamics of the industry and the value of market information.

3.2. LIVESTOCK MANDATORY REPORTING CONFIDENTIALITY GUIDELINES

From the launch of LMR, maintaining confidentiality of published market data was considered essential. The Act called for maintaining confidentiality of proprietary data, but it did not specifically indicate how that would be accomplished. The Act left it up to USDA to develop market reporting mechanisms to ensure confidentiality. Initially, USDA adopted a 3/60 rule at the request of the Office of Management and Budget. The 3/60 guideline entailed precluding publishing market information which did not have at least three reporting entities or if more than 60% of the trade volume was represented by a single entity in the particular trade area and time period being reported. The 3/60 guideline prevented a substantial number of market reports from being published. From April 2 – June 15, 2001, the first six weeks of LMR enactment, about 24% of all USDA daily reports were not published due to not meeting confidentiality (Heykoop, 2001). In fed cattle the problem was even more pervasive as 81% of national daily afternoon price reports were withheld due to applying 3/60 (Grunewald, Schroeder, and Ward, 2004).

In August 2001, USDA adopted a revised confidentiality guideline, the 3/70/20 rule. The 3/70/20 rule requires meeting all three of the following conditions:[18]

- At least three reporting entities need to provide data at least 50 percent of the time over the most recent 60-day time period.
- No single reporting entity may provide more than 70 percent of the data for a report over the most recent 60-day time period.
- No single reporting entity may be the sole reporting entity for an individual report more than 20 percent of the time over the most recent 60-day time period

Adoption of the 3/70/20 guideline resolved many, but not all, problems associated with nonreportable trade due to confidentiality especially relative to the prohibitive 3/60 rule. However, the 3/70/20 rule continues to preclude substantial reporting for some species (e.g., lamb) and for some regional reports (e.g., Colorado negotiated fed cattle). In regional fed cattle markets, the most binding constraint is the first on the list (the "3" part of the 3/70/20) of at least three reporting entities needing to provide data at least 50% of the time over the recent 60-day period.

Simply requiring three reporting entities provide data to publish market information is likely sufficient for maintaining confidentiality. However, that is a more restrictive rule than USDA

[18] https://www.ams.usda.gov/sites/default/files/media/ConfidentialityGuidelines.pdf

currently uses. In fact simply requiring three entities provide data at any time to publish a market report would likely be nearly as problematic as the original 3/60 rule. In concentrated fed cattle markets where four-firm steer and heifer slaughter packer concentration exceeds 80% nationally in the United States, regionally, it is often much higher. As such, requiring all published data to have at least three packers represented during each time period would prevent many USDA market reports from being published. Applying a less restrictive rule of 3/70/20 enables potentially much more information reporting than if a three reporting entity rule were employed.

Another aspect often not well understood is that USDA regularly publishes data from individual transactions. Many USDA reports contain price ranges where the high and low price for a product is reported even with small volume and small numbers of trades. It is not uncommon for a specific product in a boxed beef report (and others) to contain only three transactions with a high, low, and weighted average reported. For example, consider the snapshot below from the September 2, 2022 *National Daily Boxed Beef Cutout and Boxed Beef Cuts-Negotiated Sales -Afternoon* report (Figure 3.2.1). Take for example the 171C *Round eye of round* where the range is reported at $303 - $310 with a weighted average of $309.61. ***The range reveals two of the three transaction prices in the report***. Yet the published price adheres to the 3/70/20 confidentiality rule.

Figure 3.2.1. Example Boxed Beef Report

USDA National Daily Boxed Beef Cutout And Boxed Beef Cuts - Negotiated Sales - Afternoon

Agricultural Marketing Service
Livestock, Poultry, and Grain Market News

September 02, 2022
LM_XB403

IMPS/FL		Sub-Primal	# of Trades	Total Pounds	Price Range	Weighted Average
120A	3	Brisket, point/off, bnls	0	0	0.00 - 0.00	0.00
123A	3	Short Plate, short rib	3	2,545	575.00 - 625.00	597.87
130	4	Chuck, short rib	8	94,041	324.00 - 420.70	327.73
160	1	Round, bone-in	0	0	0.00 - 0.00	0.00
161	1	Round, boneless	0	0	0.00 - 0.00	0.00
167A	4	Round, knuckle, peeled	5	6,241	285.00 - 309.70	298.45
168	1	Round, top inside round			-	
168	3	Round, top inside round	8	22,214	260.00 - 294.70	282.72
169	5	Round, top inside, denuded	4	29,191	304.00 - 330.00	318.01
169A	5	Round, top inside, cap off			-	
	3	Round, top inside, side off	0	0	0.00 - 0.00	0.00
170	1	Round, bottom gooseneck	0	0	0.00 - 0.00	0.00
171B	3	Round, outside round	5	8,665	280.00 - 303.32	287.97
171C	3	Round, eye of round	3	4,050	303.00 - 310.00	309.61
174	3	Loin, short loin, 0x1	9	16,035	480.00 - 525.41	492.29
175	3	Loin, strip loin, 1x1			-	
	1	Loin, strip loin bnls. 1x1	3	1,606	426.24 - 474.00	439.38
180	3	Loin, strip, bnls, 0x1	11	36,117	467.00 - 519.00	483.77
184	1	Loin, top butt, bnls, heavy			-	

Confidentiality of individual company information has numerous dimensions. How one even defines maintaining proprietary information is debatable. In the example above where under LMR USDA publishes actual prices of individual companies, as long as the companies are not identified and they meet the 3/70/20 guideline, at least for LMR purposes the information is considered not breaching confidentiality. However, how much proprietary information might be published in a market report can also be influenced by factors other than the guideline used to allow or preclude reporting of specific data. The following dimensions of data aggregation prior to publishing market information can impact how much proprietary information might be revealed but all also have tradeoffs:

1. **Aggregating over time.** Daily reports are likely more difficult to maintain proprietary information than weekly or monthly. However, going to weekly or monthly reports by nature makes the reported information lag market activity which can be problematic in a market with rapidly evolving supply and demand information.

2. **Aggregating over products or qualities of the same product.** Individual beef products are much more likely to have fewer buyers and sellers than are several products combined. Aggregation across products and/or quality increases chances of maintaining greater confidentiality of individual transaction data. However, aggregating across products or quality of products reduces the detailed nature of the information on specific products or attributes.

3. **Aggregating across regions.** Market reports representing smaller geographic regions will be more challenging to maintain confidentiality than similar reports that utilize data from several regions at once. Aggregating across regions does not create a problem unless the regions have somewhat segmented markets. If the regions have varied prices relative to each other at times, aggregating across regions masks potentially important spatial price variation.

3.3. GUIDE TO LIVESTOCK MANDATORY REPORTING BOXED BEEF REPORTS

USDA-AMS publishes 6 daily and 11 weekly beef reports under LMR by analyzing an average of 15,000 records per day. These reports cover over 90% of the total boxed beef sales volume.[19] All federally inspected cattle plants which slaughter at least an average of 125,000 head per year are required to report the prices and quantities of all wholesale beef sold prior to the established reporting times to USDA AMS twice per day at 10:00 am CST and 2:00 pm CST

[19] The term “boxed beef,” as defined by the Code of Federal Regulations, means those carlot-based portions of a beef carcass including fresh and frozen primals, subprimals, cuts fabricated from subprimals (excluding portion-control cuts such as chops and steaks similar to those portion cut items described in the Institutional Meat Purchase Specifications (IMPS) for Fresh Beef Products Series 100), thin meats (e.g. inside and outside skirts, pectoral meat, cap and wedge meat, and blade meat), and fresh and frozen ground beef, beef trimmings, and boneless processing beef (e-CFR, 2008).

Monday through Friday (USDA-AMS, 2021a).[20] Daily LMR beef reports are normally published one hour after packers submit data. LMR beef sales reporting are for first time sales only and distributors, grinders, exporters, etc. who do not slaughter do not submit LMR sales data.

Beef items that are submitted include primals, subprimals, cut items, ground beef, and trimmings and boneless processing beef. Beef offal and variety meat sales are not reported to LMR. Each submitted beef sale specifies the following criteria (e-CFR, 2008; USDA-AMS, 2021a):[21]

- Destination – domestic, overseas, or NAFTA (USMCA)
- Sales type – negotiated, formula, or forward contract
- Delivery period – 0-21 days, 22-60 days, 60-90 days, 90+ days
- Refrigeration – fresh, frozen or aged
- Beef type – steer and heifer, cow, bull, dairy bred, etc.
- Grade for steer and heifer beef (e.g., USDA Prime, USDA Choice or better, USDA Choice, USDA Select, ungraded no-roll product) and grade for cow beef or packer yield and/or quality sort for cow beef (e.g., Breakers, Boners, White Cow, Cutters (lean))
- Unbranded or branded product characteristics, if applicable
- Specific item – packer SKU#, or Institutional Meat Purchase Specifications (IMPS) item
- Quantity sold – in pounds
- FOB plant price – in dollars per hundredweight (cwt)

The boxed beef cutout represents the estimated gross value of a beef carcass based on prices paid for individual beef items derived from the carcass. In other words, weighted average prices of individual items are used to calculate a weighted average value for primal cuts. The primal cut values are then used to calculate a carcass equivalent value. The costs of fabricating carcasses into individual beef items are not deducted from the cutout values. USDA surveys packers covered under LMR in July and updates the fabrication yields the following January if necessary. The current yields are rib (11.40%), chuck (29.62%), round (22.32%), loin (21.26%), brisket (4.95%), short plate (7.10%), and flank (3.35%) (USDA-AMS, 2022). The chuck primal constitutes the largest share of the cutout value, followed by the round and loin, and so on.

The 6 daily negotiated beef reports are listed in Table 3.3.1. The term “negotiated” when used in reference to sales of boxed beef means a sale by a packer selling boxed beef to a buyer of boxed beef under which the price for the boxed beef is determined by seller-buyer interaction and agreement on a day (e-CFR, 2008). Negotiated boxed beef cutout specifications include unbranded domestic fresh beef sales to be delivered in 0-21 days from native steers and heifers (except for 50% trimmings) grading Choice and Select. Specifications are similar for negotiated cutter cow cutouts. The *National Comprehensive Boxed Beef Cutout - All Fed Steer/Heifer Sales* report includes the comprehensive value and volumes of all reported wholesale beef trade

[20] Currently, 41 live cattle plants slaughter more than 125,000 head of cattle per year. Over 92% of national fed cattle transactions and 33% of all cow and bull transactions are covered through LMR (USDA-AMS, 2021b).
[21] There are established policies for excluding transactions for particular categories of boxed beef (https://www.ams.usda.gov/rules-regulations/mmr/lmr/excluded-transactions).

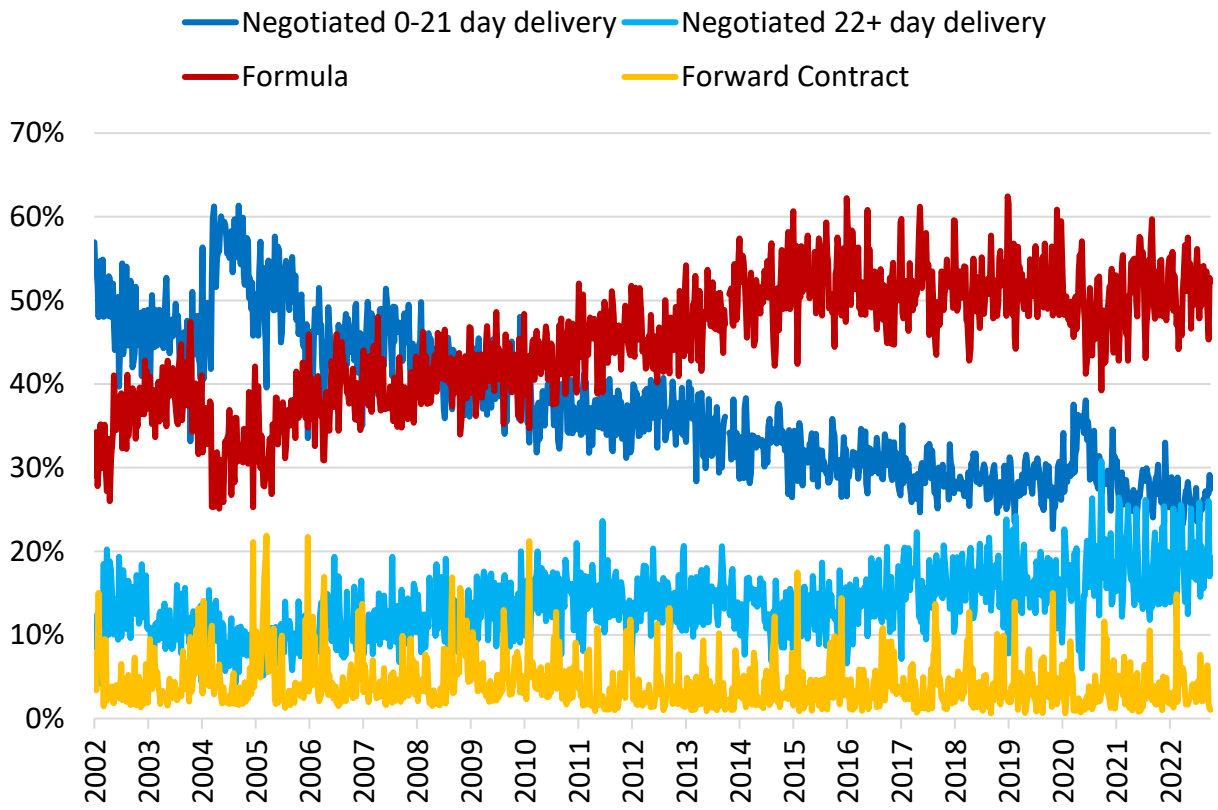
within a week. This report along with the other 10 other weekly beef reports are also listed in Table 3.3.1.

Table 3.3.1. Daily and Weekly LMR Beef Reports

No.	Slug ID	Slug Name	Report Title
Daily			
1.	2450	LM_XB400	National Daily Boneless Cow Beef and Beef Trimmings - Negotiated Sales - Morning
2.	2451	LM_XB401	National Daily Boneless Cow Beef and Beef Trimmings - Negotiated Sales – Afternoon
3.	2452	LM_XB402	National Daily Boxed Beef Cutout and Boxed Beef Cuts - Negotiated Sales - Morning
4.	2453	LM_XB403	National Daily Boxed Beef Cutout and Boxed Beef Cuts - Negotiated Sales - Afternoon
5.	2454	LM_XB404	National Daily Cutter Cow Cutout and Boxed Cow Beef Cuts - Negotiated - Morning
6.	2455	LM_XB405	National Daily Cutter Cow Cutout and Boxed Cow Beef Cuts - Negotiated - Afternoon
Weekly			
1.	2456	LM_XB450	National Weekly Boneless Cow Beef and Beef Trimmings - Formulated Sales
2.	2457	LM_XB452	National Weekly Boxed Beef Cuts - Branded Product - Negotiated Sales
3.	2458	LM_XB454	National Weekly Boxed Beef Cuts - Formulated Sales
4.	2459	LM_XB455	National Weekly Boxed Beef Cuts - Forward Negotiated Sales
5.	2460	LM_XB456	National Weekly Boxed Beef Cuts - Prime Product
6.	2461	LM_XB459	National Weekly Boxed Beef Cutout and Boxed Beef Cuts - Negotiated Sales
7.	2462	LM_XB460	National Weekly Boneless Cow Beef and Beef Trimmings - Negotiated Sales
8.	2463	LM_XB461	Final National Weekly Cutter Cow Cutout and Boxed Cow Beef Cuts - Negotiated
9.	2464	LM_XB462	National Weekly Boxed Beef Cuts - Ungraded Product
10.	2643	LM_XB463	National Comprehensive Boxed Beef Cutout - All Fed Steer/Heifer Sales
11.	2647	LM_XB864	National Boxed Beef Weekly Item Summary

The comprehensive report provides several volume (load count) breakdowns. A unique aspect of these volume breakdowns is that all fed steer/heifer (including dairy bred) product is included.[22] Sales type is categorized as negotiated sales 0-21 day delivery, negotiated sales 22+ day delivery, formula, and forward contract. Boxed beef sales types over the 2002 – September 2022 period are illustrated in Figure 3.3.1. **Most apparent is the increase in formula pricing. Formula pricing went from about 30-40% of sales in the early 2000s to commonly around 50% since 2014. During the same time frame, negotiated trade for 0-21 day delivery went from about 50% to 30% and negotiated trade for 22+ day delivery increased from typically around 10-15% to roughly 20%.** USDA-AMS (2021a) discusses a few possible reasons for the decrease in negotiated sales. One relates to an increase in product variation, i.e., packer SKU inventory totals (product code lists) number in the thousands. Also, there are currently over 100 AMS Certified Beef Programs. With this many products there is increased potential that some sales do not meet confidentiality guidelines and so they are not published in reports.

Figure 3.3.1. U.S. Comprehensive Boxed Beef Volume by Sale Type



[22] https://www.ams.usda.gov/sites/default/files/media/Comprehensive%20Boxed%20Beef%20Cutout%20Overview%20PDF.pdf

Quality grade is divided into Prime, Branded (which includes all Choice branded such as Upper 2/3rds and lower 1/3rds Choice), Choice, Select, and Ungraded (which includes cuts, grinds, and trim) and shown in Figure 3.3.2. Ungraded product has consistently been above 30% of sales for the last 20 years. While Choice grade has averaged about 30% of sales what has changed over time is that Branded product has grown from under 10% in the early 2000s to roughly 20% today. Branding of beef retail products has gained momentum in recent years (Schulz, Schroeder, and White, 2012). For example, in 2004, 42% of beef retail products were branded, a figure that grew to 63% in 2010 (National Cattlemen's Beef Association, 2010). Prime product sales have quadrupled over the last 20 years.

