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Feedlot Profitability and The Cattle Cycle

The cattle cycle is the cyclical fluctuation in the size of the cattle herd as it responds to price signals from consumer demand for beef. A biological lag in the reproductive cycle of cattle creates delays in supply, leading to periods of over and under-supply in response to beef demand. The cattle cycle is propelled by profitability, where in a free market economy, stronger beef demand leads to stronger fed cattle demand; this leads to stronger demand for feeder cattle and spurs expansion of the national beef cow herd. In the spring of 2021, we identified a [two-stage cattle cycle](#) in Canada that began in 2015, when feeding operations expanded while cow-calf operations remained in the consolidation phase of the cattle cycle.

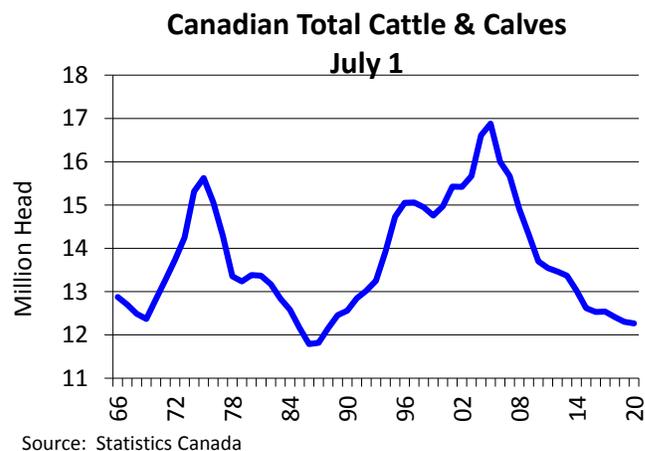
This two-stage expansion may have wrenched the gears of the national cattle cycle. Beef demand and wholesale margins in the last five years (2016-20) appear to have boomed but fed and feeder cattle prices have stayed relatively steady (extraordinary circumstances in 2020 aside). The national herd is at its lowest levels since 1989 and many feedlot operations are in the red ink (on a cash basis). As any number of black swan events can impact the cattle cycle, so too can free market disruptions.

This Fact Sheet explores the free market and the influence of the cattle cycle on feedlot profitability through examining drivers of feedlot profitability that include fed cattle prices, feeder cattle costs, the cost of feed and other production practices.

FEEDLOT PROFITABILITY AND FREE MARKETS

Demand

The cattle cycle is propelled by a free market profit cycle that begins with consumer preference for beef. A free market is one where the laws of supply and demand, in a voluntary exchange, provide the sole basis for the economic system, without government intervention. The beef industry in Canada underwent significant changes toward an integrated North American free market in 1989 that resulted in herd expansion throughout the 1990s.



The Canada-U.S. Free Trade Agreement was signed in 1989, creating an integrated North American market for cattle. In the five years that followed, cattle exports to the U.S. doubled to nearly one million head. The average price for fed cattle between 1990-94 increased 7% from the five-year average between 1985-89. It was also a time of significant investment in the meat packing industry. By 2004, a House of Commons Agri-Committee report named the “market for cattle and beef in Canada ...a

competitive free market” (Source: Report of the Standing Committee on Agriculture and Agri-food, 2004). In a competitive free market, price transmission from one sector (e.g. packer) to the next (e.g. feedlot) flows in a way that captures the transportation and transaction costs.

Demand in a competitive free market starts with the consumer. When retail demand for beef is strong, the products demanded by consumers determine the fluctuation in value of the wholesale cutout. When consumers demand higher-value middle meats, like ribs and loins, the price of those cuts drives the cutout value up. If demand for lower-value products such as ground beef or end meats increases, the cutout value may increase by less. In this way, consumer demand drives wholesale pricing.

Retail prices are an imperfect indicator of the wholesale market as they tend to follow the wholesale cutout price determined by multiple retailers bidding on the cutout, but retail prices incorporate [other expenses](#) too. Prior to 2010, the deflated (2002=100) retail beef price in Canada was never higher than CDN\$13.00/kg (and that high was in the early 1980s). Between 2010-15, it climbed 43% to break CDN\$15.00/kg. The deflated retail beef price has steadied between CDN\$14-15/kg since 2015, this includes 2020 and year to date 2021. The nominal increase in prices has been equal to inflation. Inflation has impacted retail prices in the last two years at the same time demand pull has been driven by volumes.

