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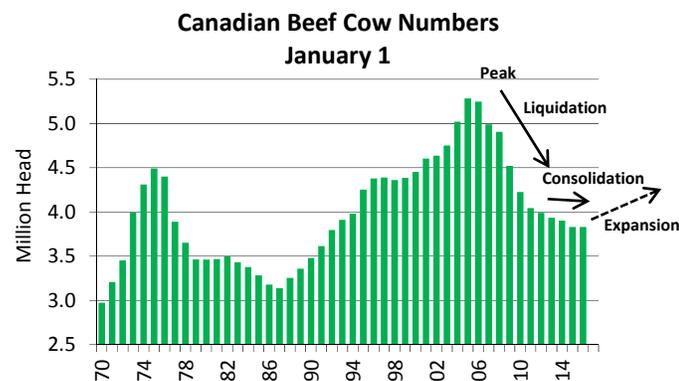


Opportunities and Challenges in the Expansion Phase

On January 1st, 2016 beef cow inventories were steady at 3.83 million head; but beef heifers for breeding were up 4% at 547,300 head, the highest number since 2008. While Canada remains in the midst of figuring out whether the industry is going to start expansion, the U.S. beef herd has been expanding aggressively in the last two years. U.S. beef cow inventories were up 3.5% to 30.3 million head on January 1st and beef replacement heifers were up 3.3% to 6.3 million head. Larger numbers becoming available have been apparent with feeders outside of feedlots up 5.3% at 25.9 million head.

and net live cattle exports. The disposal numbers used exclude exports or imports of breeding animals.

When the ratio declines, it means more males are being disposed than females. This typically happens in the expansion phase with more female cattle being held in the herd for breeding.



Source: Statistics Canada

Some of the key indicators will be examined to determine where we currently are in the cattle cycle, followed by a discussion on the opportunities and challenges for producers moving into the next phase of the cattle cycle.

CATTLE CYCLE INDICATORS

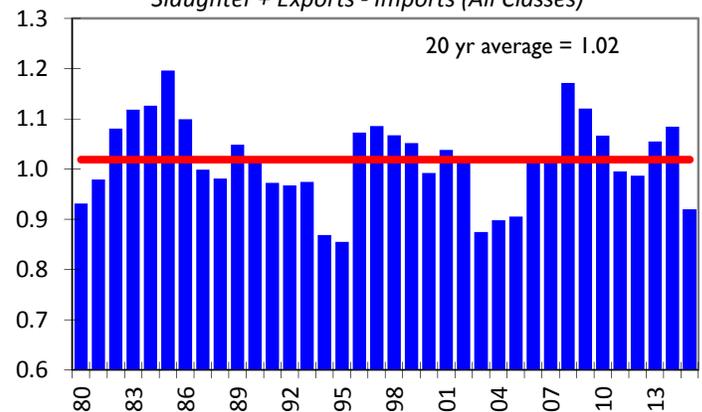
Are we heading into an expansion phase? The cattle cycle is influenced by numerous factors and therefore is difficult to predict. But there are a number of good indicators that can assist in planning. Although no single indicator is perfect, using several indicators together can provide insight into the current cattle cycle and likely trends moving forward.

Female to Male Disposal Ratio

The female to male disposal ratio measures the number of females (heifers and cows) disposed for every male (steers and bulls). "Disposal" includes domestic slaughter

Canadian Female to Male Disposal Ratio

Slaughter + Exports - Imports (All Classes)



Source: AAFC, CBGA, CanFax

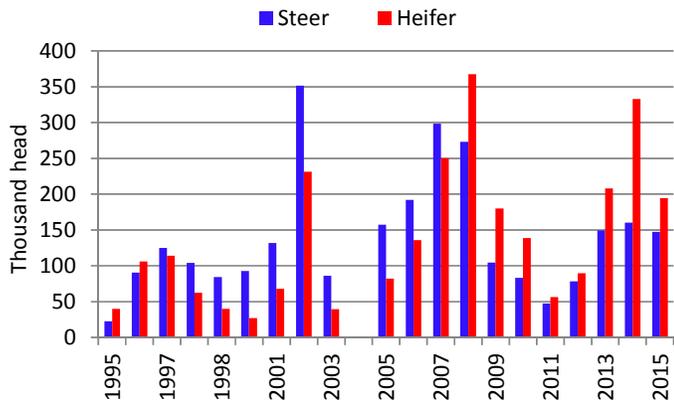
In 2014 and 2015, the female to male disposal ratio was somewhat skewed by the large feeder heifer exports in the previous year. Due to strong demand from the US for heifer during their expansion starting in 2013, feeder heifer exports were up 132% in 2013 and 59% in 2014. This has contributed to a larger proportion of fed slaughter coming from steers in the last couple of years, and also restricted expansion in Canada as a large number of heifers were exported instead of being retained for breeding.