Figure 3.3.2. U.S. Comprehensive Boxed Beef Volume by Quality Grade

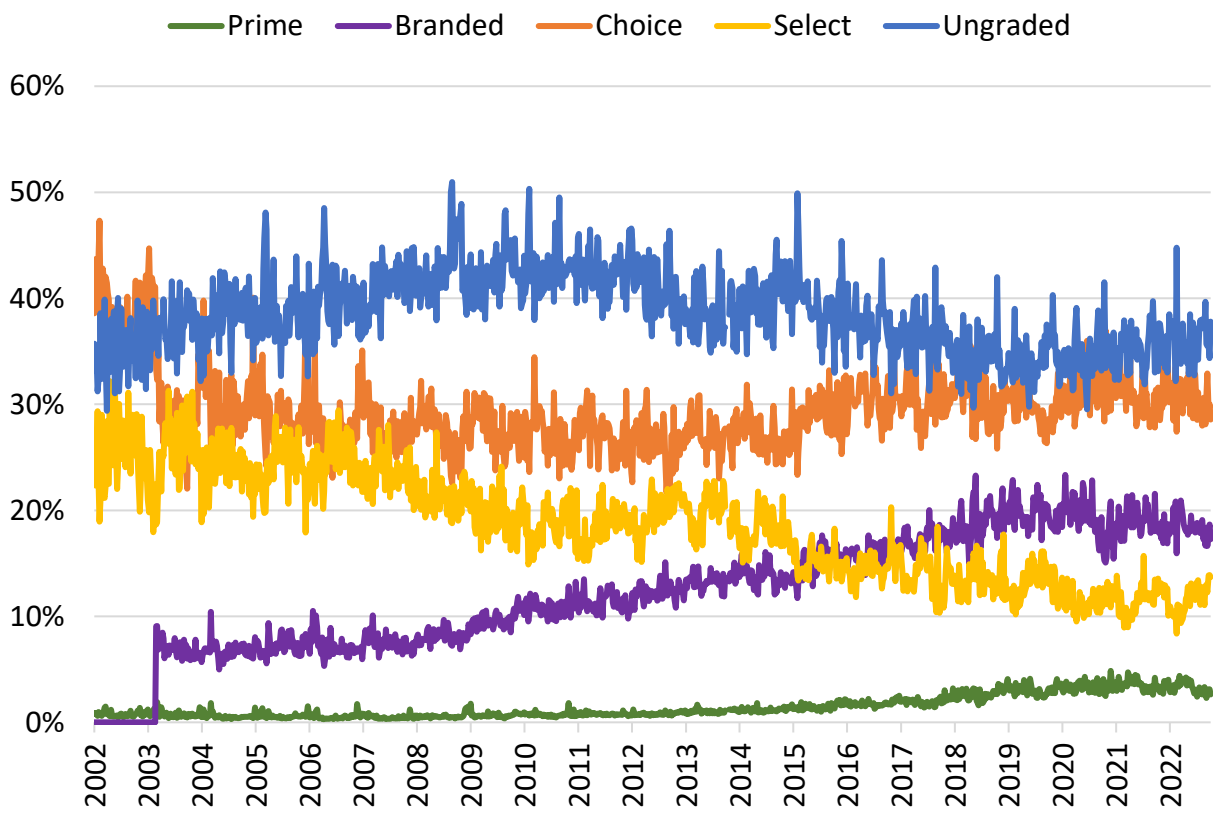


Figure 3.3.3 shows boxed beef sales destinations. Destination is divided into domestic sales and total exports (prior to September 2008) and after that NAFTA (USMCA) exports and overseas exports. Boxed beef exports to Canada and Mexico have maintained about 1%-2% of total sales volume over time while exports to the United States' diverse portfolio of other export customers has grown to 10%-20% of the weekly comprehensive boxed beef volume. As exports play an ever-increasing role in price discovery, this data has the potential to provide an indication of export demand developments.

Figure 3.3.3. U.S. Comprehensive Boxed Beef Volume by Destination

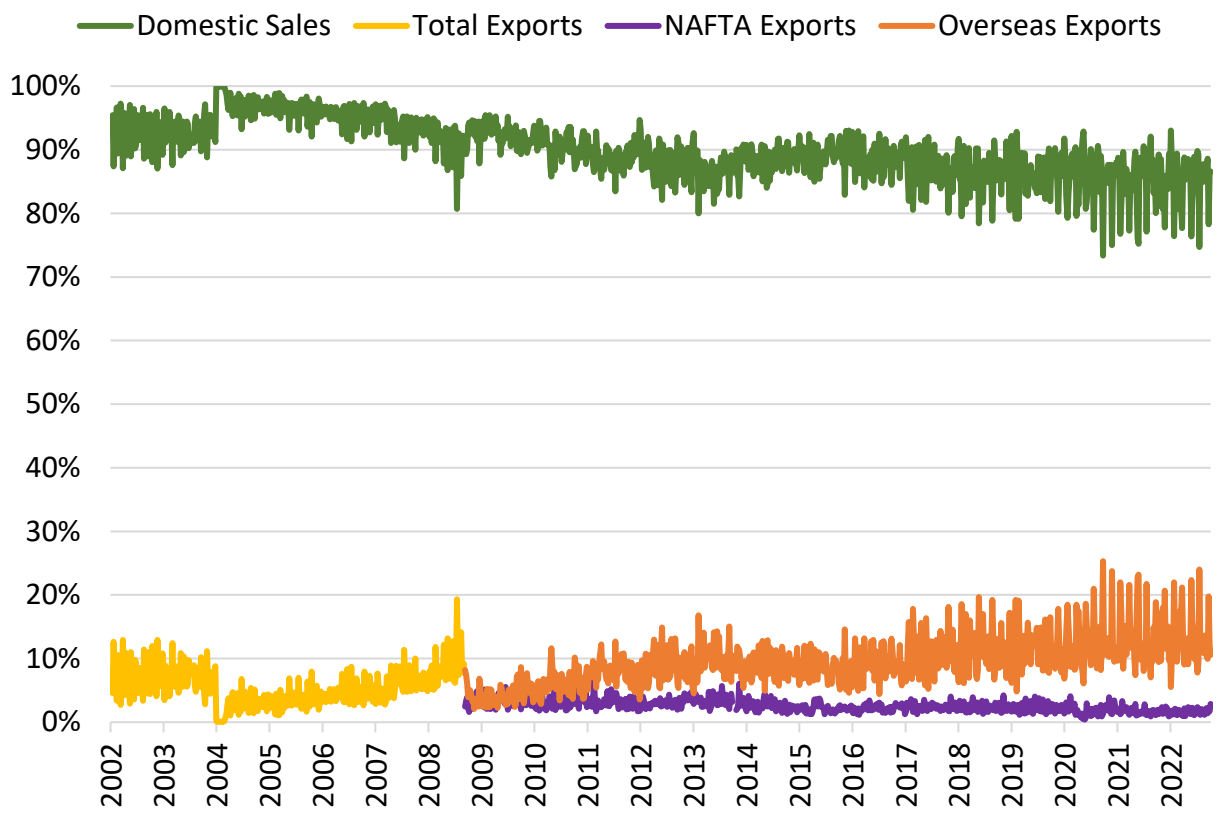
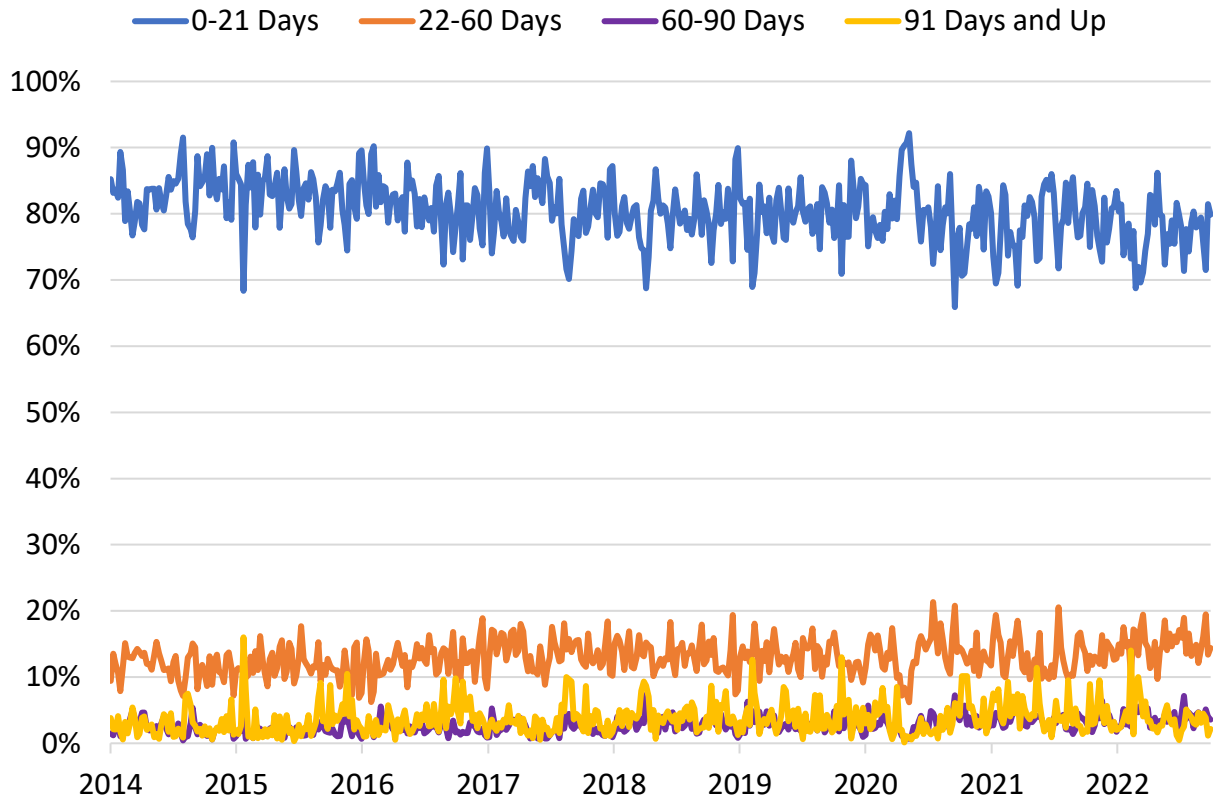


Figure 3.3.4 shows boxed beef delivery periods included in the comprehensive report. This data has been available since 2014. It has been said that food service and retail establishments price wholesale purchases well in advance of delivery (Schroeder, Coffey, and Tonsor, 2021). USDA Economic Research Service (2022) data shows that food away from home represented about 49% of total food expenditures in 2014. This increased to 53% in 2021 and 2022. Over the 2014 – September 2022 period boxed beef priced in advance of 21 days of delivery has increased from 17% in 2014 to over 20% of boxed beef trade in 2021 and 2022. Furthermore, during some weeks, more than 30% of boxed beef is priced more than three weeks forward. The pandemic's effect on forward purchases was significant. Deliveries in the 61-90 day and the 90 day and more windows fell below 1% of the total boxed beef trade for some weeks in the spring of 2020. From a buyers perspective there was likely hesitation to book forward looking deliveries with such an uncertain situation.

Figure 3.3.4. U.S. Comprehensive Boxed Beef Volume by Delivery Period



CHAPTER 4: ALTERNATIVE INFORMATION REPORTING AND PUBLISHING CONSIDERATIONS

4.1. CONSOLIDATING INFORMATION ACROSS CATEGORIES OR WEEKS

Canadian beef market information reporting under the current system, conditional on maintaining confidentiality, has become challenging. **The most apparent way to attempt to address confidentiality constraints and still maintain the criteria of trade collected (i.e., negotiated sales with delivery to the domestic market within 0-21 days, non-branded product, etc.) voluntarily is to aggregate data across reporting categories or over time.**

The process by which boxed beef prices and cutout values are derived already involves aggregation. A beef carcass is fabricated into individual cuts which are grouped into primals, vacuum packaged, and then placed into cartons to be shipped as boxed beef. The cutout value is derived from a formula that estimates the value of the carcass using a weighted average from primals. Primals are broken down into the percentage weight they contribute to the carcass value. It is from these values that the cutouts are calculated. Even if individual products, thin meats, trim, and ground beef data is suppressed in the Canadian Boxed Beef Report, it is still being used in primal and cutout calculations. Assuming a minimum level of wholesale beef reporting volume could be maintained voluntarily (see section 4.2), primal values and carcass cutouts could continue to be published under the current format. One could also consider aggregating across quality grades, AAA and AA, into a single category. A major drawback to this aggregation is that combining categories reduces the content of the market information that is discernable from market reports. For example, in general the round, chuck, and loin are usually good indicators of beef movement (Canfax, 2008), but if only carcass cutouts are published this indicator is not available. Similarly, the value of lean trim has an impact on all primal values (Canfax, 2008) but without publishing lean trim information the degree of this impact is unknown.

Another consideration is to combine multiple weeks into published categories. We examined consolidating across a four-week period for the years 2018 and 2019. Table 4.1.1 and Table 4.1.2 summarize how packers reporting and confidentiality guidelines would have impacted the ability to publish individual items weekly based on using a rolling four-week period. Under this approach of consolidating and publishing, a higher percentage of weeks are publishable because there is a fewer percentage of weeks that there is no high-low price range and a fewer percentage of weeks that packers did not report.[23] This is as expected because a "week" is now defined as a four-week rolling period. An individual packer could conceivably be the only packer providing both the high and low price during a four-week period. However, under the current publishing procedure this would still fall within confidentiality guidelines as a high-low price range would be available.

[23] We also considered consolidating by calendar month. Results were similar in that in general more items would be publishable. Under this approach to consolidation, only 12 monthly reports would be published each year as opposed to the rolling four-week period approach that would provide weekly reports.

Table 4.1.1. Percentage of Weeks Products Publishable, No High-Low Price Range, and Not Reported, Rolling 4-Week Period

	AAA						AA					
	Publishable		No High-Low Range		Not Reported		Publishable		No High-Low Range		Not Reported	
	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019
Quebec Spec	50%	0%	0%	0%	50%	100%	50%	31%	0%	0%	50%	69%
Semi-Boneless	90%	62%	0%	0%	10%	38%	54%	34%	0%	0%	46%	66%
Short Cut shoulder clod	96%	94%	0%	6%	4%	0%	96%	100%	0%	0%	4%	0%
Clod Heart	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%
Clod Tender	33%	58%	33%	0%	35%	42%	58%	75%	27%	0%	15%	25%
2 Piece Boneless Chuck	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%
Chuck Roll	96%	100%	0%	0%	4%	0%	96%	100%	0%	0%	4%	0%
Chuck Roll 0x0	58%	0%	0%	0%	42%	100%	58%	34%	0%	0%	42%	66%
Oven Ready Rib	90%	69%	0%	0%	10%	31%	4%	4%	0%	0%	96%	96%
Bone-in Lipon Ribeye 17 up	54%	0%	0%	0%	46%	100%	96%	100%	0%	0%	4%	0%
Bone-in Lipon Ribeye 17 dn	96%	100%	0%	0%	4%	0%	96%	100%	0%	0%	4%	0%
Boneless Lipon Ribeye 14 up	96%	92%	0%	0%	4%	8%	96%	100%	0%	0%	4%	0%
Boneless Lipon Ribeye 14 dn	54%	0%	0%	0%	46%	100%	54%	34%	0%	0%	46%	66%
Back Ribs	88%	37%	0%	0%	12%	63%	88%	85%	0%	0%	12%	15%
Short Loin 1x0	96%	100%	0%	0%	4%	0%	96%	100%	0%	0%	4%	0%
Striploin 0x1 13up	96%	100%	0%	0%	4%	0%	96%	100%	0%	0%	4%	0%
Striploin 0x1 13dn	54%	0%	0%	0%	46%	100%	54%	34%	0%	0%	46%	66%
Top Butt 13up	96%	100%	0%	0%	4%	0%	96%	100%	0%	0%	4%	0%
Top Butt 13dn	54%	0%	0%	0%	46%	100%	54%	34%	0%	0%	46%	66%
PSMO Tenderloin	96%	100%	0%	0%	4%	0%	96%	100%	0%	0%	4%	0%
Butt Tenderloin	96%	100%	0%	0%	4%	0%	96%	100%	0%	0%	4%	0%
Boneless Round	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%
Inside Round 1"	0%	0%	21%	0%	79%	100%	0%	0%	21%	0%	79%	100%
Inside Round	96%	100%	0%	0%	4%	0%	96%	100%	0%	0%	4%	0%
Outside Flat	96%	100%	0%	0%	4%	0%	96%	100%	0%	0%	4%	0%
Eye of round	96%	100%	0%	0%	4%	0%	96%	100%	0%	0%	4%	0%
Peeled Knuckle	96%	100%	0%	0%	4%	0%	96%	100%	0%	0%	4%	0%
Gooseneck	0%	0%	21%	0%	79%	100%	0%	0%	21%	27%	79%	73%

Table 4.1.2. Percentage of Weeks Thin Meats, Trim (Fed), and Ground Beef Publishable, No High-Low Price Range, and Not Reported, Rolling 4-Week Period

	Publishable		No High-Low Range		Not Reported	
	2018	2019	2018	2019	2018	2019
Thin Meats						
Chuck Tender	96%	100%	0%	0%	4%	0%
Briskets 120	96%	100%	0%	0%	4%	0%
Bone-in Chuck Shortrib	96%	100%	0%	0%	4%	0%
Flat Iron	100%	100%	0%	0%	0%	0%
Blademeat	96%	100%	0%	0%	4%	0%
Bone-in Shortrib	63%	90%	33%	10%	4%	0%
Outside Skirt	79%	100%	17%	0%	4%	0%
Inside Skirt	90%	96%	6%	4%	4%	0%
Flapmeat	96%	100%	0%	0%	4%	0%
Ball Tips	96%	100%	0%	0%	4%	0%
Tri Tips	52%	96%	44%	4%	4%	0%
Flank Steak	96%	100%	0%	0%	4%	0%
Pectoral Muscle	96%	100%	0%	0%	4%	0%
Lointails	21%	46%	38%	0%	40%	54%
Trim (Fed)						
Fresh 50% Lean Trimmings	96%	100%	0%	0%	4%	0%
Fresh 65% Lean Trimmings	100%	100%	0%	0%	0%	0%
Fresh 75% Lean Trimmings	100%	100%	0%	0%	0%	0%
Fresh 81% Lean Trimmings	40%	100%	60%	0%	0%	0%
Fresh 85% Lean Trimmings	100%	100%	0%	0%	0%	0%
Shankmeat	100%	100%	0%	0%	0%	0%
Ground Beef						
Extra Lean Ground Beef	100%	100%	0%	0%	0%	0%
Lean Ground Beef	92%	100%	0%	0%	8%	0%
Medium Ground Beef	58%	100%	0%	0%	42%	0%
Regular Ground Beef	100%	100%	0%	0%	0%	0%
Ground Chuck	100%	100%	0%	0%	0%	0%
Ground Sirloin	92%	100%	0%	0%	8%	0%

A concern with combining multiple weeks is that if divergent market values are combined or the market price is changing rapidly this can result in published market information that is difficult to interpret or of little value. For example, if prices were forward trending the prior week but the three weeks prior to that were flat or trending lower, combining data across the four-week period could result in an averaging out and masking of the market trend. **The tradeoff is clear, consolidation might increase the ability to publish, but at the cost of information content and value.** Furthermore, consolidating information across reporting

categories or over time cannot resolve thinning market trends. Addressing this issue is the purpose of the next several sub-sections of Section 4 of this report.