Free markets are conceptual because in reality there are no true free market systems; at the very least, authorities are required to protect the confidentiality of business practices to maintain competition and safeguard the protocols of individual businesses. Therefore, when it comes to understanding packing

prices and margins, Canadian data remains limited because there are only a few major packers in Canada.

The U.S. cutout values are used as an indicator of Canadian cutout values, as Canadian cutout values typically follow U.S. trends (albeit with less dramatic highs and lows). U.S. packer margins can also be used as a general trend to measure Canadian packing margins. Keep in mind that Canadian beef packers have higher operating costs than beef packers in the U.S. due to differences in regulations (e.g. the long list of specified risk material). Between 2016-18, gross margins for U.S. packers (beef cutout and by-product revenue, minus cattle costs, excluding operating costs) have been very positive, moving even higher in 2019 and 2020 (Source: Kevin Grier, December 2020).

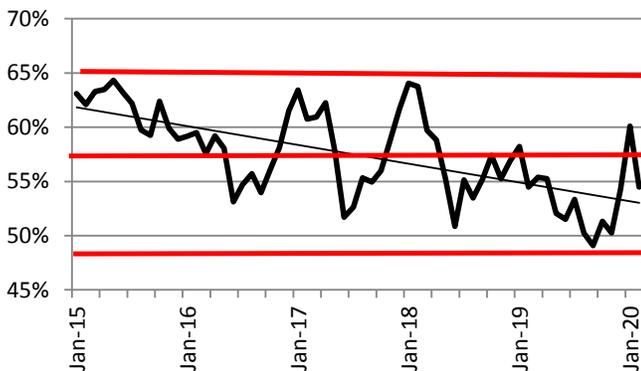
Fed cattle prices have not followed packer margins in step. Annual Alberta fed steer prices were flat between CDN\$149-154/cwt between 2016 and 2019. Prices dropped to CDN\$138/cwt in 2020 following COVID-19 related market shocks. The fed cattle price trend reflects more closely the same steady price trends seen at retail.



At this point one may question why higher packing margins (an imperfect indicator for higher beef

demand) have not translated to higher demand for fed cattle and higher prices for fed cattle? The Alberta fed steer price as a percentage of the AAA cutout provides an idea, but not an exact measure, about how prices get passed from wholesale to the feeding sector. Between January 2015 and February 2020 (latest AAA cutout values) the average fed steer price as a percentage of the AAA cutout was 57%. This means that for every \$1 increase in the AAA cutout there was a \$0.57/cwt increase in fed cattle prices. Remember this should not be a one-to-one ratio as there are operating expenses, transaction costs and dressing percentages to consider.

Alberta Live Fed Steer Price as a % of AAA Cutout Value



Source: CMC, Canfax

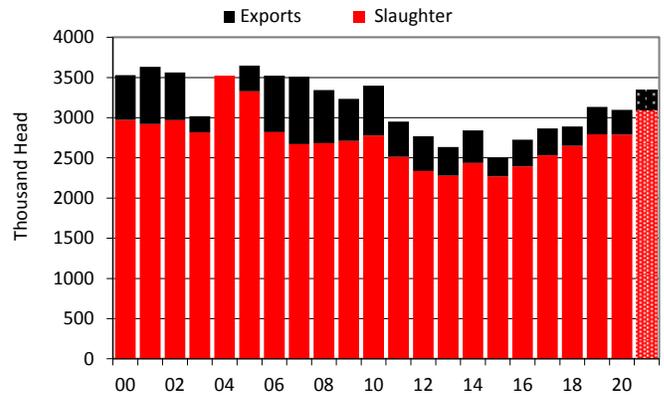
The U.S. fed steer price as a percentage of the Choice cutout for the same period was also 57%. From January 2020 to August 2021, however, the U.S. relationship has decreased to 46%. Why are feeding operations receiving only \$0.46/cwt for every \$1 increase in the cutout now? Because there is more to fed cattle pricing than demand alone.

Supply

Fed cattle prices depend on both consumer demand and overall cattle supply. Cattle supplies start with the cow-calf producer. Following the liquidation of the Canadian cow herd between 2005 and 2010, fed cattle supplies tightened until reaching a low of 2.5 million head in 2015. This coincided with the peak of

fed prices as feedlots had leverage with low packer utilization levels.