In 2015, heifers continued to account for a larger portion of feeder exports compare to steers at 55%, but it is down from 67% in 2014 and the five year average of 59%.

The female to male ratio moved sharply lower from 1.08 in 2014 to 0.92 in 2015. This is the largest year-over-year decline since the 1960s and the lowest ratio since 2005. Compared the average ratio of 0.98 during 1987-1996 when a solid expansion happened, the 2015 ratio was 6%

lower. This may be setting up 2016 as a turn year for the Canadian industry.

Annual Feeder Cattle Exports to US

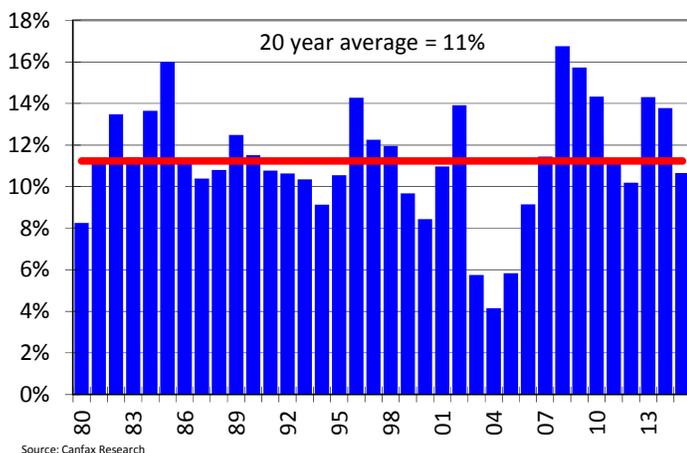


Source: USDA

Beef Cow Culling Rates

The culling rate is defined as the number of breeding cows removed from the herd as a percent of the total cow herd. Typically, reduced cow culling rate helps to increase breeding female numbers. But a lower cow culling rate alone does not necessarily lead to expansion because any change in replacement heifer numbers in the opposite direction will offset the increase. It is the relationship between these two that result in expansion or liquidation of the cow herd.

Canadian Beef Cow Culling Rate



Source: Canfax Research

Cow marketings were down 19% in 2015 pushing the beef culling rates down to 10.6%. This is only modestly below the long term average of 11% and is pretty modest in terms of expansion. In fact we were around 10% as recently as 2012 when the herd was stabilizing. Previous

expansions include 1994 when culling rates were 9% and in 1999 to 2000 it was 8.4-9.5%.

As bred heifer prices increased to uncharted levels in 2015, retaining beef cows appeared to a more affordable way to stabilize or expand the beef herd. In addition, large lean trim supplies from Australia pressured ground beef prices lower in the second half of the year. Consequently, lower cull cow prices made it easy to justify keeping cows on the farm.

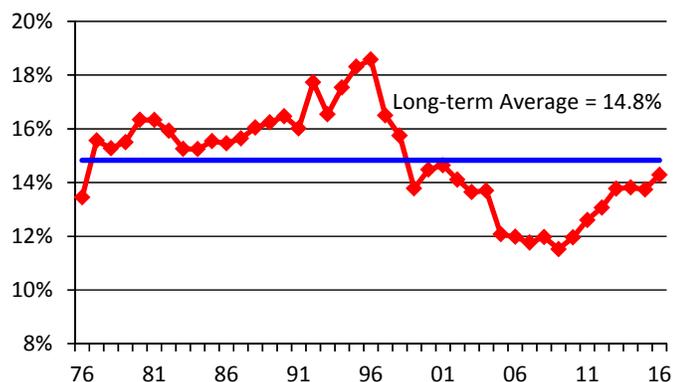
The last time the beef cow culling rate dropped below the long-term average in 2011 and 2012, it did not lead to expansion in the following years. During the 2010-2012 drought years, a larger number of U.S. cows were liquidated and pressured Canadian cow exports. Cow exports in 2011 and 2012 were down 40% and 5% from the 2008-10 average, contributing to the lower culling rate in Canada. In 2013 when moisture conditions improved, US cow slaughter dropped as producers quickly moved to restock while inventories were at a historic low. This contributed to the larger market factors that pushed North American cow prices to record highs in 2013-14. Many Canadian producers took advantage of the higher prices and we saw larger cow marketings. It should be remembered that the beef industry currently has one-third of producers expected to retire over the next decade.¹ Some older producers may have taken these strong prices as a chance to retire instead of expanding their herd.