4.2. LOADS NEEDED FOR CANADIAN BOXED BEEF REPORTING

Hayenga et al. (1978) defines a "thinly-traded" market, or "thin" market for short as one "with few negotiated transactions per time period." The thinness of a market does not necessarily imply poor market performance, but prices determined in thin markets raise potential concerns (Hayenga et al., 1978; Tomek and Robinson, 1990). Peterson (2005) summarizes three major concerns related to thin markets. First, transacted and reported prices may no longer represent overall supply and demand conditions. For example, did the 17.8% of FI fed beef production captured in the Canadian Boxed Beef Report on average in 2019, and the price levels and price changes of individual cuts, primals, and carcass cutouts accurately represent Canadian wholesale beef market conditions? Second, thinness may cause excess volatility in the market price, increasing transaction costs for market participants due to higher price risk. As this relates to the availability of information, Hayenga et al. (1978) contend that insufficient public information may be an externality associated with thinly-traded markets, heightening barriers to entry and forcing firms to internally increase costs to gather sufficient market information. Third, thin markets can make price manipulation easier due to the magnified impact of individual transactions.

The definition of what might constitute an acceptable number of negotiated transactions per time period in a particular market is necessarily subjective. Tomek (1980) suggested the use of a statistical measure, Chebychev's inequality, as a metric of the reliability of an existing price series. In recent years this framework has been applied to determining 'how thin is too thin' in national and regional fed cattle markets in the United States (Koontz, 2013) and in the U.S. wholesale pork market (Parcell, Schroeder, and Tonsor, 2009; Franken and Parcell, 2012). The issue of reliability of a price has several dimensions. First, reliability is subject to how much error in the market price one is willing to tolerate. Wider tolerance suggests the need for fewer trades. However, even modest tolerance levels can have large dollar impacts. Furthermore, the likelihood that pricing errors are symmetric around zero might be questionable. Second, reliability of a price depends on how much confidence market participants want to have in the price being within a certain error tolerance. That is, if one wants to be 90% sure that the price is accurate, this takes a lot more transactions than if one wants to be 80% sure.

Chebychev's inequality allows for the calculation of a desired number of transactions, or observations, to obtain a given level of expected price reliability. That is, given the error tolerance, the confidence level desired, and the variance in weekly carcass cutout price changes from one week to the next, we can calculate the number of observations needed to reliably compose the Canadian Boxed Beef Report. This computed number of observations, which represents the expected number of observations from Chebychev's inequality, can then be compared to the actual quantity of trade reported to assess the sufficiency, or insufficiency, of

the volume currently deriving Canadian boxed beef prices. Chebeychev's inequality can be expressed as:

$$P(-c \leq X_n - \mu \leq c) \geq 1 - \frac{\sigma^2}{nc^2}$$

where *P* is a probability operator or the confidence level, X and μ represent the mean and deviation from the mean, respectively, c represents the desired margin of error, σ^2 is the variance of the data series, and n is the number of observations. Rearranging Chebychev's inequality to solve for the minimum n necessary to satisfy the inequality yields:

$$n = \frac{\sigma^2}{(1-P)c^2}$$

where greater numbers of observations n are required as the level of pricing reliability desired increases (i.e., higher P and lower c), and for any particular chosen level of pricing accuracy, n increases with market variation σ^2.

Determining the number of observations necessary to yield a certain level of confidence with reported Canadian boxed beef price data requires a few assumptions to be made. Observations or transactions are measured in load counts. Because the total load count in the Canadian Boxed Beef Report includes AAA and AA grades, a weekly weighted average composite Canadian carcass cutout price was constructed.[24] The probability of reliability was set at 90%, which while arbitrary, was the customary level in related research (Parcell, Schroeder, and Tonsor, 2009; Franken and Parcell, 2012). The value of the desired margin of error was set to six separate levels including \$0.0010, \$0.0025, \$0.0050, \$0.0100, \$0.0250, and \$0.0500 per pound (lb.) (Table 4.2.1).

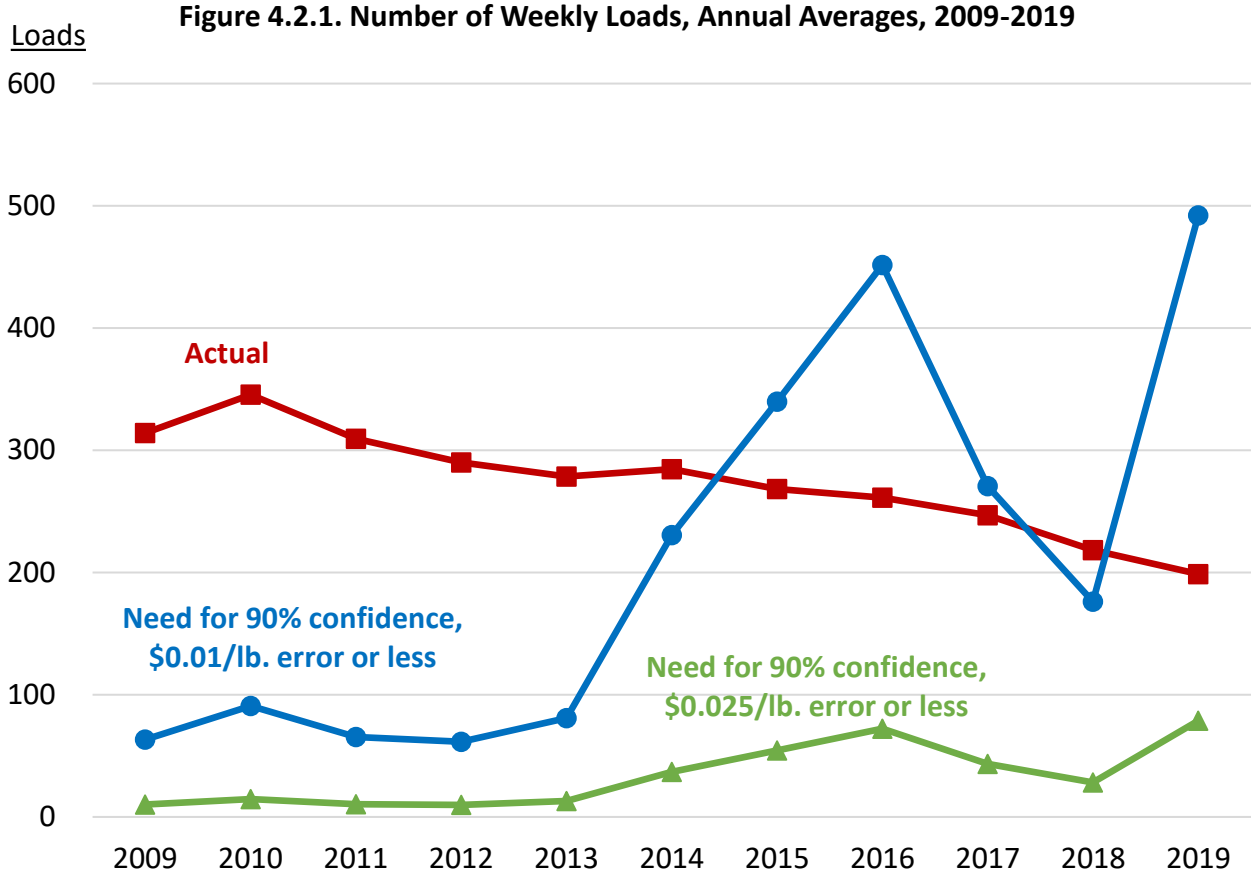
Figure 4.2.1 illustrates for two different error tolerance levels (\$0.01/lb. and \$0.025/lb.) the number of loads that would be needed each week to have 90% confidence that the carcass cutout price is accurately reflecting market supply and demand conditions. The number of loads needed for each scenario are calculated across years and compared to the estimated number of loads on average each year.

For a typical week in 2019, the calculation with 90% confidence and \$0.01/lb. error tolerance would have been (0.0049) / [(1- 0.90) × $(0.01)^2$] = 492 observations. In other words, during 2019, to be 90% certain the carcass cutout price was not more than \$0.01/lb. in error, would have required 492 loads per week. With increased variability in prices during 2019, the number of loads needed to have 90% confidence that the price is not wrong by more than \$0.01/lb. would have been well above the actual number of transactions on the typical week. If one is

[24] The weekly weighted average price was calculated using the published carcass cutout of Canadian AAA and Canadian AA and the respective monthly U.S. percentage of Choice and Select graded beef pounds from the USDA Agricultural Marketing Service Meat Grading reports available at https://www.ams.usda.gov/reports/meat-grading.

willing to tolerate a $0.025/lb. error, the number of loads needed is below the actual number (79 compared to 199) during a typical week in 2019.

Figure 4.2.1. Number of Weekly Loads, Annual Averages, 2009-2019



Some may argue that with higher carcass cutout prices in 2019, the tolerance error could be higher and based upon a percentage of the price level. However, as a percentage of the average price, the standard deviation in weekly carcass cutout prices was 2.5% in 2019 up from 1.6% in 2018. Increasing the tolerance rate with increasing carcass cutout prices directly increases the industry cost of pricing errors. So, adjusting tolerance error to overall carcass cutout price levels is not recommend without careful assessment of the industry level dollar impact of price errors. For example, if the composite carcass cutout price on a particular day was $0.01/lb. lower than market conditions indicate was the correct price, live animal equivalent prices that were derived from carcass cutout prices would have been $0.0065/lb., or $0.65/cwt lower, on average in 2019.[25] This equates to about $9 per head or $442,060 per week assuming a 50,000 head weekly fed cattle slaughter run. This potential loss amount is linear and is double if the composite carcass cutout price is lower by $0.02/lb. On the other hand, if the carcass cutout price is over-stated relative to market conditions, higher live animal equivalent prices would be realized. The likelihood that pricing errors are symmetric around zero might be questionable.

[25] The weekly Canadian Boxed Beef Report can be used as a marketing tool to work backwards and determine approximately what live fed cattle prices could be. See Canfax (2008) for calculations from carcass cutout prices to live animal equivalents.

Table 4.2.1. Summary of Statistically Inferred Load Counts Based on Level of Accuracy

Year	Proportion of AAA, AA/A to FI Fed Beef Production	Average Weekly Load Count	Average Price ($/lb.)	Average Price Change ($/lb.)	Average Variance of Week-to-Week Price Difference	Estimated Load Count Necessary from Chebychev's Inequality (P = 0.90, c = stated value)					
						0.0010	0.0025	0.0050	0.0100	0.0250	0.0500
2009	0.31	314	1.6248	-0.0052	0.0006	6,330	1,013	253	63	10	3
2010	0.34	345	1.5672	0.0018	0.0009	9,080	1,453	363	91	15	4
2011	0.33	309	1.7188	0.0046	0.0007	6,545	1,047	262	65	10	3
2012	0.32	290	1.8612	0.0011	0.0006	6,151	984	246	62	10	2
2013	0.33	279	1.9321	0.0039	0.0008	8,084	1,293	323	81	13	3
2014	0.31	285	2.5271	0.0144	0.0023	23,056	3,689	922	231	37	9
2015	0.30	268	2.9516	0.0000	0.0034	33,967	5,435	1,359	340	54	14
2016	0.27	261	2.6660	-0.0066	0.0045	45,162	7,226	1,806	452	72	18
2017	0.25	247	2.6445	-0.0005	0.0027	27,078	4,332	1,083	271	43	11
2018	0.21	218	2.6678	0.0007	0.0018	17,623	2,820	705	176	28	7
2019	0.18	199	2.7853	-0.0022	0.0049	49,211	7,874	1,968	492	79	20

Notes: The average price, average price change, and average variance of the week-to-week price difference is across a 52-week year. Load count refers to 40,000 lbs. The load count necessary is the number of observed loads required to allow one to infer that 90% of the time the week-to-week composite carcass cutout price movement will fall within a range of the previous week price level +/- the stated level of *c*. Levels of *c* are in dollars per pound. As the level of *c* decreases, the number of loads increases in order to ensure confidence in the estimate.

4.3. COMPREHENSIVE REPORTING AND PUBLISHING OF BEEF MARKET TRADE

Hayenga et al. (1978) states that "a market judged to be 'thin' need not be an illiquid, or poorly performing market. There may be sufficient volume 'waiting in the wings' that could be quickly triggered into the price determination process." The authors go on to describe this potential volume as similar products which are only slightly differentiated in time, form or geographic dimensions and that are transferred in vertically integrated forms or via reference price contracts.

Beef is being marketed in dramatically different ways today than in the past. Negotiated trade has been replaced by formula pricing, forward markets, and longer term marketing agreements. Changes in products being produced by packers through value added, branding, specialty programs, and other differentiation challenges market information reporting (Parcell, Tonsor, and Schroeder, 2016). Furthermore, the importance of international trade is elevating in the beef market as more volume (and value) is destined for export markets. LMR data provides evidence of these changes in the U.S. wholesale beef market (see section 3.3). While we do not have the data to speak directly to these changes in the Canadian market, there is some evidence of additional wholesale beef volume that could be reported by packers. Recall, there were very large weekly load counts, relative to weekly fed beef production, voluntarily reported by Canadian packers for weeks ending June 21 in 2013 and July 3, July 10, July 17, July 24, and August 4 in 2015. Given that this was a run of several weeks in 2015, a plausible explanation could be that a new person at a plant being trained to report included more trade than met the specified criteria (personal communication, Brenna Grant, Manager of Canfax). This could have consisted of formula or forward contract sales, export trade, branded beef, and so on.

If the goal of the Canadian Boxed Beef Report is to provide prices and quantities from Canadian beef packers selling in a manner representative of the Canadian wholesale beef market, than an obvious option to consider is to create a Canadian Comprehensive Boxed Beef Report. This could be akin to the *National Comprehensive Boxed Beef Cutout - All Fed Steer/Heifer Sales* report under LMR in the United States. The whole comprehensive report includes all sales types, all delivery periods, and all delivery locations. It consists of fresh, frozen, and aged product. Only fed steer/heifer beef is included, with no cow or blended cow product. Quality grades include Prime, Choice, Select, ungraded, and branded product (which includes all Choice branded such as Upper 2/3rds and lower 1/3rds Choice). Select branded product is absorbed into the Select category. For the cutout section of the comprehensive report only packer's beef item codes equivalent to an Institutional Meat Purchase Specification IMPS (item) are used in cutout calculations. Specialty cut product, small box product and small chub GB are examples of items that are not equated to IMPS. Cut items do not include dairy bred steer/heifer source, but dairy bred beef is included in trimmings and grinds.[26]

[26] https://www.ams.usda.gov/sites/default/files/media/Comprehensive%20Boxed%20Beef%20Cutout%20Overview%20PDF.pdf

If the popularity of beef × dairy crossbred cattle continues in Canada,[27] inclusion of beef derived from these cattle should be considered. Beef x dairy crossbreds are an increasing crossbreeding opportunity for dairy producers because the calves offer greater value than straight dairy. Recent research indicates beef products produced from beef x dairy crossbred cattle can be marketed alongside straight beef breed products in retail settings without consumer differentiation by color or shape. Furthermore, tenderness, flavor, and juiciness are similar or better for beef x dairy crossbred cattle (Foraker et al., 2022). This suggests beef from the two breeds (beef x beef and beef x diary crossbred) will be strong substitutes, if not perfect substitutes, in the wholesale beef market. Accordingly, the following are some pros and cons of including dairy-beef in Canadian wholesale beef market reporting.

Pros of including dairy x beef in Canadian wholesale beef market reporting:

- Because beef from straight beef-bred and beef x dairy crossbred products appear to be strong substitutes, they will undoubtedly have similar price patterns meaning including both together in reporting increases reportable volume of products for price reporting, thereby, reducing thin market concerns.
- To the extent beef x dairy crossbred cattle are represented more by some smaller packing plants that may have less volume of beef x beef only products but additional volume of beef x dairy products, combining the two sources may enable utilizing data from more plants in price reporting, thereby, reducing data confidentiality concerns.
- Because beef x dairy crossbreeding is a growing practice, the opportunities will continue to increase to add more volume from this category for price reporting.