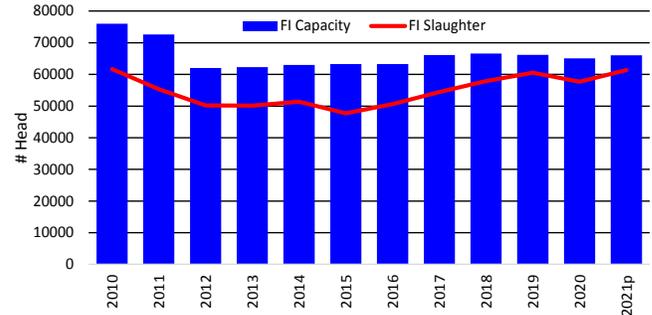
Canadian Fed Cattle Marketings



Source: CBGA, AAFC, Statistics Canada

Fed cattle supplies increased between 2015 and 2021 and packer utilization rates also improved. In 2021, packer utilization rates have averaged 95%, up from 91% in 2020. Sustained periods of high utilization would normally incentivize expansion in the packing sector, but for many reasons, there are significant barriers to entry in the packing sector. Slaughter capacity in Canada declined between 2010 and 2012, with only a slight increase in capacity over the last decade.

Canadian Federally Inspected Estimated Packer Utilization Rate (based on 40 hour packer week)



Source: Canfax, CBGA

A bottleneck in packing capacity impacts price transmission between wholesalers and feeding operations by moderating the number of fed cattle that can actually be processed. When the number of fed cattle that can be processed is disrupted it can

reduce value producers receive from the packing plant. The price of fed cattle reflects what can actually be slaughtered, not only what retailers and wholesalers are willing to pay.

In a free market, profits are allocated throughout the supply chain, with greater and less margins calculated for each sector independently, reflecting separate shifts in supply and demand. When bottlenecks occur, profits flow to that sector to create incentives to address them. The free-market expectation is that packers and processors would invest those profits to expand; addressing the current bottleneck.

Pending Liquidation

There may be hesitation for packer investment right now as the expectation is that the North American cattle cycle is entering a liquidation phase and the supply of fed cattle may decrease over the next 2-3 years. The 2021 drought is projected to push beef cow culling rates up to 14.2%. The U.S. beef cow herd peaked in 2018 and declined by 1 million head as of July 2021. As the North American herd liquidates, the supply of feeders will tighten, supporting feeder prices. It is at this point of the cattle cycle that feedlots are the most unprofitable.

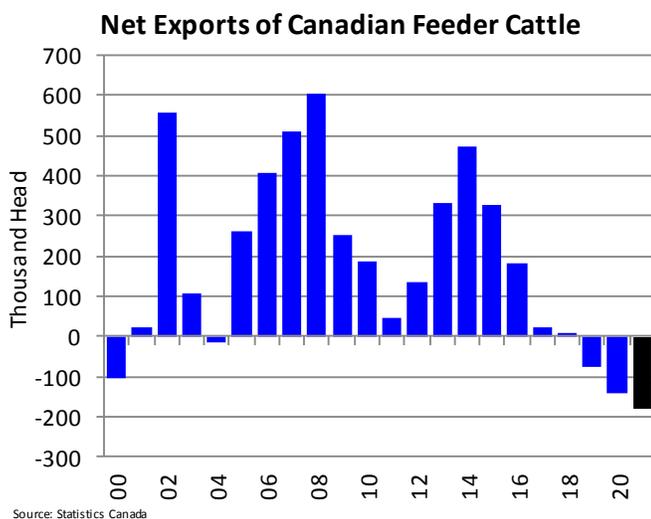
Prolonged periods of losses can occur at feeding operations during the consolidation period of the cattle cycle with reduced supply of feeders (early stages of expansion). Within an integrated North American free market for cattle, feeding operations may respond by looking for alternative sources of feeders. As the supply of feeder cattle in the U.S. moved toward a peak in 2019, this provided a source of lower cost feeders to fuel feedlot expansion. This is an effective way for feedlots to avoid the squeeze from both lower prices for fed cattle and higher prices for feeder cattle at the bottom of the cattle cycle. Indeed, cattle imports increased from 10,500 head in 2015 to 244,100 head from January through July 2021.