Replacement Heifers

It is the relationship between cows and replacement heifer inventories that result in expansion or liquidation of the cow herd. Looking at the ratio of January replacement heifer numbers to beef cow numbers, the ratio has increased from 12% in 2010 to 14.3% in 2016, but remains lower than the long-term average of 14.8% and well below the 1987-1996 (last solid expansion) average of 16.9%. While beef cow inventories have been down each year since 2010 replacement heifers were down in 2010, 2014 and 2015, but up for the rest of the years. The continuous decline in beef cow numbers was a key driver of the overall beef breeding herd which declined 8% from 2010 to 2015.

¹ CCA New Release, March 2016, Labour gap in Canadian beef sector could quadruple by 2025 <http://www.cattle.ca/assets/Article/CCA-News-Release-15-3-2016-Labour-gap-in-Cdn-beef-sector-could-quadruple-by-2025-study-says.pdf>

Replacement Heifers Relative to Cow Numbers



Source: Stats Can, Canfax

On January 1, 2016 the beef breeding herd (beef cows and breeding heifers) saw the first year-over-year increase since 2005, up 0.4% or 19,200 head. A lower culling rate in 2015 resulted in steady beef cow inventories at the beginning of 2016, while replacement heifer numbers were up 4%. The increase in overall breeding herd is the first sign of expansion and it could result in a stable to slightly larger 2016 calf crop. If the low beef culling rate is sustained in 2016, beef cow numbers are expected to increase in the January 2017 report. To push the heifers to cow ratio back to expansion levels, heifer retention will need to see a more robust growth, weather permitting.

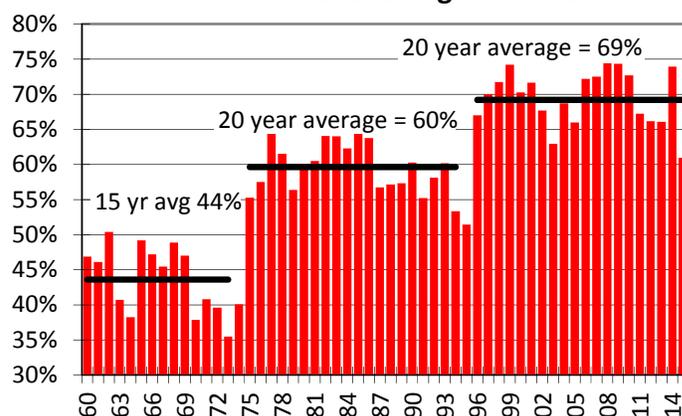
Heifer to Steer Ratio

The heifer to steer ratio, also known as the heifer slaughter ratio, measures the number of heifers slaughtered per 100 steers. It provides an indication on how many or what proportion of heifers is entering the breeding herd. In the expansion phase, the heifer to steer ratio typically trends lower as the more heifers are kept for breeding instead of being slaughtered.

It is important to note that the change in heifer slaughter ratio is also affected by reproductive efficiency. Improved reproductive efficiency means fewer female cattle are needed to produce the same number of calf. This is one of the reasons behind the big jumps in heifer slaughter ratio from the 1960-1975 period to 1975-95 and 2000s.

In 2015, the heifer to steer ratio dropped from 74 in 2014 to 61 to be well below the 20-year average of 69. While steer marketings were down 8%, heifer marketings were down 24% as large heifer exports in 2014 resulted in reduced heifer availability in 2015.

Canadian Heifer Slaughter Ratio



Source: AAFC, CBGA, CanFax, Stats Canada

THE PRICE CYCLE

The cattle cycle causes beef price cycles. The two are highly correlated, but run in opposite directions. When cattle numbers trend upward, prices tend to trend downward and vice versa.

Driver #1 - Protein Supplies

At the beginning of the expansion phase, beef supplies typically continue to decline due to lower female slaughter. The time required for the first larger calf crop to be finished means that the increase in beef supplies will lag behind the increase in cattle inventories.