Cons of including dairy x beef in Canadian wholesale beef market reporting:

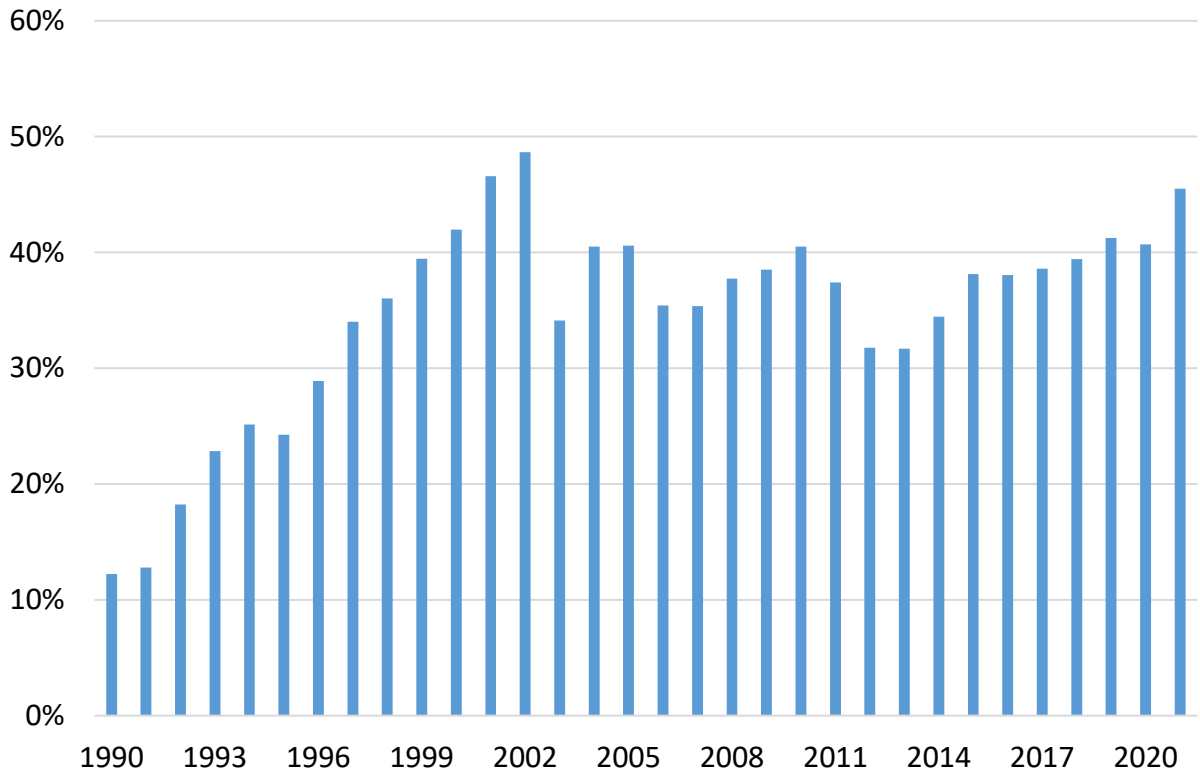
- If beef x dairy crossbred beef is not as strong of a substitute for beef x beef products as current literature suggests is probable, or if for example export markets segregate the two sources with differentiated pricing, then including beef x diary crossbred products in with beef x beef wholesale products could dilute beef x beef product prices some. This would need to be monitored.
- To combine beef x diary crossbred beef with existing beef x beef products requires segregating beef x diary sales records from straight dairy beef sales. Since beef x diary is likely to have greater value than straight dairy, this is likely to happen in the market anyway. However, in price reporting, data collection would need to be verified or somehow need to be kept identified correctly so straight dairy beef prices do not end up comingled in with beef x dairy crossbred beef. If they are, this will dilute wholesale beef price reporting.
- Branded-beef programs have increased in both prevalence and prominence in recent decades. These programs offer vertical alignment benefits to participating producers, but often time cattle demonstrating dairy breed characteristics are specifically excluded from many branded-beef programs. The relevance of this in price reporting is unless

[27] https://www.ontariobeef.com/programs/dairy-beef.aspx.

dairy x beef crossbred beef becomes accepted in branded beef programs, it could be less of a perfect substitute over time for straight beef-bred products and result in a price discount for dairy x beef crossbred beef.

An analysis of the possible increase in loads resulting from capturing U.S. and Mexico trade was conducted. On a carcass weight basis, Canada exported 46% of domestically produced beef in 2021 (Figure 4.3.1).[28] This was the third highest percentage since 1990 and the highest percentage since 2002. Still, Canada has consistently exported over 30% of production dating back to 1997.

Figure 4.3.1. Percent of Canadian Beef Exported, Carcass Weight Equivalent, 1990-2021



Data source: Statistics Canada, Supply and disposition of food in Canada.

[28] Data for beef products are typically reported in metric tons of product weight. The quantity data is often converted from a product-weight basis to a carcass-weight-equivalent (CWE) basis. Data are converted to a CWE basis to allow “apples-to-apples” comparisons to beef production data which are reported in CWE. Quantities are also often converted from metric tons to pounds. Beef carcasses typically have the feet, head, tail, hide, and internal organs removed, although there are some variations across countries. Carcass weight intends to measure the weight of skeletal muscle and bones after the other parts listed above have been removed. Also, for boneless beef products, the conversion factor "adds back" the weight of the bones removed from that portion of the carcass. For processed-meat products, such as sausage, the conversion factors assume some fixed fraction of the product is beef, pork, chicken, etc. The factors for converting product weight to carcass-weight equivalent are based on studies of the relative weights of carcass components, where composition is considered by type of cut and by the shares of muscle, bone, and fat in these parts (USDA-ERS, 1992).

Canadian exports to the United States and Mexico represented 73% and 3%, respectively, of total Canadian beef export volume in 2021 as shown in Figure 4.3.2. On a value basis, it was 76% and 4%, respectively. Over three-quarters of the total Canadian export volume to the United States and Mexico is fresh or chilled product (not frozen). Canadian beef exports to the United States are dominated by loin cuts and chuck cuts and also strong rib cut and trimmings trade.[29]

The Canadian Boxed Beef Report included Canadian sales only except for some items that included export volumes. These items were Outside Skirt, Inside Skirt, Flapmeat, Ball Tips, Tri Tips, Lointails, Fresh 50% Lean Trimmings, Fresh 65% Lean Trimmings, Fresh 75% Lean Trimmings, Fresh 85% Lean Trimmings, and Shankmeat.[30] Canadian sales and export volumes of these items account for about 17% of the total load count in the Canadian Boxed Beef Report. The data is unavailable to calculate the percentage that is represented by Canadian sales versus North American exports.

Table 4.3.1 provides the total load count of Canadian fresh or chilled and frozen beef exports to the United States and Mexico. Recall, from Table 4.2.1 actual load counts have generally been below the load counts needed to be 90% certain the carcass cutout price was not more than $0.01/lb. in error. Assuming the export trade met the remaining criteria for Canadian wholesale beef reporting (i.e., negotiated with delivery within 0-21 days, etc.), only about 1.0% of the fresh or chilled exports to the United States and Mexico would be required to get to this needed level of load counts. Furthermore, if one wanted be 90% certain the carcass cutout price was not more than $0.005/lb. in error only about 10% of the fresh or chilled beef exports to the United States and Mexico would be needed.

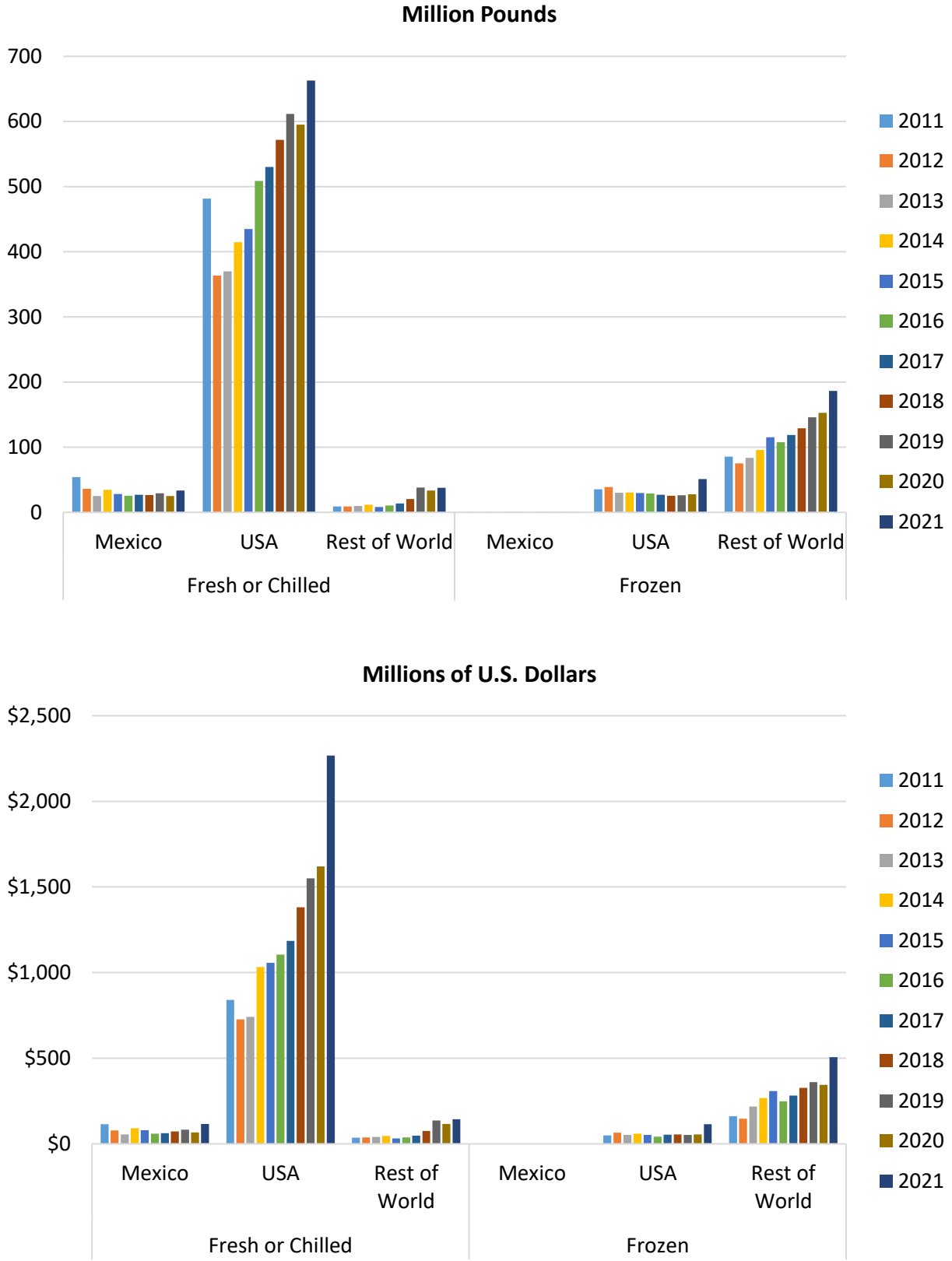
Table 4.3.1 Loads of Beef Exported to the United States and Mexico and Available to be Captured and Added to Canadian Boxed Beef Reporting

	2015	2016	2017	2018	2019	2020	2021
Fresh or Chilled							
USA	10,875	12,715	13,250	14,297	15,292	14,877	16,570
Mexico	706	639	673	667	733	629	839
USA & MX	11,581	13,354	13,923	14,964	16,025	15,506	17,409
Frozen							
USA	738	723	674	634	656	691	1,278
Mexico	12	12	10	13	9	16	5
USA & MX	750	735	683	647	665	707	1,283

Data source: Data source: UN Comtrade DataBase.
Notes: One load count = 40,000 pounds.

[29] Harmonized (HS-10) codes (https://hts.usitc.gov/?query=beef) include 0201.30.50.45 (BFBLQ,XPFC,LOIN), 0201.30.50.35 (BFBLQ,XPFC,CHKCT), 0201.30.50.25 (BFBLQ,XPFC,RIBCT), and 0201.30.50.85 (BFBLQ,XPFC,CTNES), respectively.
[30] Harmonized (HS-10) codes (https://hts.usitc.gov/?query=beef) include 0201.30.50.85 (BFBLQ,XPFC,CTNES), 0202.30.50.85 (BFBLQ,XPFZ,CTNES), 0201.20.50.85 (BFBIQ,XPFC,CTNES), and 0202.20.50.85 (BFBIQ,XPFZ,CTNES).

Figure 4.3.2. Canadian Exports, Meat of Bovine Animals, 2011-2021



Data source: UN Comtrade DataBase.

4.4. PRICE INDICES

Numerous uses can be made of published prices of individual beef products. However, the price level is secondary to measuring price changes. Therefore, even biased prices can provide a viable measure of price changes for use in an index assuming the bias is consistent. To collect sufficient prices to publish detailed price reports can require large sample sizes. Data availability and collection costs can exceed available resources. A price index is a tool that simplifies the measure of movements in a price series.[31]

A price index measures the change in prices from some reference point, or base period, to another point in time. Ideally the base period is one not impacted by inflation or supply chain disruptions. The closer the base period is to the current time, the more value an index may have in predicting future trends. The index reference point is generally one year but can span multiple years. For example, federal U.S. law requires USDA to maintain the prices paid and prices received index series using the 1910-1914 base period for parity price purposes. Updates use more recent base reference periods. The 2011 base year (2011=100) is the most recent.[32] Prices received statistics for crops and livestock are used in the calculation of key economic indicators for the U.S. farm sector (e.g., farm income, commodity costs and returns and farm sector productivity), U.S. and world supply and demand estimates, the calculation of the parity ratios, and other purposes. Because prices received statistics are at an aggregate level (i.e., meat animals, cattle, hogs, dairy, and poultry and eggs) and only reported monthly, they are not intended for short-term marketing decisions. For that purpose, USDA-AMS Market News daily and weekly reports are more useful.

Movements of an index from one period to another can be expressed as changes in index values. Using the percent change of an index is more useful to express the movements of the price level. This is because index values are affected by the level of the index in relation to its base period, while percent changes are not. Any price index measures changes in prices only. They do not measure changes in revenues or expenses, which are calculated as prices multiplied by quantities. The collection of prices must be planned so that differences between the prices of any two dates will reflect changes in price and price alone (Parcell and Tonsor, 2017). There are several methodologies for computing a price index (Akem and Opryshko, 2014; Diewert, 2021). The simplest index of price at time *t* is of the form:

[31] For example, the U.S. Bureau of Labor statistics publishes producer price indices (e.g., 311612311612A1—meat processed from carcasses-Boxed meat (beef, pork, lamb, etc.), made from purchased carcasses), not actual or average prices. Actual transaction prices are used in the calculation of the indices but actual prices are not published because they are provided on a voluntary and confidential basis by survey respondents.

[32] The *Agricultural Prices* report (https://usda.library.cornell.edu/concern/publications/c821gj76b?locale=en) contains prices received by producers for principal crops, livestock and livestock products; indexes of prices received by producers; feed price ratios; indexes of prices paid by producers; and parity prices.

$$Simple\ Index\ of\ Price_t = \frac{\frac{1}{q_t}\sum_i P_{it} \cdot q_{it}}{\frac{1}{q_0}\sum_i P_{i0} \cdot q_{i0}} = \frac{\sum P_t}{\sum P_0}$$

where, q_{it} is the market share of the *i*th firm in the current period *t*, subscript 0 represents the base period, and $q_t = \sum q_{it}$ and $q_0 = \sum q_{i0}$. P_{it} represents the prices in the current period and P_{i0} represents the prices in the base period.

The challenge with using the simple index as a replacement for a "published" beef item price is that a base price period must be provided, which could disclose information related to P_0 and q_0. This allows for any entity to quite easily use a current index to back into the current price (P_t), i.e., reverse engineer the information to possibly disclose confidential information. An alternative index computation, the Lowe Index, takes the form:[33]

$$Lowe\ Index\ of\ Price_t = \frac{\frac{1}{q}\sum_i P_{it} \cdot q_{is}}{\frac{1}{q}\sum_i P_{i0} \cdot q_{is}} = \frac{\sum P_t}{\sum P_0}$$

where, q_{is} is the market share of the *i*th firm in period *s* and $q = \sum q_{it}$. P_{it} represents the price in the current period and P_{i0} represents the price in the base period 0. The advantage with the Lowe index is that the volume weight (e.g., pounds or loads) share (q_{is}) assigned to a firm price is tied to an arbitrary period of time. The chosen volume weights could be suppressed from public viewing.

The advantage of this particular index is that one can provide the base period price (P_0) as a reference point, suppress the firm share weights used, and utilize the current index without the ease of reverse engineering the current price (P_t). Also, one will be able to provide the current number of loads because the current period loads are not used in computing the current period price. The downside is that a period from which to derive the firm loads to compute market share weights must be selected. This is a subjective decision that would need to remain in place over time. We offer an example using LMR data. Assumptions and computational process, for this example, include:

1. Looking at Choice prices for negotiated (LM_XB459), formula (LM_XB455), and forward contract (LM_XB456) "loin, strip, bnls, 0x1 (180 3)" for the period week ending January 6, 2017 through week ending October 14, 2022.

2. Use the period January 2017 through December 2017 as the base pricing period.

[33] The consumer price index from Statistics Canada (https://www150.statcan.gc.ca/n1/pub/62-553-x/2014001/chap/chap-6-eng.htm) is a Lowe index.

3. Assume there are three firms in this market during the base period. For demonstration purposes, negotiated sales represent one firm, formula sales represent another firm, and forward contract sales represent the third firm. Then select an alternative set of dates, say the first 26 weeks of 2018, to determine the three firms have a market share trade in this beef item of: 26.6%, 57.7%, and 16.7%.
    a. Note, the share weights would be suppressed from the public. Only the publisher of the index will know these weights.
    b. The share weights always remain the same except for when firms do not report trade. If any firm reports no trade, the weighting matrix will adjust accordingly.
        i. If only one firm reports, then the index will need to be suppressed due to confidentiality. This would be the same as if there was no high-low price range provided for a particular cut and Canfax would suppress the product price in the Canadian Boxed Beef Report.

4. Using the information from 2. and 3. the base period price is $5.82/lb.
    a. Note, this will differ from the actual weighted average price computed of $5.87/lb. because the share weights will differ.

5. Moving forward to the week ending October 14, 2022, the price is computed as $5.63/lb.
    a. Note, this will differ from the actual weighted average price of $5.61/lb. because the index uses the share weights from 3. in computing the weighted average price.

6. The index is computed as $5.63/$5.82 x 100 = 96.74. This is 96.74% of the base period price week ending October 14, 2022.
    a. A user of this data would take the published 96.74 index to know that the price of "loin, strip, bnls, 0x1 (180 3)" is, on average, 96.74% of the base price period. So, the price is 96.74% of $5.82, or $5.63.

A price index may be a feasible option for some beef items if a minimum level of wholesale beef reporting volume could be maintained voluntarily. Though this option would likely take considerable industry education such as a detailed user guide accompanying the published indices.

4.5. SUPPLEMENTING CANADIAN VOLUNTARILY REPORTED INFORMATION WITH LMR

The CME Group launched a Boxed Beef Index on March 5, 2021.[34] The index is a five-business-day, volume-weighted moving average of daily Choice and Select cutout values. CME said the index "will provide a benchmark price that both producers and end users of beef can use to track and forecast price." To calculate the index, CME uses data collected by USDA's Agricultural Marketing Service and published in the National Daily Boxed Beef Cutout and Boxed Beef Cuts

[34] https://www.cmegroup.com/trading/agricultural/livestock/cme-boxed-beef-index.html.

