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Kill or Shill: Processing Capacity and Cattle Prices with a Closed Border

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The Issue

The discovery of bovine spongiform encephalopathy (BSE) in Alberta and the subsequent U.S. border closure raised concerns about the reliance of Canada's cattle industry upon U.S. packers. It became clear that Canada lacked the slaughter capacity to support the number of cattle going to market. This and other factors resulted in steep price declines. Since 2003, slaughter capacity has increased by approximately 46 percent. Given that many of the start-ups are small-scale operations that in many cases lack experience and financial backing, questions arise regarding the viability and sustainability of these enterprises.

This study examines existing processing capacity as well as planned expansions and discusses the implications for Canadian cattle prices. Even though the U.S. border reopened in July 2005, concerns about slaughter capacity remain. Animals over 30 months of age must still be slaughtered in Canada. There are also ongoing concerns about Canada's continued ability to export live cattle to the United States. Future exports are threatened by potential trade actions and by unpredictable animal health issues that could again close the border.

Implications and Conclusions

There is no guarantee that small, start-up slaughter facilities will achieve success in an industry characterized by economies of scale. Such plants should not attempt to operate as scaled-down versions of their larger counterparts, but should exploit specialty markets where larger firms lack flexibility. If projected slaughter capacity were realized, fed cattle prices would recover to near baseline pre-BSE levels, but the price of cull animals would remain well below pre-BSE levels. Fed and cull cattle prices could both improve with further expansions to slaughter capacity for animals aged over 30 months.

Background

The closure of the U.S. border to exports of live Canadian cattle required that cattle previously exported for slaughter in the United States must compete with cattle that were normally slaughtered in Canada for hooks in Canadian plants. The excess supply of cattle relative to domestic slaughter capacity caused live cattle prices to decline significantly. During the initial weeks following the May 2003 discovery of a Canadian case of BSE, the markets for cattle and beef were characterized by the inability to export live animals or meat, an unwillingness to market cows or fed cattle because of steep price declines and uncertainty over when exports might resume, dramatically reduced slaughter levels, and general uncertainty about the market. In September 2003, U.S. and Mexican markets reopened to boneless beef from Canadian animals less than 30 months of age. Backlogs in the system began to decrease as slaughter activity increased and cattle were delivered to market.

Prior to the closure of the U.S. border, Canada was heavily dependent upon the United States as a market for its slaughter cattle. Live exports of fed cattle were 594,636 head out of 3.5 million head total marketings (17 percent) in 2002, while 429,742 cull slaughter animals out of 990,860 head total marketings (44 percent) were exported that year (Canfax, 2004). Canada is also a major exporter – and importer – of beef products, and the United States is the largest market for those products. Total exports of beef into the United States from Canada were slightly over 363,453 tonnes in 2002, representing approximately 40 percent of total beef production; an additional 9 percent was exported to other destinations (AAFC, 2005).[1] Given Canada's reliance on U.S. slaughter capacity and the subsequent loss of this marketing avenue, it is no wonder that new slaughter facilities are now being planned.

The North American beef packing industry has evolved into two types of operations. The first involves high throughput plants (over one million head slaughtered each year) specializing in slaughtering fed steers and heifers and selling their output as boxed beef. With the U.S. border closed, boxed beef from these young animals was the only product allowed into the U.S. market. The second subset of packers generally operate smaller

plants, slaughter cattle of varying quality (often even multiple species), cater to smaller specialized niche markets, and do not produce boxed beef.

MacArthur, Briere, and Bell (2005) provide a relatively complete description of recent planned expansions to Canadian slaughter capacity. Of the eighteen ventures that plan to expand or create federally inspected slaughter facilities, ten aim to slaughter 500 or fewer animals each day; an additional three expect to slaughter between 500 and 1,000 animals each day. The remaining five companies – including Canada's two largest packers, Cargill and Lakeside Packers (Tyson/IBP) – plan capacity to kill more than 1,000 animals each day. Eleven of the planned plants intend to kill animals over 30 months of age, either exclusively or in combination with younger animals. The total anticipated investment exceeds $625 million, with plans by two ventures to each invest over $100 million. Two of the more modest expenditure plans are by Canada's two largest packers, another planned investment has been in the works for years, and another investment involves a former president of XL Foods, Canada's third largest beefpacking firm. However, most of the planned investments involve a collection of cattle producers who have little or no prior meatpacking experience, and several of the investments involve decommissioned plants. Many of the ventures involve new generation cooperatives; some involve niche markets such as natural beef. As result, most of these enterprises will face considerable challenges, whether or not the U.S. border reopens to exports of older cattle or beef derived from them.