Expansion has progressed rapidly in the U.S. in 2014 and 2015. Overall North America beef production remained historical low in 2015 with U.S. and Canadian beef production down 2.3% and 8.9% respectively. Part of the decline was offset by imports from Australia where prolonged drought encouraged cattle slaughter.

In 2016, larger U.S. beef production is projected (up 4.8%). If the aggressive expansion continues, it could lead to a more rapid increase in beef supplies in the next couple of years, pressuring beef and cattle prices moving forward.

Larger production of pork and poultry coupled with trade restrictions in 2015 resulted in large protein supplies in the U.S. and pressured overall protein prices. In 2016, U.S. pork and poultry production is forecast to increase by 2% and 3% respectively. Larger production will prevent prices from increasing unless exports significantly rebound.

The degree that prices will fall in response to larger production will depend on consumer demand.

Opportunity – Current beef supplies remained historically tight, lending support to prices.

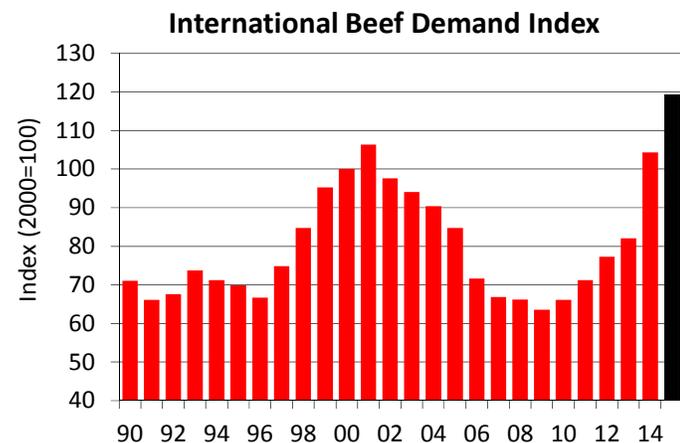
Challenge – Increased beef supply is starting to surface while pork and poultry supplies are large. This will pressure overall protein prices.

Driver #2 - Consumer Demand

Supplies are only half the story that determines prices. Consumer demand is the other half that drives overall market signals in the beef industry. When beef demand increases, fed cattle prices increase, signaling the industry to expand. Similarly, when beef demand decreases fed cattle prices fall resulting in negative returns and producer consolidate. Consumer decides the price of beef depend on their willingness to pay. This can be indicated by the beef demand index calculated based on beef consumption and deflated beef prices (See “Consumer Demand” Fact Sheet).

In 2015 international demand for Canadian beef was the strongest on record. The international demand index was up 14% from 2014 and up 12% from the previous peak in 2001. While global beef supplies remained tight in 2015 with smaller production in major exporting countries, rapid population growth and urbanization within many developing regions remains a key driver of the growth in beef consumption. The lower exchange rate in 2015 have also support international demand as it enhanced price competitiveness of Canadian beef in the global market.

In 2015, Canadian beef exports were up 1% in volumes and 15% in value. While beef prices soften with increased North American beef supplies, more robust demand could develop as more international buyers will be finding the price range where they are willing to enter the market.



Source: SScanfield 2012, Canfax Research

In 2015, domestic demand also reached the strongest since 1989. The high prices over the last four years have been supported not only by tight supplies but also by stronger demand. If retail beef demand in 2015 had been steady with 2012/13 levels deflated beef prices would have been 19% lower than what actually occurred. In other words, demand has increased prices by 19% over the last three years. Maintaining demand is important going forward.

Beef demand is inelastic. For every 1% increase in production, prices decrease by more than 1%, and vice versa. This supported record high prices in 2014 when a shortage in global supplies resulted in prices spiking sharply higher. But as expansion occurs and beef production increases moving forward prices can be expected to be extremely sensitive anytime there is larger than anticipated production.

Opportunity – Strong international demand with renewed interests in Canadian beef due to lower prices will support exports and herd expansion.

Opportunity – After several years of retail beef prices increasing, stable prices that are more in line with competitive meats should provide an opportunity to regain market share.

Challenge – Beef prices will be pressured by increased beef supplies.