Negotiated Sales–Afternoon (LM_XB403) report. USDA has provided those data, in their current form, since 2004. Market participants who see value in such an index may already be calculating something like it or using the USDA boxed beef cutout data directly.

While the CME Group calls this calculated series a boxed beef index, it simply is a weighted average price series. With this as a precedent, we consider the option of supplementing voluntary reported Canadian wholesale beef market information with LMR information. This would add volume to Canadian Boxed Beef reports but would preclude U.S. and Canadian boxed beef value comparisons. Prior to 2003-2004 U.S. boxed beef cutout values, reported by the USDA-AMS, converted to Canadian dollars were used as an estimate of the value of Canadian beef carcasses. So, combining Canadian and U.S. information would be a hybrid approach between the early years of calculating boxed beef prices in Canadian dollars and the last 15 plus years of the Canadian Boxed Beef Report.

To determine how price information would be affected by aggregating voluntarily reported Canadian wholesale beef market information with LMR information, we evaluated how price levels would be impacted for the 2013 to week ending March 20, 2020 period for a select number on AAA products. We chose two products from each of the chuck, rib, loin, and round primals and products where no high-low price range for a particular week often precluded publishing a price. Table 4.5.1 reports summary statistics for Canadian prices and weighted average composite Canadian and U.S. prices, and t-tests of mean differences in prices. Paired t-tests are used because the price comparisons are not independent, a natural pairing of the price series exist as the Canadian price is contained in the Canadian and U.S composite. The paired t-test is more appropriate than a simple test of means because it takes correlation into account. Using this correlation results in higher power to detect existing differences between the means.

Findings for price differentials across cuts are mixed, as some composite prices have higher values and others have lower values, while one composite price, AAA “Chuck Roll” and Choice “Chuck, roll, lxl, neck/off (116A 3),” shows no statistical difference compared to the Canadian price. However, other mean prices differ between -$0.3340/lb. to $0.1461/lb. and are statistically different. Table 4.5.1 also shows Pearson correlation coefficients between each Canadian price and weighted average Canadian and U.S. composite. All correlations are statistically significant at the 99% level of confidence.

While this approach would add volume to Canadian Boxed Beef Reports, if only one Canadian firm reports, then the price will need to be suppressed due to confidentiality. If not, using the U.S. price and load count and Canadian load count, one could solve for the Canadian price. This would be the same as if there was no high-low price range provided for a particular cut and Canfax would need to suppress the product price in the Canadian Boxed Beef Report. Furthermore, this option might cause confusion as to how much contribution is from LMR and from Canadian voluntary information as the relative weighting would differ by beef item due to differences in load counts.

Table 4.5.1. Summary Statistics for Canadian Price and Weighted Average Canadian and U.S. Composite Price, Select AAA Products, 2011 - March 2020

Price	N	Loads	Mean	Std Dev	Min	Max	Mean Difference[1]	Pr > |t|	Correlation Coefficient	Pr > |t|
AAA Chuck Roll & Choice Chuck, roll, lxl, neck/off (116A_3)										
Canadian	470	3,237	3.2179	0.7173	1.7920	5.0320				
Canadian & U.S.	470	14,875	3.2173	0.7017	1.8059	4.7526	-0.0006	0.9221	0.9812	<0.0001
AAA Short Cut Shoulder Clod & Choice Chuck, shoulder clod, trmd (114A_3)										
Canadian	464	767	2.77	0.481	1.91	4.35				
Canadian & U.S.	464	10,592	2.65	0.481	1.77	4.68	-0.1248	<0.0001	0.9117	<0.0001
AAA Boneless Lipon Ribeye 14 up & Choice Rib, ribeye, bnls, heavy (112A_3)										
Canadian	468	289	8.4170	1.9093	4.6076	14.0700				
Canadian & U.S.	468	5,858	8.5475	2.0607	4.5728	13.7710	0.1305	<0.0001	0.9462	<0.0001
AAA Bone-in Lipon Ribeye 17 dn & Choice Rib, ribeye, lip-on, bn-in (109E_1)										
Canadian	465	911	7.3363	1.6113	4.1122	12.4100				
Canadian & U.S.	465	7,315	7.5845	1.7367	4.1687	12.1834	0.2482	<0.0001	0.9271	<0.0001
AAA Short Loin 1x0 & Choice Loin, short loin, 0x1 (174_3)										
Canadian	469	321	6.7272	1.3520	4.0626	10.6116				
Canadian & U.S.	469	5,410	6.3932	1.3171	3.8547	10.3121	-0.3340	<0.0001	0.9204	<0.0001
AAA PSMO Tenderloin & Choice Loin, tndrloin, trmd, heavy (189A_4)										
Canadian	470	1,894	11.6060	1.8421	5.9832	15.9330				
Canadian & U.S.	470	8,061	11.7701	2.0254	7.1968	17.0962	0.1641	<0.0001	0.9587	<0.0001
AAA Inside Round & Choice Round, top inside round (168_3)										
Canadian	470	2,492	2.8043	0.4745	1.9263	3.9860				
Canadian & U.S.	470	13,736	2.7429	0.4990	1.8660	4.4109	-0.0613	<0.0001	0.9688	<0.0001
AAA Peeled Knuckle & Choice Round, knuckle, peeled (167A_4)										
Canadian	470	1,892	3.0269	0.5642	2.0500	4.3000				
Canadian & U.S.	470	11,673	2.9450	0.5482	1.9495	4.2112	-0.0819	<0.0001	0.9379	<0.0001

Notes: [1] The paired t-test only use cases that have non-missing values for both variables.

4.6. POSSIBLE AVENUES FOR INCREASING PACKER REPORTING

Price discovery is a time consuming and costly activity (Schroeder and Ward, 2006). Individual buyers and sellers have search costs in the price discovery process that include collecting and analyzing market fundamentals and finding a party to trade with in order to arrive at a price reflecting uncertain market conditions. Publicly available price and quantity data and developing market fundamentals significantly reduce search costs. Reliable market information reveals supply and demand fundamentals and communicates information to otherwise uniformed market participants. This information is a public good meaning that everyone individually uses it freely and regardless of how many people access market information, the amount available remains the same. Because of this characteristic of market information its value is difficult to measure for each user. Each user, in turn, has difficulty placing a value on ensuring its timeliness, accuracy, etc. This suggests that from a public perspective, individual firms would underinvest in information collection and reporting relative to the public value of such efforts. Therefore, in the United States, the cost of market information (i.e., LMR) has been borne in large part by taxpayers rather than relying on the private sector. That is not to overlook, however, successful voluntary market information reporting efforts.

In the United States, by far the most frequently binding rule for maintaining confidentiality of reported fed cattle information used by USDA in LMR tends to be at least 3 reporting entities needing to provide data at least 50 percent of the time over the most recent 60 day time period. This is especially the case when reports are disaggregated into specific regions (e.g., Colorado) for a sale type such as negotiated cash trade. In some ways, the Canadian beef industry might have similar structure with the market structure of Colorado so this could be roughly a model to compare with. Unless some smaller plants in addition to the two majors located in Colorado were subject to LMR, the two major plants in Colorado (JBS in Greeley and Cargill in Ft. Morgan) would never meet confidentiality guidelines for publishing wholesale beef market information. This information can be aggregated and published at the regional or national level but not at the state level.

In the United States, price reporting for cattle is based on origin of cattle, and not the location of the plant, so because Colorado origin cattle may be sold to packing entities located in other states, confidentiality may be able to be assured for fed cattle purchases at times in certain categories (it rarely is met for cash negotiated). However, it would not be met for beef sales since only two plants would be represented if beef sales were reported regionally just for Colorado. The United States reports boxed beef information nationally so this is not an issue. However, it would remain an issue in Canada if no more than two plants reported beef prices. If Canada cannot get more than two plants to regularly participate, confidentiality cannot be assured—the two entities would always be able to reverse engineer reported price data to identify the prices of their sole competitor. As such, the only way to achieve, and maintain, confidentiality is to get more plants involved in reporting. If individual plants do not sell sufficient products daily, or weekly, to be included in reported data, adding more days or weeks to make the reporting a rolling time period may be a solution. A question to ask is, if the report were two-week rolling, would more plants be represented? Furthermore, if plants do not sell

sufficient individual products, but individual products can be aggregated together so a composite carcass cutout value is at least reportable and perhaps some primals (if not all) could be reported, whether using a single or rolling time period, this might attain confidentiality.

One approach for encouraging voluntary reporting commitments from packers in Canada could be to compensate them for the cost of participating in the program. For example, startup and maintenance costs, record keeping costs, and data submission costs could be cost shared between packers and the Canadian government. It is important to note that there will likely be some learning by doing and costs would likely decline over time.

Alternatively, to help persuade the voluntary reporting of wholesale beef market information, an assurance contract, suggested by Tabarrok (1998), could be utilized to achieve cooperation among beef packers. An assurance contract says "I am willing to commit to X if Y others do the same." In the case of wholesale beef market information reporting, a beef packer commits to reporting if all other beef packers, that also meet a certain criteria, make the same commitment. If not all the beef packers that meet the criteria sign the contract it has no effect. If all the beef packers that meet the criteria, or more, sign the contract, it goes into effect and all beef packers who signed it are expected to report wholesale beef market information. Assurance contracts, at least in theory, are useful where collective action is needed and individual actions are for some reason risky or not worth it for an individual if they end up participating alone or as part of a too small of group. Whether an assurance contract among beef packers would be successful in Canada to provide viable data to conduct market information reporting, we do not know.

A mandatory reporting system is an alternative to an assurance contract and it is not subject to individual participants ignoring the agreement without consequence. In Canada, with the small number of packing companies represented, an assurance contract relies critically upon all to always abide and with no enforcement this can quickly become problematic. In contrast, a mandated system assures all regularly participate. In the United States, the LMR Act of 1999 specifies what constitutes a violation such as failure to report the required information on time or failure to report accurate information. The section on enforcement provides for a civil penalty of up to $10,000 for each violation and provides for the Secretary's issuance of cease and desist orders. The Livestock, Poultry and Grain Market News Division of USDA ensures compliance with the law. The division's compliance staff audit covered packers, and the division's market reporting staff evaluates this information to ensure conformance with the LMR Act of 1999, regulations, and policies.[35] Each covered packer is audited a minimum of once every six months.[36] If non-compliance is found, it is assigned a level of designation indicating its severity. Major non-compliance would be a covered plant does not submit information or inadvertently submits incorrect information that affects the accuracy of published reports with

[35] LMR Compliance Questions and Answers, https://www.ams.usda.gov/rules-regulations/mmr/lmr/compliance/FAQ.
[36] LMR Compliance Audit Process, https://www.ams.usda.gov/sites/default/files/media/LMR%20Audit%20Process%20Flowchart.pdf.

examples including an issue that can be replicated due to programming errors; a replicated issue that causes inaccurate data submitted on published reports; a plant failing to submit files; or a plant is consistently submitting late or inaccurate files. Minor non-compliance would be a covered plant does not submit information in compliance with applicable rules and regulations, but their submission or incomplete submission has minimal effect on the accuracy of published data. Examples include a typo, data entry error or some other issue that is not readily replicated or the plant is inadvertently submitting inaccurate data that has no effect on published reports (i.e., the data is not utilized in reports).

A mandatory approach would require more standardized reporting, collection, summarizing, and publishing of wholesale beef trade information than is required under a voluntary approach. Furthermore, a standard process, that is automated, would go a long way in reducing the need to make "on the fly" changes as personnel change (i.e., vacations, sick leave, personal leave, employee turnover, promotions, etc.) and other circumstances occur (i.e., change in business hours, planned or unexpected maintenance, holidays, etc.). For example, under LMR in the United States, "whenever information is required to be reported under this part, it shall be reported by electronic means and shall adhere to a standardized format established by the Secretary to achieve the objectives of this part, except in emergencies or in cases when an alternative method is agreeable to the entity required to report and AMS" (e-CFR, 2008).

Imbalances in market power between buyers and sellers can impact wholesale beef prices. However, potential adverse impacts of market power imbalances are greatly reduced by complete market information flow (Schroeder and Ward, 2006). Increased reporting, be it voluntary or mandatory, would result in more market information being available which increases the efficiency of the market. This would likely benefit smaller firms more than large firms. Large firms have considerable private information about their own fed cattle purchases and wholesale beef sales.

CHAPTER 5. SUMMARY OF RECOMMENDATIONS UNDER CURRENT SYSTEM

Our recommendations are framed with the goal of providing as much market information as feasible under the current (voluntary) reporting system. More extensive recommendations are highlighted throughout the report such as packers and government sharing reporting costs, assurance contracts to persuade reporting, and moving to a mandatory reporting system. Implementing these more extensive recommendations are beyond the scope of this study. The following recommendations are not necessarily mutually exclusive. Combinations could be considered.

- Move to a Canadian Comprehensive Boxed Beef Report. This would include only fed steer/heifer beef (no cow/bull or blended cow/bull/ steer/heifer product), AAA and AA grades, all sales types (negotiated sales 0-21 day delivery, negotiated sales 22+ day delivery, formula, and forward contract), all delivery periods (0-21 days, 22-60 days, 60-

90 days, and 91 days and up), and all delivery locations (domestic sales and exports), and branded and unbranded product.

- Include beef sales destined for United States or Mexico, beyond the few items (i.e., trim, etc.) that are already included.

- Include beef × dairy product sales.

- Aggregate across reporting categories so a composite carcass cutout value is at least reportable and perhaps some primals, if not all, could be reported for individual plants.

- Add more days or weeks to make reporting a rolling time period, e.g., two-week rolling, to allow individual plants that do not sell sufficient products daily, or weekly, to be included in reported data.

Because the Canadian beef industry is undergoing considerable structural change in numerous aspects from the ways cattle are purchased and beef sold by packers to the number, size, and location of beef packers, we recommend continued assessments of how to potentially report and publish wholesale beef market information be done periodically. The pace of change in the beef market is rapid and institutions responsible for wholesale beef market information reporting (i.e., Canfax, Agriculture and Agri-Food Canada, Canadian beef packing plants) need to be able to assess and adjust reporting and publishing as the market environment changes.

Appendix A.1. The Canadian Boxed Beef Report, Week Ending Friday, March 20, 2020

Canadian Boxed Beef Prices

The data used in the Canadian Boxed Beef Report is provided by the Agriculture and Agri-Food Canada (AAFC). It is based on negotiated prices and volume of boxed beef cuts and on average industry cutting yields. Values reflect CDN dollars per pound.

Week ending: Friday, March 20, 2020 **Exchange Rate:** 1.4495

	Canadian AAA			Canadian AA/A		
	This Week	Last Week	Last Year	This Week	Last Week	Last Year
CHUCK	$2.6581	$2.2964	$2.3443	$2.6045	$2.2426	$2.2705
RIB	$4.9666	$4.1016	$4.5616	$4.4776	$4.0995	$4.3470
LOIN	$3.7523	$3.6660	$3.7057	$3.6084	$3.4849	$3.4748
ROUND	$2.5049	$2.2607	$2.2997	$2.7671	$2.3293	$2.2970
BRISKET	$2.2490	$2.1769	$2.4025	$2.2490	$2.1769	$2.4025
SHORT PLATE	$1.9894	$1.8799	$2.1858	$1.9894	$1.8799	$2.1858
FLANK	$1.5232	$1.4375	$1.5014	$1.5232	$1.4375	$1.5014

	USDA Choice	Canadian AAA			USDA Select	Canadian AA		
	This Week (CDN$)	This Week	Last Week	Last Year	This Week (CDN$)	This Week	Last Week	Last Year
Carcass Cutout	$ 3.5227	$3.0139	$2.7211	$2.8399	$ 3.3795	$2.9703	$2.6818	$2.7439
Load Count Totals		154.71	124.02	192.51				

AAA Product

	C$	C$(Last Wk)	C$(Last Yr)	US$	In C$	Cdn-US Diff$	Cdn Loads
Quebec Spec	n/a	n/a	n/a				
Semi-Boneless	+++	+++	+++	$ 2.8007	$ 4.0596	$ -0.1496	0.15
Short Cut shoulder clod	+++	+++	+++	$ 3.2260	$ 4.6761	$ -1.5461	0.01
Clod Heart	n/a	n/a	n/a	$ 3.3308	$ 4.8280		
Clod Tender	+++	+++	+++	$ 3.9107	$ 5.6686	$ -2.1186	0.15
2 Piece Boneless Chuck	n/a	n/a	n/a				
Chuck Roll	+++	+++	+++	$ 3.2637	$ 4.7307	$ 0.3013	2.57
Chuck Roll 0x0	n/a	n/a	n/a				
Oven Ready Rib	n/a	n/a	+++				
Bone-in Lipon Ribeye 17 up	n/a	n/a	n/a	$ 7.1033	$ 10.2962		
Bone-in Lipon Ribeye 17 dn	+++	+++	+++	$ 7.1033	$ 10.2962	$ -0.4462	2.83
Boneless Lipon Ribeye 14 up	+++	+++	+++	$ 8.0799	$ 11.7118	$ -1.5618	0.32
Boneless Lipon Ribeye 14 dn	n/a	n/a	n/a	$ 8.2296	$ 11.9288		
Back Ribs	+++	n/a	+++				0.01
Short Loin 1x0	$ 7.4576	$ 7.3289	$ 7.5595	$ 5.9138	$ 8.5721	$ -1.1145	0.33
Striploin 0x1 13up	$ 8.4324	$ 7.7905	$ 8.1312	$ 6.1933	$ 8.9772	$ -0.5448	8.69
Striploin 0x1 13dn	n/a	n/a	n/a	$ 6.1933	$ 8.9772		