Table 1 shows beef slaughter facilities in Canada with current or near-term planned capacities of greater than 1,000 head per day, as well as the category of cattle slaughtered at the plants. Cargill Foods in High River and Lakeside Packers in Brooks each have planned processing capacities of 5,000 head per day in the near future (MacArthur, Briere, and Bell, 2005). Table 2 provides a longer term forecast (2003-2009) of the aggregate capacity for all sizes of slaughter facilities within Canada. The projection in table 2 provides both weekly and annual capacities and separate capacities for fed (under 30 months) and cull slaughter (over 30 months) cattle.[2]

The breakdown of slaughter by category of cattle has important implications for the cattle and beef industries in Canada. During the border closure period, plants that slaughtered cattle under 30 months of age for export could not slaughter cattle over 30 months, and plants slaughtering older cattle were obliged to sell all of their production in the domestic market. It is expected that with planned expansion, in a few years Canada's slaughter capacity for cattle under 30 months will be able to accommodate all marketings at pre-BSE levels. This is not the case for older cattle, for which it is expected that kill levels will not soon approach those required to accommodate normal marketings. Existing under-30-month facilities may be reluctant to add capacity for animals over 30 months into their existing operations, partly due to switching costs associated with accommodating the larger animal frame size typically associated with culls. Furthermore, new ventures dedicated to slaughter of animals over 30 months are potentially risky due to

Table 1 Largest Canadian Beefpacking Plants, Current & Planned Capacities

Company	Plant location	Category	Daily kill	
			Current	Planned
Cargill Foods	High River, AB	fed cattle	4,100	5,000
Lakeside Packers	Brooks, AB	fed cattle	4,000	5,000
Better Beef Ltd.	Guelph, ON	fed cattle	1,900	1,900
XL Beef	Calgary, AB	mixture	1,000	1,000
XL Beef	Moose Jaw, SK	fed cattle	900	1,200
Colbex/Levinoff	St. Cyrille, QC	cull cows	720	1,040

Note: In some cases numbers have been converted from weekly to daily.
A five-day kill week was assumed.
Sources: Canfax, Cattlemen, and MacArthur, Briere, and Bell.

Table 2 Canadian Weekly Cattle Slaughter, Federal & Provincial Inspection

Class	2003	2004	2005	2006	2009
Federally inspected					
fed cattle	61,220	71,270	76,910	81,410	88,397
non-fed	11,920	10,020	15,720	15,470	16,798
annual total	3,657,000	4,064,500	4,631,500	4,844,000	5,259,741
Provincially inspected					
fed cattle	2,763	3,500	3,500	3,500	3,500
non-fed	943	1,500	1,500	1,500	1,500
annual total	185,300	250,000	250,000	250,000	250,000
Total slaughter					
weekly total	76,846	86,290	97,630	101,880	110,195
annual total	3,842,300	4,314,500	4,881,500	5,094,000	5,509,741

Note: Slaughter numbers are end-of-year.
Source: Personal correspondence with AAFC and CANFAX.

the historical seasonality of availability of cull cattle: cows are usually culled from the herd in the spring and fall; as a result there is a lack of a consistent supply of cattle aged over 30 months in Canada (Grier, 2005).

Challenges for New Entrants

A major challenge faced by small plants slaughtering younger or older cattle is the scale economies that characterize beef slaughter. A number of studies (including and summarized in MacDonald et al., 2000) have found that there are non-trivial economies of scale in beef packing, even with live animal input outlays approaching 85 percent of total costs.

Estimates of minimum efficient scale (MES) are difficult to obtain, but Ward (1988) estimated this minimum to be just over a million animals annually (4,048 each day) and it is probable that MES has increased in the time since that research was conducted. Only Cargill and Lakeside Packers are operating beyond this scale of operation, and the majority of the planned expansions will have only a fraction of this capacity. If significant economies of scale exist within an industry, conditions are created whereby large packers may be able to raise bids for cattle and operate profitably while small packers could not afford to pay the same cattle prices. Estimates cited in MacDonald et al. suggest that plants killing 1.35 million head per year (4,500 each day) have a cost advantage (including the cost of acquiring cattle) of between 4.6 and 7 percent under the costs of a plant killing 175 thousand head per year (583 each day).

A second advantage of larger packers relative to smaller scale operations is their advantage in offering an assured supply of a homogeneous product in large volumes. Bigger plants can produce greater quantities of multiple products for buyers. There are transaction costs associated with boxed beef, offal, and hide purchases for downstream buyers, and these costs are reduced by increasing the scale of the purchase. Larger plants can have economies of scope in producing several products jointly at a lower cost than the products can be produced individually. Lakeside Packers, pre-BSE, would run a short shift of cull cows through one of their processing lines near the end of the production day. They could do so on a large enough scale to economically justify the switching costs to prepare the line for a run of culls. A smaller scale plant might not be able to do so – its scale of production would be unlikely to create enough revenue to justify the costs of preparing a line for a run of different sizes of animals. So these economies are typically not available to smaller plants, although such plants may offer a broader variety of products.