Driver #3 - Exchange Rate

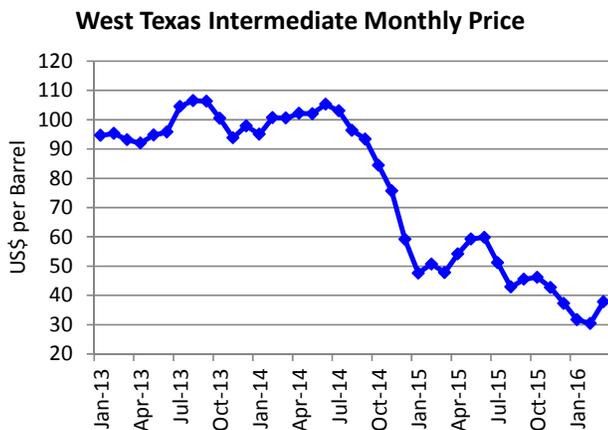
The exchange rate has a direct impact on the price producers received for their cattle. Due to the ability to arbitrage, cattle prices are heavily influenced by the U.S. market and therefore when a change in exchange rate would typically result in changes in the opposite direction for cattle prices.

The history of how exchange rates have influenced the cattle cycle are highlighted in the expansion that commenced in 1987. It was driven by stronger cattle prices created by a low exchange rate at that time. The Canada/U.S. exchange rate had fallen to \$0.72 and \$0.73 in 1986 and 1987 pushing Canadian cattle prices \$20/cwt higher from \$95 in 1986 to \$115/cwt in 1987, while the U.S. prices were up US\$14/cwt from US\$65 to US\$79/cwt. A stronger price signal supported expansion in Canada up to three years earlier than in the U.S.

At current prices, for every one cent change in the Canadian dollar, calf price change about 6 cents per pound in the opposite direction. In 2015, the Canadian

market was supported by a lower exchange rate with the loonie weakening 14% from \$0.82 in January 2015 to \$0.70 in January 2016 before rebounding to US\$0.76 in March 2016.

The price outlook for 2016 and beyond is highly dependent on what happens with the loonie. Given the loonies is a petro currency that means what is the outlook for oil. In January the West Texas Intermediate, the benchmark price for oil, fell below US\$30 a barrel, but has recovered slightly and hovers in the low \$40s. This is down from above US\$100 a barrel in the summer of 2014. At the end of 2015, the U.S. had the equivalent to one year's worth of production in crude reserves. In mid-January Iran announced plans to increase production and exports, adding to the global oil glut. Structural changes in the China's economy may also soften oil demand. These are expected to keep oil prices under pressure moving forward.



Source: World Bank

While the stronger loonie has been pressuring prices in the first quarter of 2016, it remained the lowest since 2004. If the loonie stabilizes into a trading rate seen over the last year it would support the price signal to expand. But a stronger loonie would amplify the current decline in Canadian prices, pressure profitability and curb expansion.

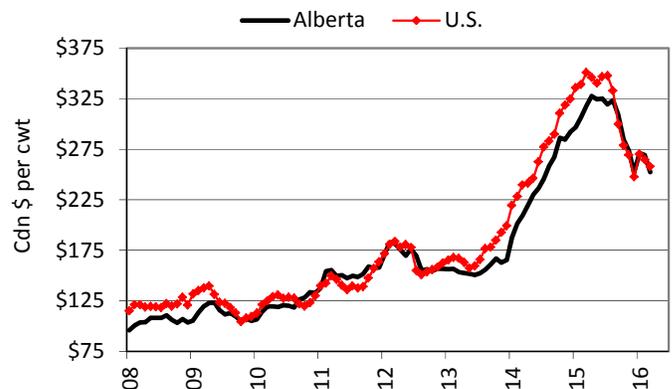
Opportunity – A historically weak Canadian dollar is supporting cattle and beef exports.

Challenge – An uncertain exchange rate outlook makes cattle prices hard to predict. A strong exchange rate could be a great threat to cattle profitability in Canada.

Calf prices

Cattle prices tend to reach their cyclical peak in the early expansion phase as cattle supplies are at the bottom and increased retention of heifers and cows further reduces slaughter animal numbers. As expansion continues, larger beef production pressures cattle prices. Cow/calf producers tend to keep increasing the cow herd as long as calf prices remain profitable. In a typical cattle cycle, the expansion phase is usually the longest phase lasting between 5-7 years. Anything that makes cow/calf production less profitable or unprofitable may stop the expansion and move into the liquidation phase.