Basis

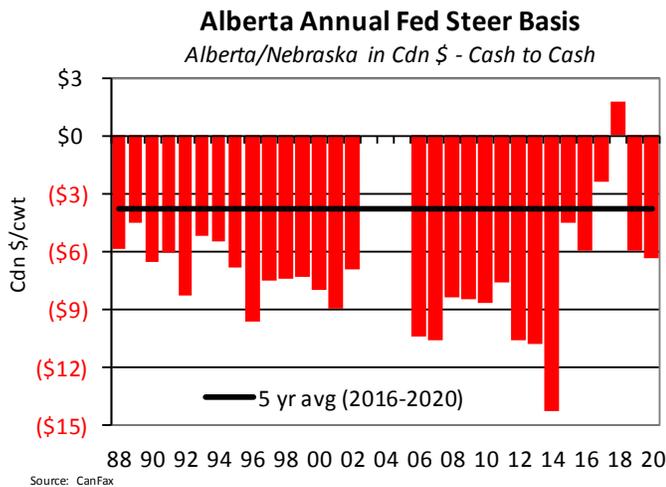
In the North American free market, cattle and beef prices will arbitrage. Cattle prices are determined in the larger U.S. market; the law of one price dictates that the difference in regional prices reflect local supply and demand conditions along with transportation and transaction costs. This is measured in the cash basis. The Alberta/Nebraska cash-to-cash fed steer basis is the price of Alberta steers, minus the price of Nebraska steers in Canadian dollars.

Cash Basis = Alberta Fed Steer Spot Price - (Nebraska Fed Steer Spot Price/ spot CAD\$)

As a net exporter of fed cattle, Alberta has a negative basis, meaning that supplies are generally larger than local demand. Additional transaction costs that thicken the border and decrease U.S. packer demand for Canadian cattle, will weaken the basis. High utilization rates at U.S. packing plants that pressure fed prices can result in a stronger basis encouraging cattle to move to where there is additional packing capacity.



Between 2011-15, the Alberta/ Nebraska cash-to-cash fed steer basis averaged CDN\$-9.56/cwt. Simultaneous to the feedlot expansion of 2015, the five-year (2016-20) average for the Alberta/Nebraska cash-to-cash fed steer basis strengthened to CDN\$-3.79/cwt. In 2018 the basis was actually positive (CDN\$1.78/cwt) for the first year on record (record since 1986). The stronger basis was the North American market signaling cattle to move where there was existing packing capacity available - at the time, that was Alberta. Hence, the driver for feedlot expansion was about maximizing packing capacity at the peak of North American fed cattle supplies.



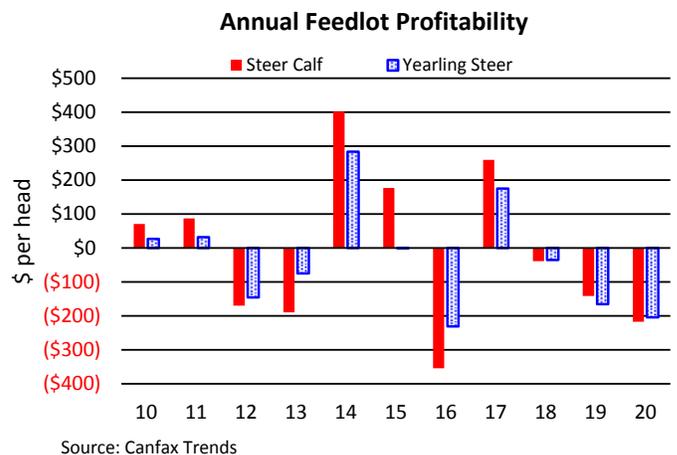
Packing plants across North America were historically located around population centres that were close to consumer demand and labour supplies. As cold shipping improved, plants moved closer to where cattle production occurs. Today's facilities are situated near both so don't necessarily reflect current levels of cattle supplies in each region. This requires regional price spreads to encourage cattle to move to where they need to be for processing.

FEEDLOT PROFITABILITY

The influence of the cattle cycle and disruptions like packing capacity bottlenecks on feeding operations means feedlot management is critical. The basis is

just one management tool at the disposal of feeding operations. Production and management choices must reduce risk of an unprofitable turn in the cycle or be ready to seize opportunities that arise. As well, operations can capitalize on their regional advantages with respect to transport, exports, imports, weather, and housing. While the cost of the feeder and price received for fed cattle can often be beyond any one operations' control, what happens between when the feeders arrive and before they leave presents a significant opportunity for profitability.

Steers have been fed over heifers at an average ratio of 2:1 for the last five years (2016-20), so they have historically been the focus of analysis for feedlot profitability. Since 2010, feedlot profits on a cash basis for both steer calves and yearling steers have followed a steady pattern of positive profitability for one to two years, then negative profitability for one to two years, and so on, switching back and forth until mid-2018. Since then, feedlot profits on a cash basis have remained below zero.