Given these considerable advantages for incumbent firms that can process cattle on a larger scale, questions arise about the conditions under which processing on a reduced scale would be successful. The survival rates for small plants are quite poor in general. MacDonald and Ollinger note that successful small plants do not try to operate as scaled-down versions of their larger counterparts. Rather, they resourcefully engage in activities that larger plants lack the flexibility to accommodate.

Small plants, for instance, often cover a much wider array of products and processes than do large plants. They also are more likely to operate as multi-species plants, a practice no longer carried out by large plants because of the loss of efficiency associated with doing so. Plants with lower capacities are also more likely to specialize in slaughter of cattle with nonstandard shapes and sizes, or to rely upon sales of high-quality beef to local or regional restaurant markets. Smaller plants can also overcome the challenges associated with limited processing capacity by targeting niche markets on a greater scale than their larger competitors are able to do.

Conversely, the goals of high throughput and increased efficiency drive larger plants. These plants are, first and foremost, producers of generic boxed beef, an intermediate product. The value added to their product further downstream (i.e., by further processing into retail cuts) often accrues to others in the supply chains that specialize in marketing retail products. A smaller plant, while killing many fewer cattle, might be able to more effectively target segments of the market seeking (and willing to pay for) particular retail product attributes such as tenderness, flavour, organic characteristics, and others.

Price Impacts of Capacity Expansion

The impacts on fed and cull cattle prices[3] resulting from a closed border for exports of live animals and of beef from animals over 30 months are obtained from Rude and Carlberg (2005). A small dynamic annual synthetic model of Canadian cattle and beef markets was built, where cattle prices are determined domestically, high- and low-quality beef[4] is consumed domestically and exported into the U.S. market, and Canadian high-quality beef prices are linked to U.S. prices. A Canadian market-clearing condition determined the price of low-quality beef. The model was simulated over a sufficiently long period[5] for markets to adjust given the projected expansion in slaughter capacity. In the baseline scenario, fed and cull cattle prices are linked to U.S. prices. After BSE is introduced[6] into the model, these prices are determined by Canadian market-clearing conditions for each animal.

Two alternative scenarios are considered: a closed border where processing capacity is assumed to expand at the rate described in table 2; and a scenario where slaughter capacity for cows and bulls is reduced by 20 percent below the projected growth rates.[7] The fed and cull cattle price paths for these scenarios are shown in figures 1 and 2. Each graph shows the path of prices in the no-BSE baseline and the temporal adjustment of prices in response to a closed border with projected processing capacity (solid black line) and with a reduction in projected cull slaughter capacity (dashed line).

The immediate impact of a closed border is that fed cattle prices decline by $31/cwt from the baseline, and cull cattle prices decline by $27/cwt. This result is consistent with actual price declines in 2003. For the projected slaughter capacity scenario, the gap in fed cattle prices between the baseline and the closed border case gradually closes over the seven-year adjustment, with price recovering to baseline levels at the end of the period. It is also important to determine implications for these prices should new slaughter capacity not materialize. A wide variety of factors may prevent firms from operating at capacity limits, including the need to perform regular maintenance and labour shortages. This scenario was run with slaughter capacity for cows and bulls reduced by 20 percent below the projected growth rates.[8] The reduced-capacity scenario reduces fed cattle prices by an additional 8 percent below baseline prices relative to the projected-capacity scenario. The gap in these prices is more noticeable later in the simulation period. This is because lower cow prices initially increase inventories of cows and bulls; the increased breeding

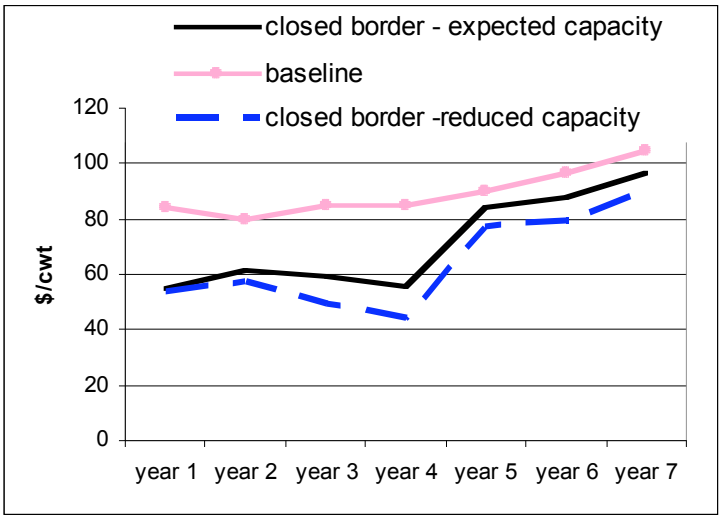

Figure 1 Impact of a closed border on fed cattle prices.