Top Butt 13up	$ 4.6066	$ 4.2181	$ 4.1889	$ 3.2994	$ 4.7825	$ -0.1759	4.14
Top Butt 13dn	n/a	n/a	n/a	$ 3.2994	$ 4.7825		
PSMO Tenderloin	$ 12.3587	$ 12.5014	$ 12.8127	$ 8.1109	$ 11.7567	$ 0.6020	4.83
Butt Tenderloin	$ 12.1377	+++	$ 12.4964	$ 8.8950	$ 12.8933	$ -0.7556	0.27
Boneless Round	n/a	n/a	n/a				
Inside Round 1"	n/a	n/a	n/a	$ 2.8453	$ 4.1243		
Inside Round	$ 3.9308	$ 3.3395	$ 2.8991	$ 3.0431	$ 4.4110	$ -0.4802	8.65
Outside Flat	$ 3.6552	$ 3.1938	$ 3.1787	$ 2.7524	$ 3.9896	$ -0.3344	3.36
Eye of round	$ 3.9116	$ 3.7198	$ 3.7468	$ 3.1627	$ 4.5843	$ -0.6727	6.13
Peeled Knuckle	+++	+++	+++	$ 2.8457	$ 4.1248	$ -0.6448	3.73
Gooseneck	n/a	n/a	n/a	$ 2.5041	$ 3.6297		

AA Product

	C$	C$(Last Wk)	C$(Last Yr)	US$	In C$	Cdn-US Diff$	Cdn Loads
Quebec Spec	n/a	n/a	n/a				
Semi-Boneless	n/a	n/a	n/a	$ 2.8652	$ 4.1531		
Short Cut shoulder clod	+++	+++	+++	$ 3.1485	$ 4.5638	$ -1.4338	0.01
Clod Heart	n/a	n/a	n/a				
Clod Tender	+++	+++	+++	$ 3.8161	$ 5.5314	$ -0.2814	0.03
2 Piece Boneless Chuck	n/a	n/a	n/a				
Chuck Roll	+++	+++	+++	$ 3.2850	$ 4.7616	$ 0.0578	0.51
Chuck Roll 0x0	n/a	n/a	n/a				
Oven Ready Rib	n/a	n/a	n/a				
Bone-in Lipon Ribeye 17 up	+++	+++	+++	$ 5.9227	$ 8.5850	$ 0.3450	4.61
Bone-in Lipon Ribeye 17 dn	+++	+++	+++	$ 5.9227	$ 8.5850	$ -0.4733	3.57
Boneless Lipon Ribeye 14 up	+++	+++	+++	$ 6.9881	$ 10.1293	$ -1.2993	0.45
Boneless Lipon Ribeye 14 dn	n/a	n/a	n/a	$ 6.9086	$ 10.0140		
Back Ribs	n/a	+++	+++				
Short Loin 1x0	$ 6.6601	$ 6.5307	$ 7.1189	$ 5.0609	$ 7.3358	$ -0.6757	0.98
Striploin 0x1 13up	$ 7.6674	$ 6.7292	$ 6.8353	$ 5.0792	$ 7.3623	$ 0.3051	5.41
Striploin 0x1 13dn	n/a	n/a	n/a	$ 5.0792	$ 7.3623		
Top Butt 13up	$ 4.6311	$ 4.2270	$ 3.9592	$ 3.3135	$ 4.8029	$ -0.1718	8.55
Top Butt 13dn	n/a	n/a	n/a	$ 3.3135	$ 4.8029		
PSMO Tenderloin	$ 11.9682	$ 12.0513	$ 12.0116	$ 8.0571	$ 11.6788	$ 0.2894	7.51
Butt Tenderloin	$ 12.1323	+++	$ 11.5321	$ 8.6630	$ 12.5570	$ -0.4247	0.13
Boneless Round	n/a	n/a	n/a				
Inside Round 1"	n/a	n/a	n/a	$ 2.8444	$ 4.1230		
Inside Round	$ 4.5726	$ 3.5991	$ 3.0047	$ 3.3214	$ 4.8144	$ -0.2418	12.38
Outside Flat	$ 4.1367	$ 3.2210	$ 3.0474	$ 2.9441	$ 4.2675	$ -0.1308	9.17
Eye of round	$ 3.9778	$ 3.5914	$ 3.7378	$ 2.9612	$ 4.2923	$ -0.3145	2.66
Peeled Knuckle	+++	+++	+++	$ 2.8536	$ 4.1363	$ -0.4763	1.42
Gooseneck	+++	+++	+++	$ 2.2225	$ 3.2215	$ -0.7849	0.01

Thin Meats (AAA/AA)	C$	C$(Last Wk)	C$(Last Yr)	US$	In C$	Cdn-US Diff$	Cdn Loads
Chuck Tender	$ 3.7095	$ 3.5131	$ 3.2436	$ 2.7125	$ 3.9318	$ -0.2223	2.61
Briskets 120	$ 3.2729	$ 3.1753	$ 3.4853	$ 2.5697	$ 3.7248	$ -0.4519	3.86
Bone-in Chuck Shortrib	$ 4.3138	$ 3.8849	$ 4.5695	$ 3.2136	$ 4.6581	$ -0.3443	5.00
Flat Iron	$ 3.5844	$ 3.5020	$ 4.4040				0.88
Blademeat	$ 3.7568	$ 3.2892	$ 4.2716	$ 2.6866	$ 3.8942	$ -0.1374	2.93
Bone-in Shortrib	+++	+++	+++	$ 4.0914	$ 5.9305	$ 0.8195	0.01
Outside Skirt	+++	+++	+++	$ 5.7331	$ 8.3101	$ -0.0001	0.01
Inside Skirt	+++	+++	+++	$ 4.2892	$ 6.2172	$ 0.1240	0.01
Flapmeat	+++	+++	+++	$ 5.7487	$ 8.3327	$ -1.1327	0.02
Ball Tips	+++	+++	+++	$ 2.6489	$ 3.8396	$ -0.0001	0.01
Tri Tips	+++	+++	+++				0.03
Flank Steak	$ 7.2371	$ 6.8309	$ 6.7288	$ 5.1465	$ 7.4599	$ -0.2228	1.92
Pectoral Muscle	$ 3.8064	$ 3.3494	$ 4.3626	$ 2.8319	$ 4.1048	$ -0.2984	3.54
Lointails	+++	+++	n/a				0.57

Trim (AAA & AA) (Fed)	C$	C$(Last Wk)	C$(Last Yr)	US$	In C$	Cdn-US Diff$	Cdn Loads
Fresh 50% Lean Trimmings	+++	+++	$ 1.0353	$ 0.5676	$ 0.8227	$ 0.0373	0.13
Fresh 65% Lean Trimmings	+++	+++	$ 1.7384	$ 1.0102	$ 1.4643	$ -0.1843	0.09
Fresh 75% Lean Trimmings	+++	+++	+++	$ 1.4952	$ 2.1673	$ -0.1223	0.01
Fresh 81% Lean Trimmings	+++	+++	+++	$ 1.7574	$ 2.5474	$ 0.0698	0.01
Fresh 85% Lean Trimmings	+++	+++	$ 2.6476	$ 1.9801	$ 2.8702	$ -0.0602	2.41
Shankmeat	+++	+++	$ 2.6476				0.01

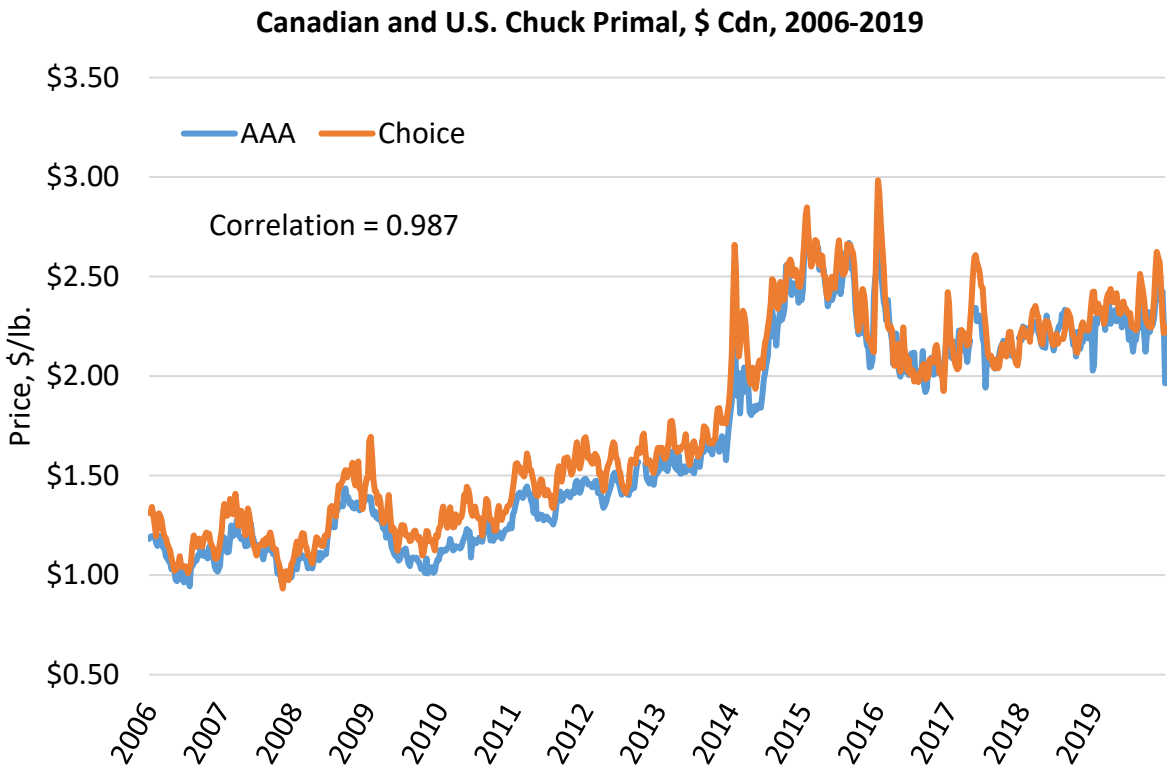
Ground Beef	C$	C$(Last Wk)	C$(Last Yr)	US$	In C$	Cdn-US Diff$	Cdn Loads
Extra Lean Ground Beef	+++	+++	+++				10.01
Lean Ground Beef	n/a	n/a	+++				
Medium Ground Beef	+++	+++	+++				14.71
Regular Ground Beef	+++	+++	+++				2.33
Ground Chuck	+++	+++	+++	$ 3.3424	$ 4.8448	$ 0.0000	0.01
Ground Sirloin	+++	+++	+++	$ 3.6210	$ 5.2486	$ 0.0000	0.01

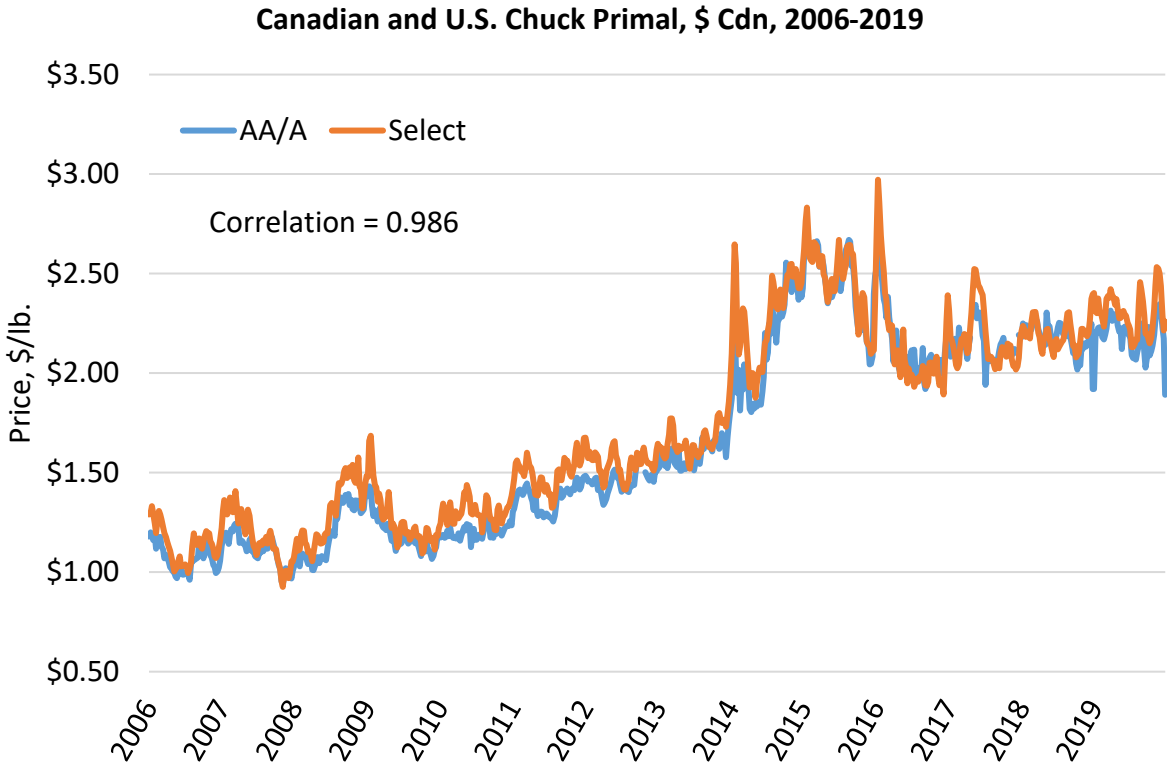
+++ This is suppressed data that is used in the primal and cutout calculation.

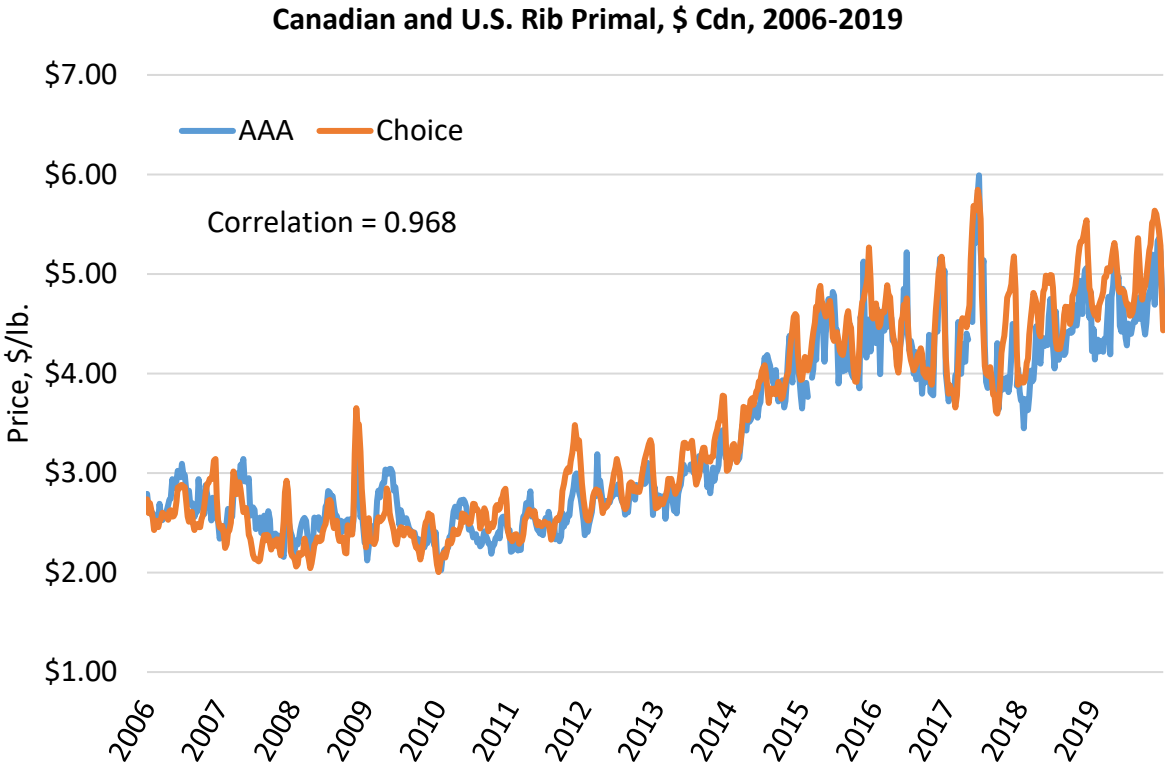
Appendix A.2. Canadian Boxed Beef Reporting Form