Alberta vs U.S. 550 lb Steer



Source: CanFax, Cattle-fax

In the second half of 2013, U.S. calf prices sharply increased, sending strong price signal for expansion. Calf prices peaked at \$340/cwt in the first quarter of 2015 and have dropped to \$260/cwt since then. A key driver to the decline was larger protein supplies. In 2015, U.S. pork production increased 7% as Porcine Epidemic Diarrhea Virus (PEDv) was mostly addressed and U.S. poultry production was up 3%. But larger protein supplies were compounded by Highly Pathogenic Avian Influenza (HPAI) which closed U.S. poultry exports (Russia and China). In addition, the strong US dollar and challenges at west coast ports reduced red meat exports. All of this added an additional 9.5 lbs per capita of animal protein onto the U.S. consumer. The only way to deal with that kind of volume is to reduce prices.

Canada is a price taker in the North America cattle market as the Canadian beef cow herd at 3.83 million head is only one tenth of the U.S. at 30.3 million head. Despite the lower exchange rate cushioning some of the effect, Canadian calf prices have been following the same trend with prices peaking at \$325/cwt in June 2015 and

dropping to \$252/cwt in March 2016. This means Canadian producers are facing lower cattle prices before a robust expansion even begins.

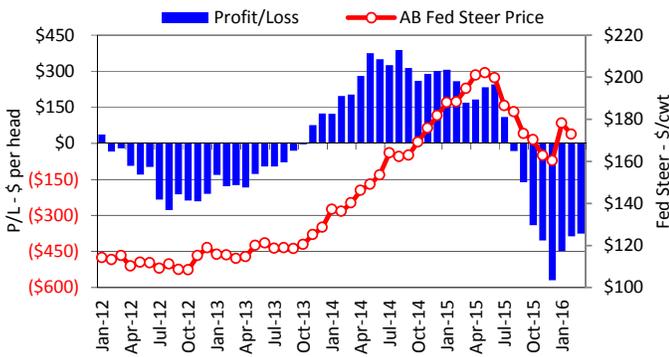
As beef production increases in the U.S. cattle prices have started their decent. Lower calf prices will pressure cow-calf profitability and weaken the expansion signal. Canadian producers who did not expanded in the last two years may have missed the best timing. The time lag of expansion and the price drop driven by the U.S. may result in calf prices falling to unprofitable levels quicker than previous cycles in Canada.

Challenge – Calf prices moved lower before a robust expansion starts in Canada. Shrinking profits in the cow-calf sector will constrain expansion.

Feedlot Margins

High cattle prices through most of the first three quarters of 2015 created large profit opportunities for the cow-calf sector. But from a feedlot prospective, buying record high priced calves set very high break-evens for the end of 2015 and the start of 2016. As prices have gone through a dramatic correction, the feedlot sector has been experiencing large losses since the fourth quarter of 2015. Negative feedlot margins have reduced willingness to pay for cattle and pressured calf and feeder prices.

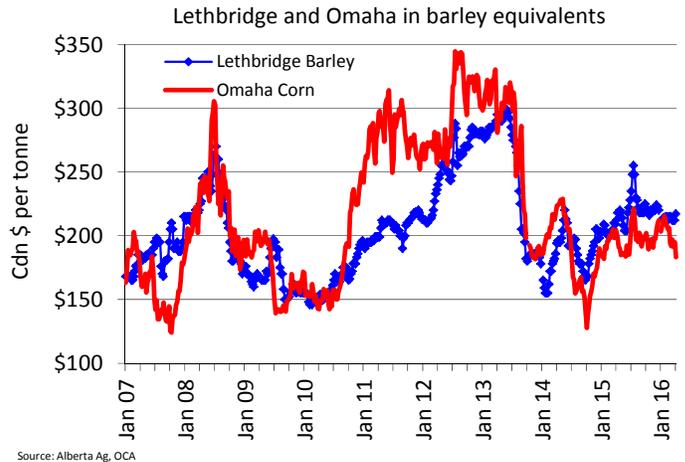
Feedlot - Profit/Loss Margin YEARLING STEER



Replacement ratios show how much higher feeder cattle prices are per pound of fed cattle. The lower the ratio, the fewer dollars a feedlot needs to replace an animal. Conversely, a high ratio implies the feedlot must pay more per pound to replace an animal. Replacement ratios peaked in the third quarter of 2015 and have since dropped back to levels similar to lower than last year in the first quarter of 2016. The declining ratio has positive implications on feedlot profitability as it means feedlot can now place cattle at a better breakeven and an

improved profit outlook, assuming feed costs are constant.