Feedlots were profitable in 2014 and 2015 when the price of fed cattle jumped to CDN\$154/cwt and CDN\$183/cwt, respectively, but unprofitable again in 2016, even as fed cattle prices remained at \$151/cwt. At just \$3/cwt higher per head in 2017

(\$154/cwt), feedlot profitability was as high as \$250 per head on steer calves. Ultimately, as we've seen, the fed cattle price is not the only driver of profitability.

Feedlot profits can swing wildly on an annual basis because there are many interacting market forces at play. In the last five years (2016-20), gross profit for an Alberta 550 lb steer on a cash basis has been as low as CDN\$-355/head in 2016 and as high as CDN\$259/head in 2017. On average over the last five years, these calves have grossed CDN\$-98.70/head (and CDN\$-68.97/head with 2020 excluded). The pattern is similar for shortkeep steers and heifers (see Table 1).

Table 1. Five-year Profit and Loss for Fed Cattle

2016-2020 CDN\$/head	Heifer calf	Steer calf	Shortkeep heifer	Shortkeep steer
5-yr high	269.99	259.23	193.25	161.35
5-yr low	-328.89	-354.86	-194.40	-187.92
5-yr avg	-63.65	-98.70	-46.56	-73.95

Source: Canfax Trends

It is critical to point out that the numbers in Table 1 are on a cash basis, and that Alberta feedlots market most of their animals on forward contracts. Even over a longer term, it doesn't look like many operators would survive just selling on the spot market. Table 2 presents that same data as Table 1, for a 10-year term instead of five.

Table 2. 10-year Profit and Loss for Fed Cattle

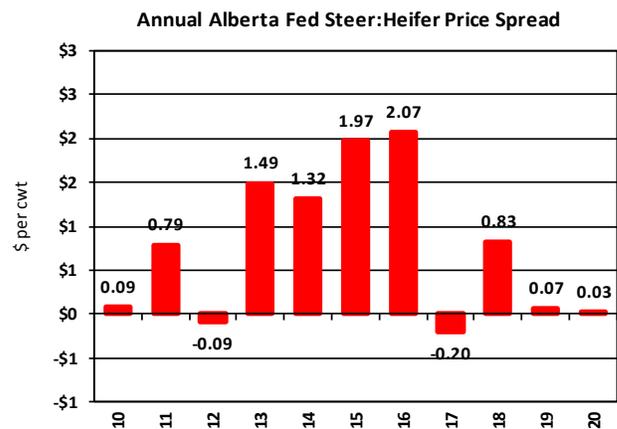
2011-2020 CDN\$/head	Heifer calf	Steer calf	Shortkeep heifer	Shortkeep steer
10-yr high	384.85	401.89	306.93	260.29
10-yr low	-328.89	-354.86	-194.40	-187.92
10-yr avg	-3.21	-18.94	-4.95	-22.80

Source: Canfax Trends

Steer:Heifer Spread

In the past, fed steers have commanded a significant premium over fed heifers, but that really started to change around 1989. From 1978-88, that fed steer

premium was an average CDN\$3.39/cwt. As the premium diminished, some years presented a heifer premium over steers, for example 1994-96, 1998-00, and 2002-07. In the last 10 years, heifers commanded a premium in both 2012 and 2017. The relative importance of fed pricing between steers and heifers has certainly diminished as fed steer and heifer prices have converged or become inverse. From 2010 to 2020, that average premium of a steer over a heifer was just CDN\$0.76/cwt, ranging from CDN\$2.07/cwt in 2016 to -\$0.20/cwt in 2017. Fed steer marketings still remain well above fed heifer marketings.



Source: Canfax

While the price for fed steers and heifers has converged in recent years, the decision to feed steers or heifers is one of relative profitability due to the performance of one over the other. Steers are thought to be more profitable than heifers in the feedlot, but when heifer supplies outpace bred heifer demand during a period of cow-calf liquidation, heifers can present an attractive, low-cost opportunity for feeding. This occurs in a year like 2021.

When purchasing heifers, especially in a year of liquidation, the quality of the stock could substantially influence prices paid as well as

performance. Heifers that end up in the feedlot are not always the best stock, as the best heifers are reserved to breed. Individual feeding operations should consider their morbidity and mortality track record of steers versus heifers placed in the past.