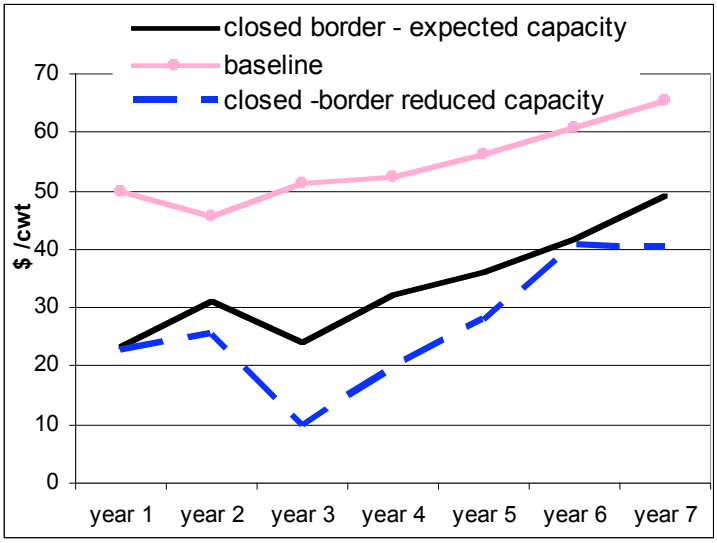

Figure 2 Impact of a closed border on cull cattle prices.

inventory then has a lagged effect, where two years later there are increased marketings of fed steers and heifers and this in turn puts downward pressure on fed cattle prices.

Figure 2 illustrates the impact on cull cattle prices. The gap in prices, between the no-BSE baseline and the closed border projected-capacity case, is not eliminated throughout the simulation. The gap is somewhat reduced by the end of the simulation. This result is not surprising, as just prior to the closing of the border the ratio of live animals exported to the total number marketed was much higher for cull animals (45 percent) than for fed cattle (17 percent). The most noticeable effect is the decline in cow prices to $10/cwt in the third year of the simulation. As a result of the reduction in processing capacity, cow

prices are on average an additional 11 percent below baseline prices relative to the scenario with a closed border and projected slaughter capacity.

Recently the United States allowed imports of live Canadian cattle under the age of 30 months. This creates another avenue for primary producers to market their livestock, but it also reduces incentive to expand domestic slaughter capacity. It is still not possible to export animals over 30 months of age, and these animals must be slaughtered and their meat consumed domestically. This has implications for the overall potential Canadian herd size and for how much fed beef can be produced. Slaughter capacity for cull cattle not only supports the price of these animals but also affects the rest of the industry.

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Endnotes

[1] These trade data were obtained from Statistics Canada HS 2013010 - 1602909900. These trade numbers may differ from frequently cited export volumes (CANFAX and Livestock Market Review) because they were obtained from Statistics Canada, while the alternative numbers are reported from USDA import numbers for Canada.

[2] The expansion projections for 2003 to 2006 were obtained through personal correspondence with officials from Agriculture and Agri-Food Canada. It was necessary to extend the projection to 2009 for this article, so an additional growth rate of 8 percent was applied to the federally inspected slaughter projection to provide the forecast in the final column of table 2.

[3] Alberta steer prices are used to reflect the price of fed cattle throughout this study, and weighted-average (D1-D2) cow prices are used to reflect the price of cull animals.

[4] Low-quality meat consists of the chuck, brisket and shank, and flank of fed plus trimmings from other parts of the carcass. High-quality beef consists of the hip, sirloin, loin and rib. For steers and heifers, low-quality meat consists of 43 percent of the carcass after these cuts and trimmings. High-quality meat is 57 percent of the carcass of a steer or heifer. The dressed carcass of cull cows and bulls is assumed to consist of 89 percent low-quality beef. The wholesale price of low-quality beef is derived from an industrial produce price index for hamburger. Low-quality beef from older animals is not exported

[5] The model is simulated over the seven-year period prior to the first case of BSE. This baseline was chosen because it is sufficiently long to allow the model to fully adjust after the initial shock of closing the border to live cattle trade.

[6] A closed border as a result of BSE is introduced in the first year of the seven-year period in the alternative scenarios.

[7] Sensitivity analysis is not run for steer and heifer slaughter capacity, given that a significant amount of this investment is being made by large existing processors Cargill, Tyson Foods, and XL Foods; therefore, the projections for this capacity expansion are more certain.

[8] This reduction in processing capacity is imposed from the second to the final year of the simulation.