Feed Grain Prices



In addition to lower cattle costs, feed prices have softened with the U.S. corn planting intensions surprisingly large at 93.6 million acres compared to pre-report estimates of 89-91 million acres. Now, a lot can and will happen with acres planted as farmers adjust plans, but at this point it appears there will be ample feed in 2016, pressuring prices lower. In Canada, barley production is projected to increase a modest 2% to 8.4 million tonnes. This combined with a 38% increase in carry-out stock at 1.7 million tonne is expected to result in a 6% in total supply in 2016. Annual barely prices are forecast to decline 5% at \$190-220/tonne.

Challenge – Negative feedlot margins since the second half of 2015 have pressured feeder prices down.

Opportunity – Calf prices have stabilized as feedlots are now able to source contracts that are profitable.

Opportunity – Ample grain supplies is positive for the livestock sectors as it points to lower cost of production.

Market Volatility

During the expansion phase, the market can be the most volatile as it finds a new trading range. For example, fed cattle prices were down 21% from the annual high to low in 2015, while the historical seasonality shows a much smaller drop of 9%. In addition, with prices running at historical highs, a one percent move translated into larger change in prices compared to previous cycles. Therefore, even seasonal price movements imply a much larger dollar change than has been experienced historically by cattle producers, retail and foodservice operators.

Uncertainties in terms of the exchange rate, cattle futures and the increasing integration into the global market also add to the volatility in the current cattle cycle.

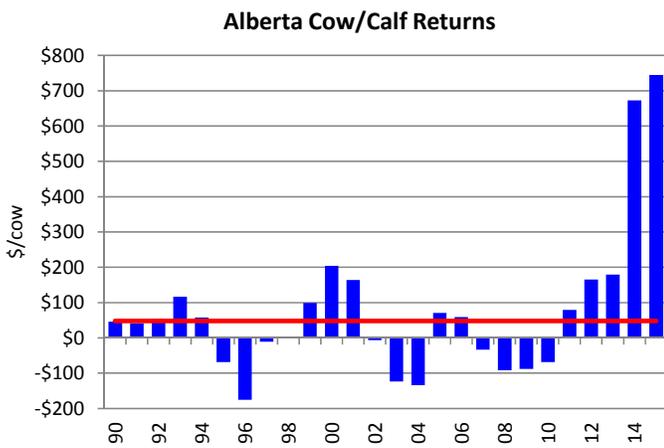
Challenge – Greater price volatility at higher prices will add to the risk for all market participants and presents greater challenges in risk management.

EXPANSION?

While many of the indicators discussed above provide evidence of the shift toward an expansion phase and current market environment provides both challenges and opportunities for cattle producers, whether the expansion will materialize and its length and magnitude will be dependent on the change in cattle prices, production costs, and profitability. Labor and feed availability, age, risk tolerance, and other factors will also play a role in the decision to expand on individual farms.

Cow/calf Profitability

Profitability in the cow/calf sector is the most important driver behind the decision about expansion or contraction the cow herd.



Source: Canfax Research

Calf prices in 2014 and 2015 resulted in record high profitability for the cow-calf sector. While a strong market signal for expansion, the decision about expansion is highly dependent on the individual operators' own situation. After years of poor margins associated with the Bovine Spongiform Encephalopathy (BSE) outbreak, the strong Canadian dollar and high feed costs – producers have been focused on rebuilding equity and making investments in infrastructure. Now that those investments have been made greater focus on expanding the herd is anticipated in 2016. (See [“Who’s Expanding: Factors to Consider”](#) Fact Sheet).

On the flip side, it should be remember that older producers may have taken these strong prices as a chance to retire instead of expanding their herd. The dry conditions at the start of the grazing season in western Canada may have put expansion on hold.

Opportunity – Strong cow-calf profit in 2014 and 2015 is signaling expansion.

Challenge – Aging farmer population will be a constraint to expansion.

Bred Heifer Value

In addition to cattle prices, cost of production is also an important factor affecting cow-calf profitability and the move of the cattle cycle. For producers who are expanding their herd or considering to expand, it is important to note that the value of bred heifer during the expansion phase will affect cost of production in the next decade as they are the depreciation costs paid for the next decade.

The Net Present Value calculate what a producer can pay for a bred heifer depending on expected revenue and expenses over the life of the heifer, while achieving a desire rate of return for investing in the bred heifer. The Net Present Value is the sum of future cash flows (incomes less expenses) in present value dollars, calculated as follows:

$$NPV = \sum R_t / (1+i)^t$$

where: t is the year in the future;

i is the discount rate; and

R_t is the net cash flow (income less expenses) for the year t.

Based on this formula and the assumptions below, the average break-even calf prices required for the next decade can be calculated at different bred-heifer price scenarios.