Depending on the resources available to each operation, there are other trade-off decisions to make when choosing to feed steers or heifers, explored in the following sections.

Feeder Prices

The profit cycle for feeders is meant to be driven by the returns from cattle feeding. Cattle feeding returns determine what price producers are willing to pay for feeder calves. Alberta feeder steer calf prices have been flat for the last five years (2016-20) between CDN\$217-\$223/cwt, even as feedlot profits have fluctuated. It's a similar story for Alberta 550 lb heifer calves, with prices between CDN\$190-\$195/cwt. Tight supplies of Canadian calves and a strong futures market are likely keeping calf prices stable even as cash fed prices have experienced volatility.

The feeder price ratio, or replacement ratio, is the feeder price divided by the price for fed cattle, which shows how much cattle feeders are reinvesting their revenue into placements. Lower replacement ratios mean fewer replacement dollars need to be invested to replace a fed animal. It is interesting to note that replacement ratios for heifer calves (450 lbs) in the west have been less than or steady with steer calves (550 lbs) every quarter since 2016. In the east, the replacement ratios for heifer calves have grown larger between 2016-20, compared to the five years prior. A full breakout of replacement ratios is published each November in the [Canadian Cattlemen's Magazine Beef Watch article](#).

When evaluating the options between placement weights, feeder prices, and the choice of steers or heifers; one must also consider animal performance and feed costs.

PRODUCTION & MANAGEMENT PRACTICES

Average Daily Gain and Feed Conversion

In the last five years, feeding operations in Canada appear to have made significant advances in average daily gain and feed conversion in heifers. Preliminary results of a meta-analysis evaluating Canadian research published between 2011-15 show the average daily gain (ADG) for a heifer was around 2.7 lbs/day in the west (with limited data in the east). For a steer during that time period, the ADG was 3.5 lbs/day in the west, and 3.3 lbs/day in the east. Papers published between 2016-20 report ADG for a heifer in the west increased on average to 3.8 lbs/day, with steers at an average 3.6 lbs/day in the west, and an average 3.5 lbs/day in the east. Further evaluation is required to finalize the exactness of this trend, but a shift toward improved heifer performance can be inferred.

Using the same preliminary results, heifer feed to gain ratios also appear to have experienced improvements recently. A lower feed to gain ratio means that fewer pounds of feed are needed for each pound of gain. An average feed to gain ratio reported in papers published between 2011-15 show heifer feed to gain conversion in the west was 7.8:1 (with limited data in the east). Research papers published between 2016-20 puts that western heifer feed to gain ratio at an average 6.8:1. This is very near where the western steer feed to gain ratio has averaged in the last few years, at 6.4:1. This may help explain why the negative profits for heifers over the last five years, have been substantially smaller than steers on a cash basis (see Table 1).

Determining when an animal has reached its finished weight is an important aspect for feed efficiency as well. Once an animal's rate of gain slows, most of the feed consumed is converted to extra-muscular fat rather than meat and marbling. Therefore, extra weight is not cost effective. Tracking and sorting animals based on finished weights is likely to result in higher returns at the packing plant for this reason.

Cost of Feed

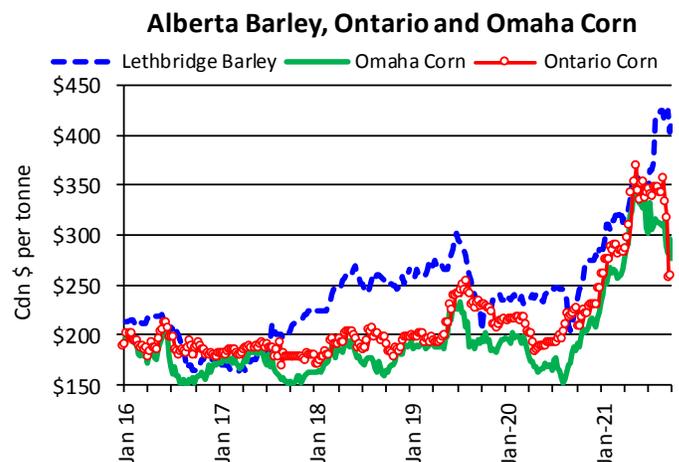
Feed is a major input, making understanding the grain cycle influential to feedlot profitability. Feedstuffs for cattle are globally traded commodities. Barley and corn are the main feeds; but wheat, hay and by-products are traded too. The decision to grow or purchase feed within the grain cycle has implications for profitability. Responding to high feeder prices and low fed cattle prices, cattle feeders are likely to look to alternative feeding strategies to support profit margins.