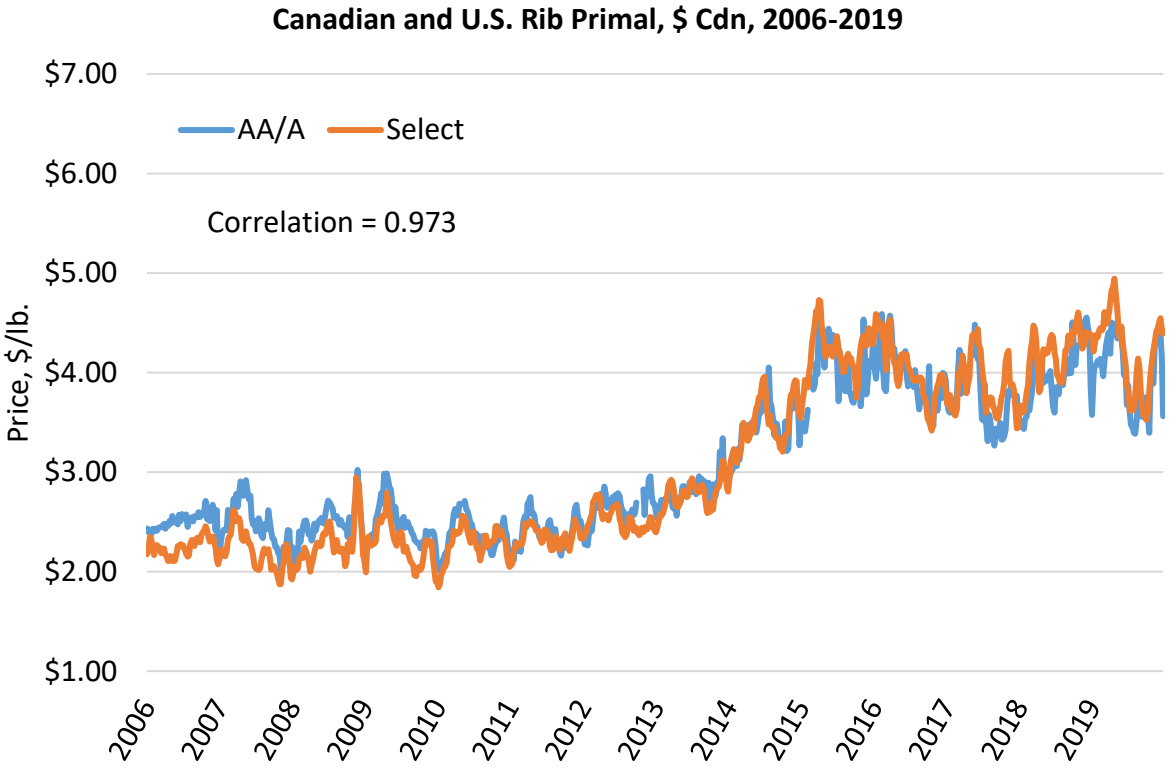
	TOTAL WEIGHTED AVERAGE PRICES / QUANTITIES IN LOADS							WEEK:	February 22-2014		
		AAA					AA/A				
		Quantity	Price $/lb	Min Price	Max Price		Quantity	Price $/lb	Min Price	Max Price
Chucks										
	Quebec Spec	-	-	-	-		1.10	2.8187	2.2500	2.9085
	Semi-Boneless	-	-	-	-		0.40	3.3036	2.9085	3.3600
	S/C Shoulder Clod	-	-	-	-		3.07	2.5965	2.4900	3.1186
	Clod Heart	-	-	-	-		-	-	-	-
	Clod Tender	-	-	-	-		0.81	3.5589	3.3900	3.5942
	2Pc Bls	-	-	-	-		-	-	-	-
	Blade Eye 1x1	3.35	2.9386	2.8800	3.0744		16.86	3.0476	3.0300	3.0523
	Blade Eye 0x0	-	-	-	-		-	-	-	-
Ribs										
	Oven Ready Ribs	-	-	-	-		3.40	4.8700	4.8700	4.8700
	B/I Lipon 17 up	4.69	5.6838	5.6600	5.7507		4.58	5.4197	5.3800	5.7507
	B/I Lipon 17 dn	-	-	-	-		-	-	-	-
	Bls Lipon 14 up	0.32	6.6683	6.5248	7.2900		0.23	6.5270	6.5248	6.5500
	Bls Lipon 14 dn	-	-	-	-		-	-	-	-
	Back Ribs	0.01	2.3224	2.3224	2.3224		1.35	2.3224	2.3224	2.3224
Loins										
	Short Loin 1x0	0.22	6.1659	5.8613	6.3400		3.26	5.6617	5.5600	5.8613
	Striploin 1x0 13 up	5.10	5.9380	5.9200	5.9719		2.17	5.8255	5.7400	5.9719
	Striploin 1x0 13 dn	-	-	-	-		-	-	-	-
	Top Butt 13 up	10.23	3.5797	3.5389	3.6500		5.14	3.5343	3.5000	3.6495
	Top Butt 13 dn	-	-	-	-		-	-	-	-
	PSMO Tender	0.94	10.8300	10.8300	10.8300		2.66	10.4000	10.1100	10.8378
	Butt Tender	0.04	10.9889	10.8378	11.1400		0.31	10.7377	10.6900	10.8378
Rounds										
	Boneless Round	-	-	-	-		0.16	2.2300	2.2300	2.2300
	Inside Round 1"	-	-	-	-		5.17	2.7393	2.5900	2.8062
	Inside Round	2.54	2.9977	2.9859	3.0000		11.95	2.8684	2.8200	2.9271
	Outside Flat	2.10	3.0725	3.0600	3.1739		8.98	2.9825	2.8600	3.0921
	Eye of Round	3.04	3.5014	3.3300	3.7048		3.56	3.6368	3.6000	3.6863
	Peeled Knuckle	3.27	3.3100	3.3100	3.3100		3.20	3.2200	3.2200	3.2200
	Gooseneck	-	-	-	-		-	-	-	-
Thin Meats				(AAA & AA / A)		Trim				(AAA & AA / A)
	Chk Tender	2.20	3.3032	2.9200	3.3177	* 50%	22.27	0.8083	0.6679	1.0900
	Brisket 120	8.44	2.4972	2.4200	2.4993	* 65%	6.35	1.0572	1.0029	1.3000
	BN In Chk S/R	3.64	3.6495	3.6495	3.6495	* 75%	-	-	-	-
	Flat iron	0.01	3.5100	3.5100	3.5100	* 85%	12.51	1.6873	1.5529	1.7500
	Blademeat	3.21	3.0978	3.0965	3.5100	* Shankmeat	-	-	-	-
	BN In S/R	0.27	5.1200	5.1200	5.1200					
*	Outside Skt	0.02	6.2483	6.2483	6.2483	Ground Beef				
*	Inside Skt	4.12	3.9259	3.9259	3.9259	Extra Lean	1.02	2.6600	2.6600	2.6600
*	Flapmeat	1.01	4.6660	4.2700	4.7001	Lean	16.28	2.4200	2.4200	2.4200
*	Ball Tips	0.10	3.0200	3.0200	3.0200	Medium	3.10	2.3100	2.3100	2.3100
*	Tri Tips	2.05	4.8437	3.7100	4.8549	Regular	0.85	1.9600	1.9600	1.9600
	Flank Stk	2.97	4.5479	4.5100	4.5563					
	Pectoral	1.88	3.0833	2.9500	3.0965	Ground Chuck	-	-	-	-
*	Lointails	2.10	2.6928	2.6200	2.6984	Ground Sirloin	-	-	-	-
Cdn Sales Only Except * equals All Sales										

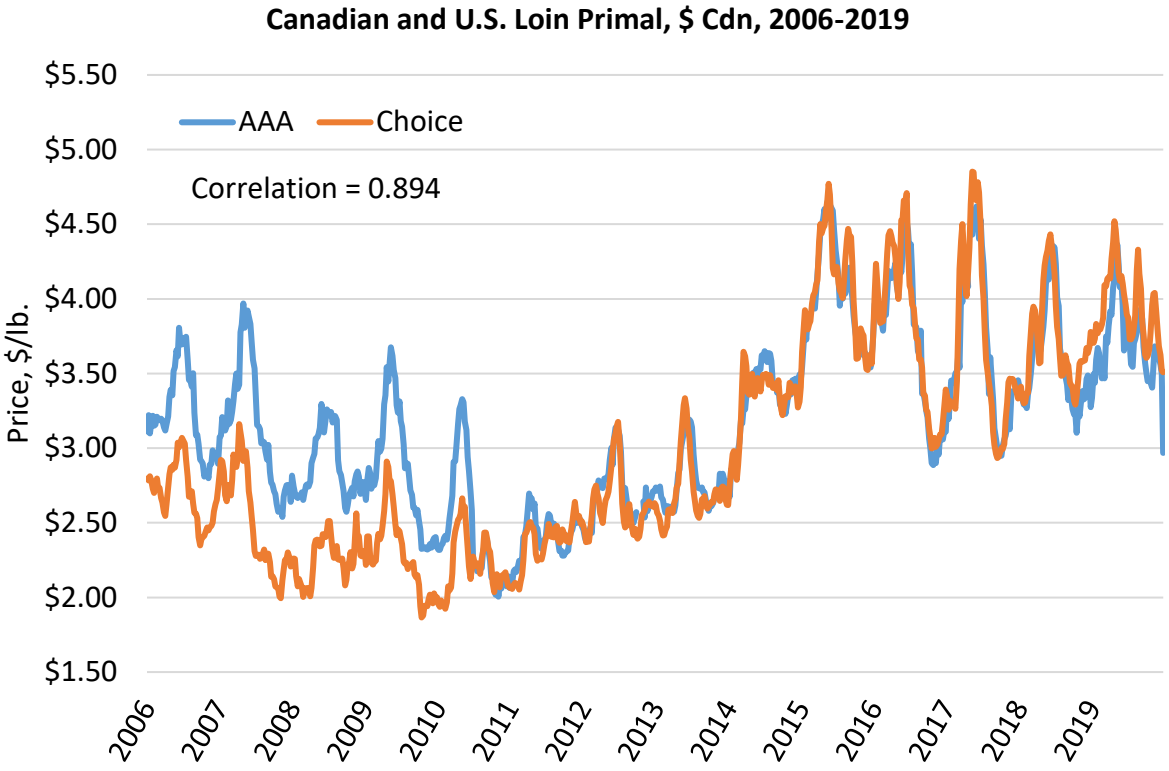
Appendix A.3. Canadian and U.S. Beef Primals, Canadian Dollars, 2006-2019

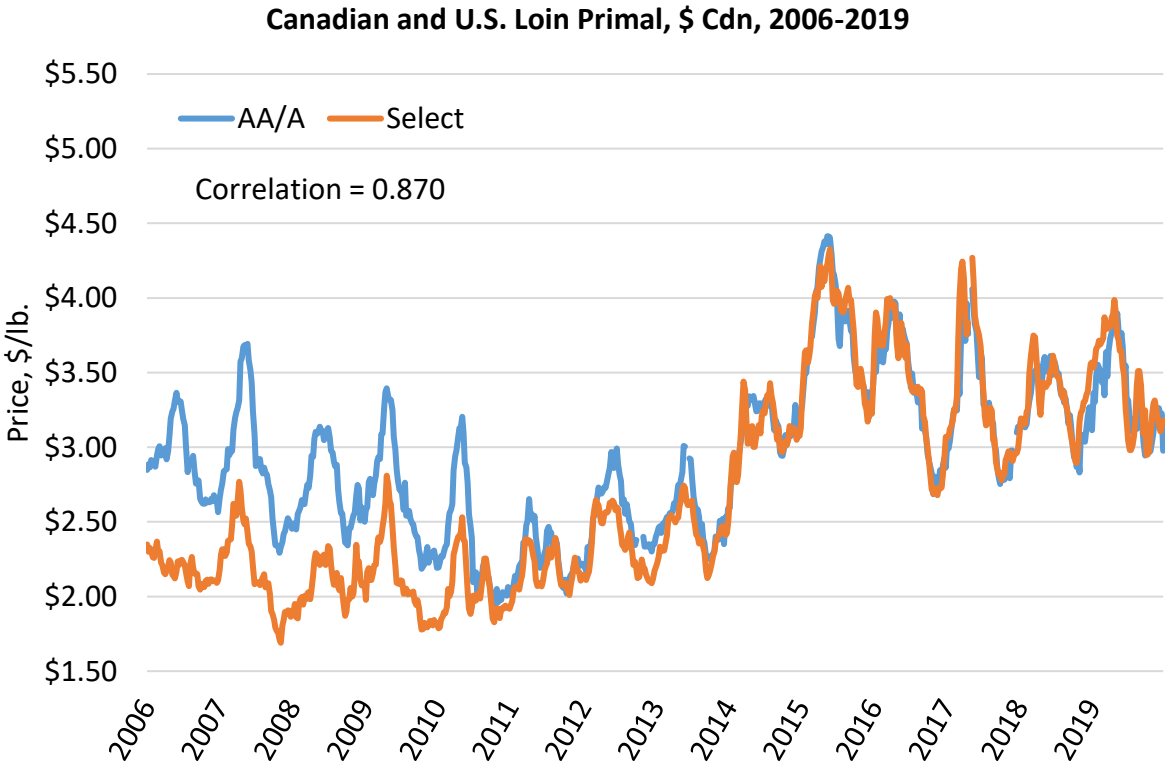


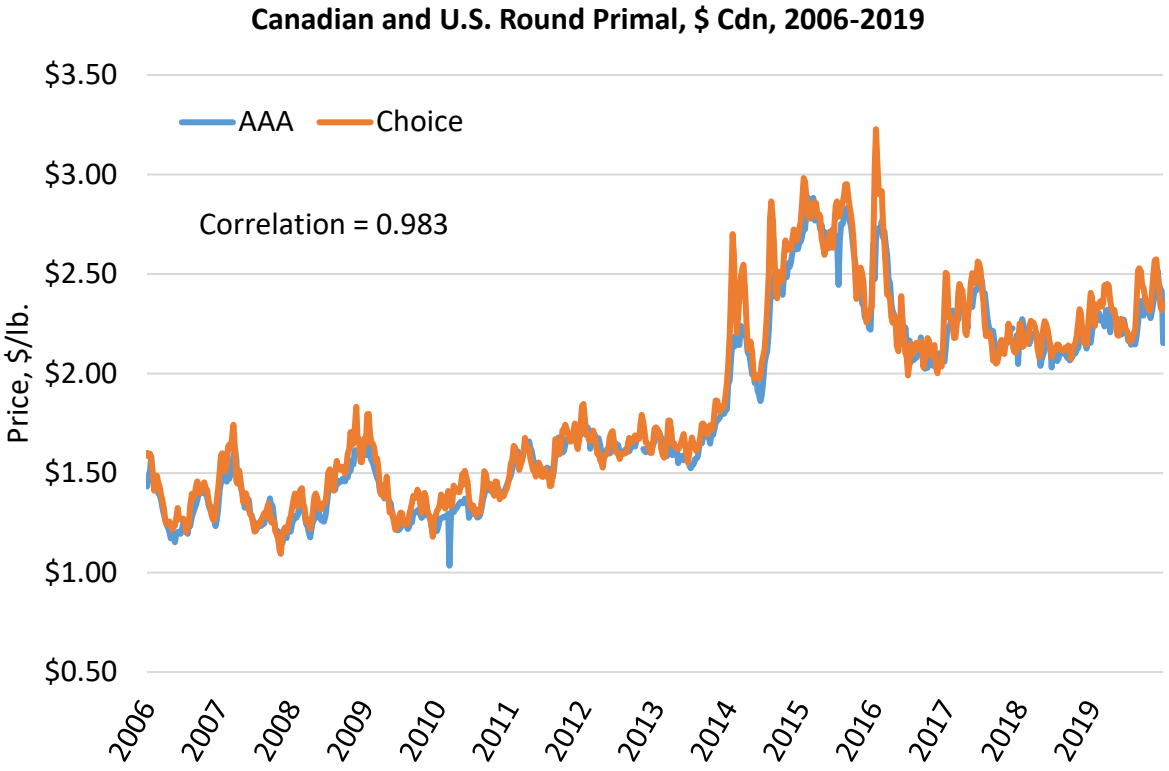


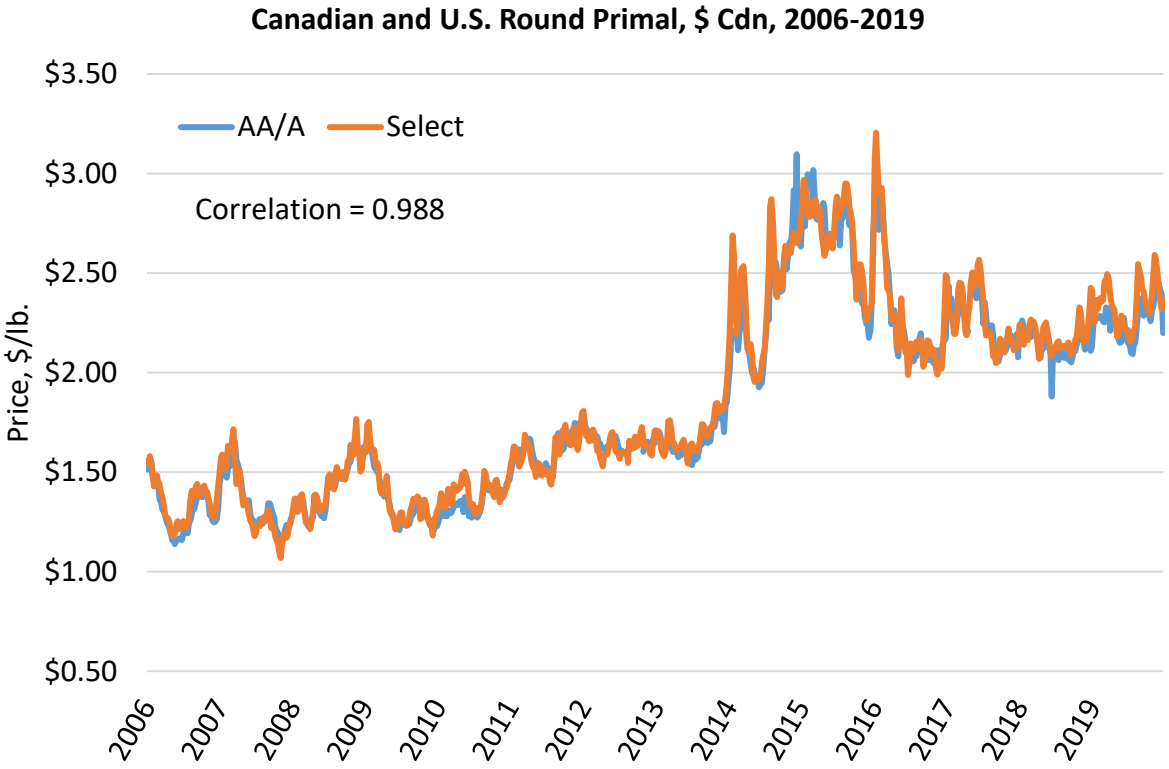

Canadian and U.S. Rib Primal, $ Cdn, 2006-2019
$7.00
$6.00
$5.00
$4.00
$3.00
$2.00
$1.00
Price, $/lb.
AAA
Choice
Correlation = 0.968
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