Production Cost per Cow	\$750/yr
1st calf weaning weight	500 lbs
Avg Weaning weight	550 lbs
Salvage value	\$1,400/hd
Culling rate	10.0%
Death loss Cows	0.5%
Death loss calves	5.0%
Expected Rate of Return	5.0%
Number of calves born	10

It should be noted that each operation are different in production cost and price projection. It is important to adjust the assumptions to fit the specific operation.

In 2015, bred heifer prices averaged \$2,701/head. For a bred heifer at this price to break-even, calf prices need to average at least \$210/cwt for the next decade (see Table 2). This would be 30% higher than the average calf prices in the last decade of \$161/cwt. While current calf prices are at \$260/cwt, a typical price cycle would suggest lower calf prices moving forward.

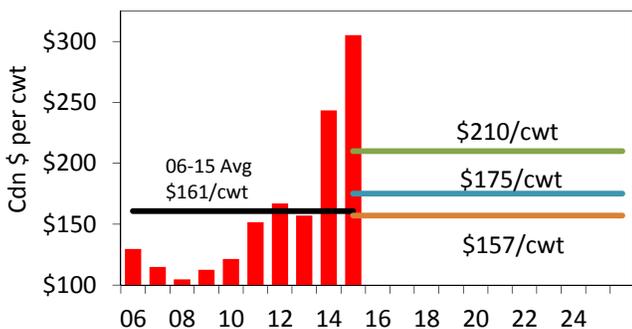
In the first two months of 2016 bred heifers have averaged \$2,474/head, implying an expected average calf price of \$200/cwt in the next decade. This remains 24% higher than the previous average.

Bred Heifer Price	Break-even Calf Price (10-yr avg.)
\$2,700/head	\$2.10/cwt
\$2,500/head	\$2.00/cwt
\$1,800/head	\$1.75/cwt
\$1,300/head	\$1.57/cwt

If bred heifer prices dropped back to 2012 levels at \$1,800/head (down 30% from the current levels), the price risk is much smaller with a break-even calf price of \$175/cwt only 9% higher than the last decade. The largest annual decline in history was 37% and it happened in 2004 after BSE and is unlikely to occur in the short term.

Estimated Break-even Calf prices for Bred Heifers

— \$2,700 heifer — \$1,800 heifer — \$1,300 heifer



Source: CanFax

Challenge – producers who bought bred heifers at record high prices in 2014/15 may need to see a 25-30% increase in average calf prices for next decade in order to breakeven.

Opportunity – As bred cattle prices moved lower, there will be opportunity to expand the cattle herd by purchasing bred heifer prices at reasonable prices levels.

Other Factors

From 1960 through the 1980s, the industry saw a somewhat typical cattle cycle approximately ten to twelve years in length. However, during the last 20 years, a number of outside forces such as unfavorable weather conditions, animal diseases, trade policy changes, financial crisis and ethanol policy have caused the cycle to be less predictable. Uncertainty in terms of these outside forces is likely to persist and influence the current cattle cycle.

Unfavorable weather conditions such as drought and floods could affect feed cost and cattle profitability. It could force producers to sell off breeding stock and delay expansion.

Animal health issue such as HPAI in poultry and PEDv in the hog sector with the impacts on production, international trade, and domestic supplies could rapidly change competing meat prices.

Labour shortage has been a challenge for agriculture in general and potentially constraint expansion in the cattle industry.

CONCLUSION

The cattle cycle indicators provide initial evidence of a shift into an expansion phase in the Canadian cattle industry. However, for herd expansion to materialize and be sustained, producers need to be confident that the price signal supporting profitability is not going to disappear over the next two to three years. As expansion in Canada is lagging behind the U.S. and prices have been trending lower, the main challenge for cow-calf producers will be shrinking profits moving forward.

While strong international and domestic demand supported beef and cattle prices in recent years, beef demand will be a key factor to determine the magnitude of price decline with larger supplies moving forward. Since North America is a mature market for beef, international demand is expected to play a more important role.

On the other hand, lower feeder cost and ample feed grain supplies expected for 2016 could improve margins and support the feeder market. For producers who are looking to expand their cow herd, bred heifers may become more affordable compared to the last two years. The combination of strong domestic and global beef demand, lower beef prices and larger supplies will provide an opportunity to expand market share of the beef sector.

Uncertainties in terms of exchange rate, weather and animal health issues will continue to play a role.