Strong domestic usage in 2019 and 2020, combined with strong export demand in 2020, have limited barley supplies and pushed barley prices to their highest level on record in 25 years. This is compounded by the declining trend in barley production over the last 20 years leading to low ending stocks. Lethbridge barley was at CDN\$421/tonne in August, 86% higher than the five-year average of CDN\$226/tonne. Barley end use stocks are forecast to be the lowest levels on record for 2021/22 at 300,000 tonnes, following two of the highest production years in the last decade in 2019/20 and 2020/21. Extremely hot and dry conditions in western Canada are impacting yield.

Total supply is forecast to be down 33% in 2021/22, drawing domestic use down 21% this year to its lowest ever levels, with exports halved (-52%) on availability. However, this follows the 2020/21 crop

year when barley exports were the highest in 30 years on strong international demand.

Ontario corn is also at peak price this year, at CDN\$346/tonne in August, 71% higher than the five-year average. Canadian corn ending stocks in 2021/22 are forecast to be steady with last year but at levels 13% lower than the five-year average, supporting prices. Omaha corn at US\$6/bushel was 92% higher than the five-year average for August with meteorological experts and analysts pointing to the severe La Nina drought affecting portions the U.S. corn belt. Drought is affecting all commodities, with feed wheat at CDN\$410/tonne mid-September, a record price second only to the last half of August.



Source: Alberta Ag, OCA

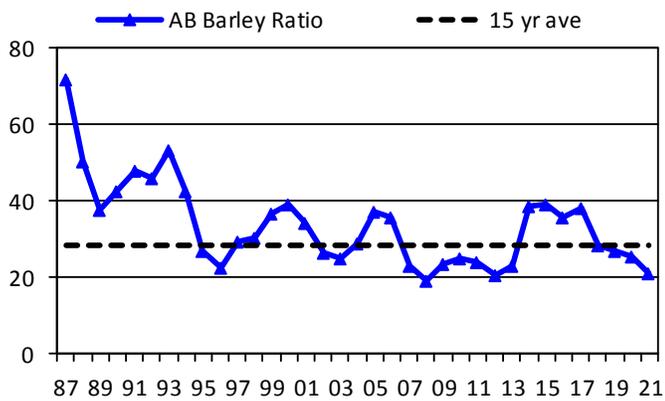
Cattle to Barley Ratio

In western Canada, the cattle to barley ratio reflects the number of bushels of barley that are equal in value to 100 pounds of a fed steer. When the ratio is high it also indicates fed cattle prices are relatively high compared to feeding costs and should encourage the industry to expand, which often results in higher calf and feeder prices. However, when the ratio is low it indicates smaller feeding margins, which has a negative impact on calf and feeder prices and can result in contraction.

The ratio can be used as an indicator for feedlot profitability showing what margins may be in the feeding industry. As feed prices move higher, the fed cattle to feed ratio drops. The Alberta fed cattle to barley ratio moved down to 16.5:1 in August 2021 with fed cattle prices at CDN\$153/cwt and the price of Lethbridge barley at CDN\$425/mt (\$9.25/bu). The lower ratio reflects a higher cost of feeding.

Just because feed prices are up does not mean the ratio goes up, if fed cattle prices go up too. Unfortunately, the fed cattle price has decreased as feed prices have gone up in recent years. In the past, low ratios like the ones being seen today, have often been followed by a period of positive feedlot profits.

Fed Cattle to Feed Ratios



Source: Canfax

Looking back, the lowest ratio on record was in July 2003 at 12:1, pressured down by low fed cattle prices. The ratio was below the 15-year average (28.5:1) between 2007 and 2013, before spending four years between 2014 and 2017 around 40. In 2018 and thereafter, the ratio declined from 28.5:1 to 25.7:1 in 2020. Year to date (August 2021) the ratio is 21:1, just two points higher than the lowest annual ratio on record (19:1 in 2008).

By-Products

Feeders have turned to by-products, not only to reduce food waste, but to mitigate the current high costs of feed grains. The ethanol industry has expanded capacity since 2018, resulting in more dried distillers grains (DDGs) being available. Dried distillers grains are one of the most commonly fed by-products in Canada, but there are many other by-product sources out there. Oil seed by-products include cotton seed, soybean meal, sunflower meal and canola meal. Other alternatives include sprouts from malting barley, wheat shorts, bran, millrun from milling wheat for flour, barley milling, or even sugar beet pulp. Additionally, with a drought year, salvage crops will be on the market, with wheat silage and barley silage potentially more readily available.