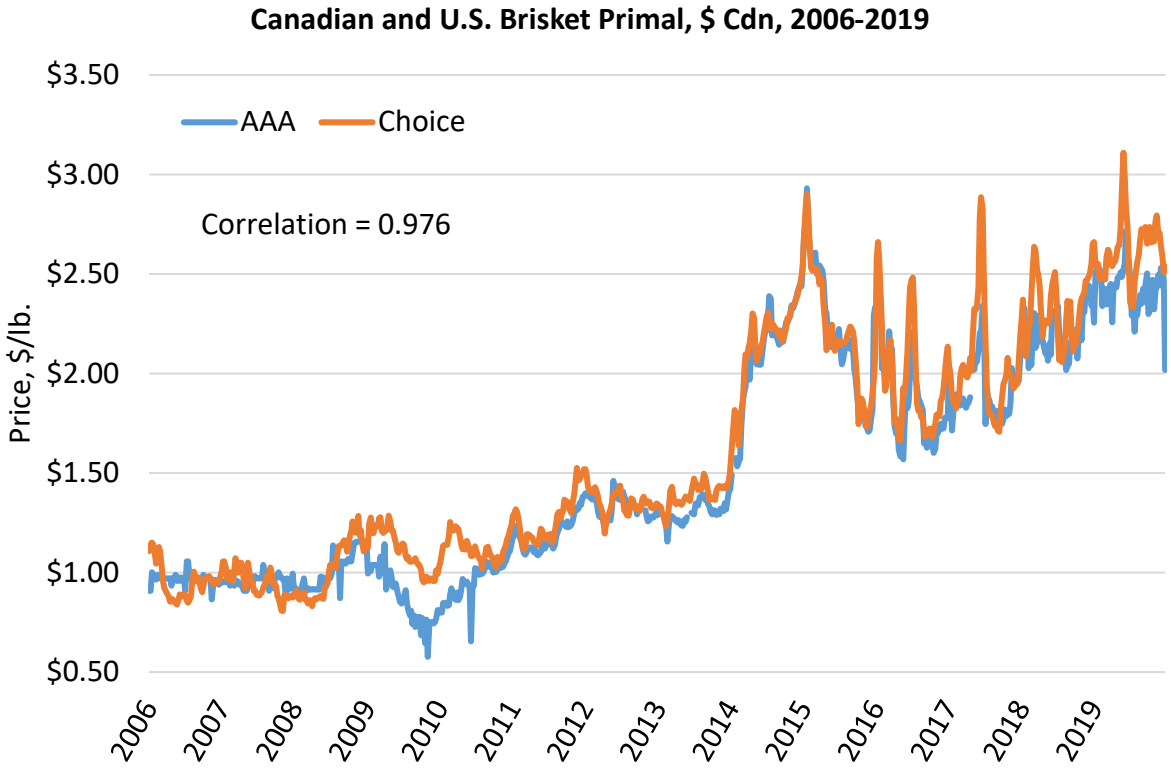

Canadian and U.S. Rib Primal, $ Cdn, 2006-2019
$7.00
$6.00
$5.00
$4.00
$3.00
$2.00
$1.00
Price, $/lb.
AA/A
Select
Correlation = 0.973
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

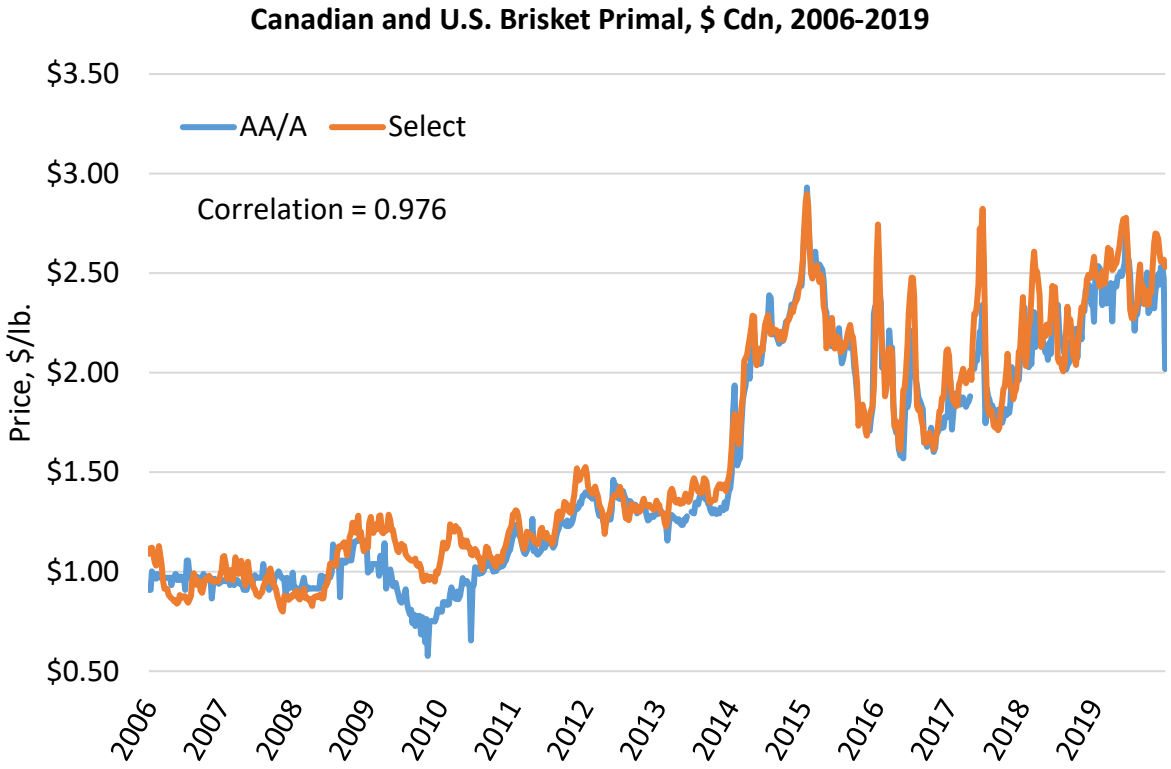

Canadian and U.S. Loin Primal, $ Cdn, 2006-2019
AAA
Choice
Correlation = 0.894
Price, $/lb.
$5.50
$5.00
$4.50
$4.00
$3.50
$3.00
$2.50
$2.00
$1.50
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

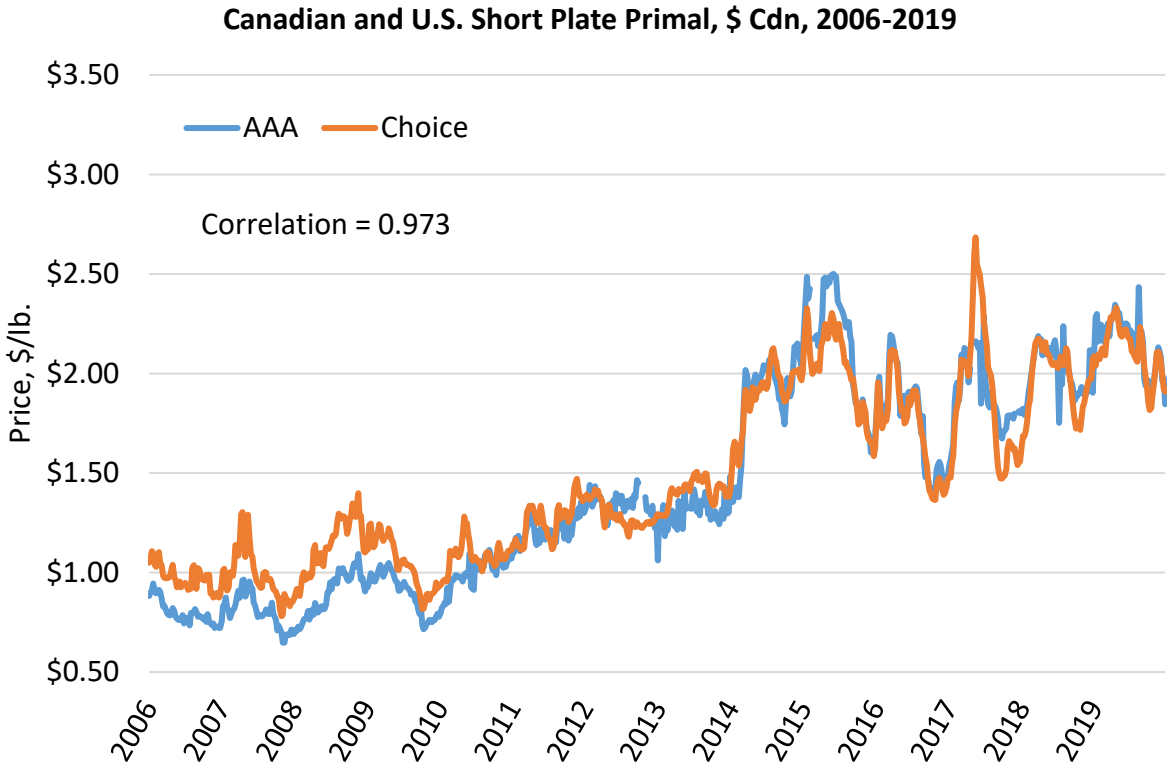

Canadian and U.S. Loin Primal, $ Cdn, 2006-2019
AA/A
Select
Correlation = 0.870
Price, $/lb.
$5.50
$5.00
$4.50
$4.00
$3.50
$3.00
$2.50
$2.00
$1.50
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

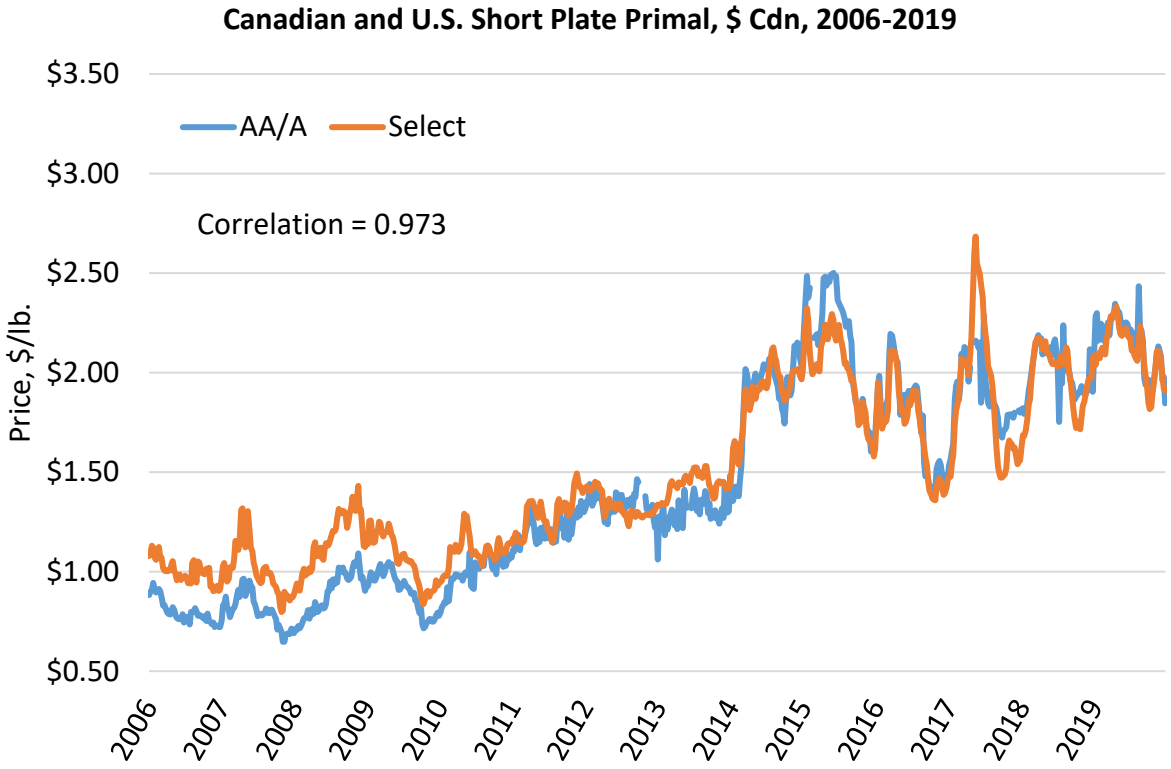

Canadian and U.S. Round Primal, $ Cdn, 2006-2019
AAA
Choice
Correlation = 0.983
Price, $/lb.
$3.50
$3.00
$2.50
$2.00
$1.50
$1.00
$0.50
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019


Canadian and U.S. Round Primal, $ Cdn, 2006-2019
AA/A
Select
Correlation = 0.988
Price, $/lb.
$3.50
$3.00
$2.50
$2.00
$1.50
$1.00
$0.50
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019


Canadian and U.S. Brisket Primal, $ Cdn, 2006-2019
$3.50
$3.00
$2.50
$2.00
$1.50
$1.00
$0.50
Price, $/lb.
AAA
Choice
Correlation = 0.976
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019


Canadian and U.S. Brisket Primal, $ Cdn, 2006-2019
$3.50
$3.00
$2.50
$2.00
$1.50
$1.00
$0.50
Price, $/lb.
AA/A
Select
Correlation = 0.976
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019


Canadian and U.S. Short Plate Primal, $ Cdn, 2006-2019
$3.50
$3.00
$2.50
$2.00
$1.50
$1.00
$0.50
Price, $/lb.
AAA
Choice
Correlation = 0.973
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019


Canadian and U.S. Short Plate Primal, $ Cdn, 2006-2019
$3.50
$3.00
$2.50
$2.00
$1.50
$1.00
$0.50
Price, $/lb.
AA/A
Select
Correlation = 0.973
2006
2007
2008
2009
2010
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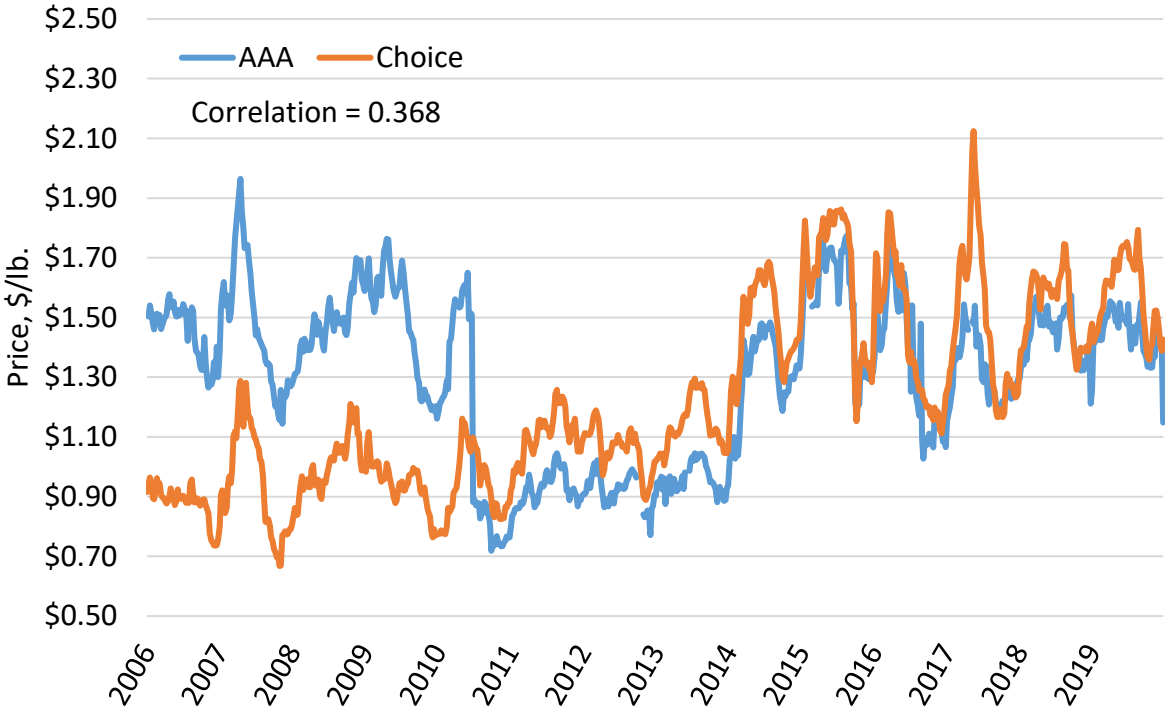
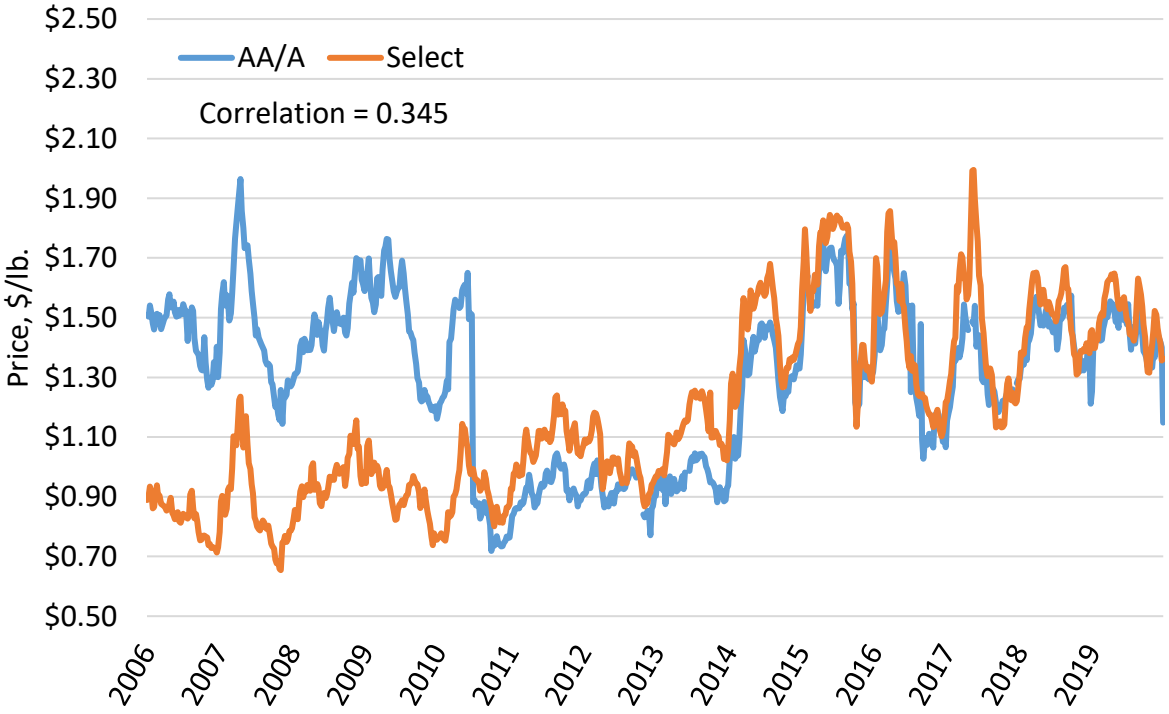
Canadian and U.S. Flank Primal, $ Cdn, 2006-2019



Canadian and U.S. Flank Primal, $ Cdn, 2006-2019



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