As with any feeding program, it is important to know the quantity of major nutrients, such as protein and energy, and mineral levels fed. In some cases, minerals that are present in very high levels can limit how much by-product can be fed. An example of this is the level of sulfur in DDGs. Feed testing is recommended before including any by-product in a feed program.

Learn more about feeding by-products and other performance and animal health production practices at: beefresearch.ca

Fed Cattle Marketing

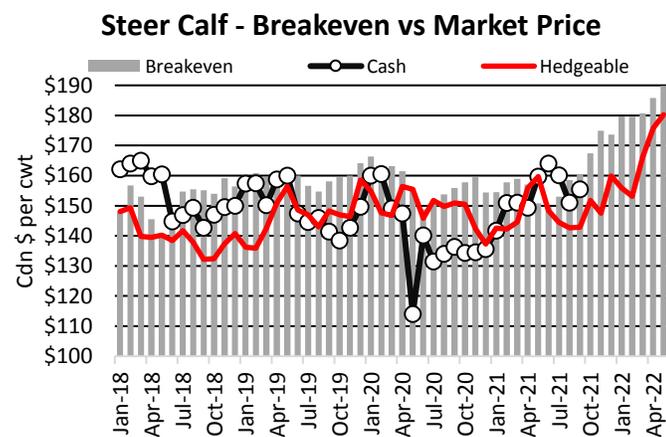
The interaction of fed cattle prices, feeder cattle costs, cost of feed stuffs, and production and management choices comprise a breakeven cost for each animal fed. To reduce risk, many producers sell on a futures market, or a forward contract, that prices at the time fed cattle would be ready to come to market.

The cash-to-futures basis provides market signals to feedlots on whether they should sell now or wait to sell later. A narrow or positive basis with the current

cash price higher than the nearby futures market would indicate that the marketing will be moving lower and producers should sell now. While a wider or negative basis would indicate that the current market price is lower than what it is expected in the coming months.

Futures Basis = Alberta Fed Steer Spot Price - (CME Live Cattle futures/CME Nearby CAD Futures)

The Alberta/Nebraska cash-to futures basis has been strengthening over the last five years, similar to the cash basis, but even stronger. Between 2006-10, the basis averaged -\$10.48/cwt. Between 2011-15, the basis averaged -\$8.42/cwt. Between 2016-20, the basis average has been near zero, at -\$0.67/cwt.



As the cash-to-cash and cash-to-futures basis' have strengthened over the last five years, this has signaled expansion for feedlots in Canada. A stronger basis makes the domestic fed cattle supply look more attractive to American buyers, signaling access to larger markets and sidestepping the domestic capacity constraints. Indeed, from 2014 to 2015, the first year of feedlot expansion, the Alberta/Nebraska cash-to-cash basis narrowed by CDN\$9.77/cwt (from CDN\$-14.27 to CDN\$-4.51), CDN\$5.88 narrower than the average for the previous five years (which was CDN\$-10.39). During the same period, the futures basis narrowed by CDN\$7.40/cwt (from CDN\$-10.44

to CDN\$-3.04), CDN\$6.65 narrower than the average for the previous five years (which was CDN\$-9.60).

The chart above shows there are times that the cash price is better than the hedgeable price, and vice versa. The chart also shows there have been very few opportunities for profitability in the last three years, at either price. The value in the futures market, or a forward contract, is that it provides certainty about the selling price. This gives feedlots direction in managing production choices to keep breakevens in check.

CONCLUSION

The bottom of the cattle cycle, in theory, is not necessarily a profitable place for feedlot operations. Free market disruptions that may occur during that phase make the risk for loss even greater. Tapping into an integrated North American cattle market is one strategy to mitigate that risk. Similar to what happened in 1989, feeding operations have looked to the U.S. to navigate out of the tightest part of their profit cycle.

Changes in genetics and management practices have narrowed performance differences when it comes to feeding steers or heifers. In a drought year, the profitability of feeding heifers will vary by operation. The opportunity to hedge risk on the futures market, or with forward contracts, has provided some relief from the cash market volatility, making production and management choices that can be effective for long-run profitability.