



Virtual Beef

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- **Understanding Cattle Prices** ...Understanding the factors that affect price determination is critical to maximizing sales price. In his article "Understanding Cattle Prices", Steve Duff, Chief Economist with OMAFRA, covers the difference between price determination and price discovery and discusses the drivers of supply and demand, basis calculation and the price discovery formula, and key information that can be tracked to manage price expectations.

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Your pasture mix matters when planning spring grazing

Christine O'Reilly, Forage and Grazing Specialist, OMAFRA, Lindsay

Preparations for the upcoming grazing season are in full swing. Farmers are checking their fences and water systems, and frost-seeding legumes to improve pasture quality. Soon there will be cattle out on grass, and less (if any) feeding to do in the barns! But with all the excitement, have you put much thought into your spring grazing plan? Where should you start?

There are two schools of thought on which paddock should be grazed first. One is to start each spring in a different paddock, so that the grasses are not being grazed at the same time every year. This strategy can help maintain a diverse mix of species in your pastures, because changing when the cattle eat those plants means a different species bears the brunt of that stress each year. The disadvantage to this strategy is that it assumes all your paddocks are similar: that they have the same drainage, the same soil type, and they are ready to be grazed at the same time in the spring. If your farm is not very uniform – think hills or wet areas – there will be paddocks that simply cannot be grazed first without the rest of the pasture becoming over-mature.

The other approach is to plant different mixtures in different paddocks, taking advantage of variation in growth patterns between species and differences in heading dates for various cultivars. The paddocks that drain well and are ready to graze first would be planted with grasses and legumes that are productive early on, while wetter paddocks would be seeded with later-heading varieties and species that grow later in the year. While the paddocks would be grazed in roughly the same order every year, the pasture mixtures are tailored to support this management strategy. The downside is that it takes more work to figure out what should be planted where, and buying several seed mixes may cost more than a large amount of one mix.

Dr. Yousef Papadopoulos at AAFC's Nappan research station has been studying pasture mixes. He has worked on simple and complex mixtures, complimentary grass and legume species, and how grass varieties perform in mixes. In a webinar held February 2017, he outlined which forage species are most productive at different times of year:

Early spring: meadow brome grass, orchardgrass, Kentucky bluegrass, red fescue, and white clover

Late spring: meadow brome grass, orchardgrass, Kentucky bluegrass, reed canarygrass, perennial ryegrass, red fescue, and white clover

Early summer: meadow brome grass, orchardgrass, timothy, meadow or tall fescue, reed canarygrass, perennial ryegrass, white or red clover, birdsfoot trefoil

Mid- to late summer: meadow brome grass, orchardgrass, meadow or tall fescue, reed canarygrass, alfalfa, red clover, birdsfoot trefoil

Early fall: Kentucky bluegrass, tall fescue, reed canarygrass, red clover

Late fall: Kentucky bluegrass, tall or meadow fescue, reed canarygrass, red clover

How can you use this information to create the right pasture mix for your farm? There are figures that outline which forage species thrive in different soil drainage and pH conditions in Chapter 2 of Publication 19: Pasture Production (you can download or order a copy at www.omafra.gov.on.ca/english/crops/pub19/pub19toc.htm or pick one up from an OMAFRA office). Rule out anything that won't grow well in the fields you intend to seed.

Then decide which approach to first-paddock selection makes most sense for your farm and management style. If you decide that starting in a different paddock each year is best for you, seed a pasture mix that includes some grasses and legumes from each time period listed above in all your paddocks. If starting in the same place every year fits your operation best, consider planting different mixes in different paddocks, using the above time periods to guide mixture creation for different areas on your farm.

There are lots of things to balance in the spring: calving, grazing, planting, and pasture regrowth. Choosing a pasture mix that suits your farm and your management style makes that balancing act a little easier. Warmer weather will soon be here...happy grazing!



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Understanding Cattle Prices

Steve Duff, Chief Economist, OMAFRA, Guelph

Farmers are faced with a wide range of market information and opinions on market prices. These sources of market information and opinion often offer conflicting views which can make marketing decisions for individual farmers quite difficult and stressful. It is useful for each farmer to have a general understanding of how prices are both determined and discovered. Price determination refers to the big picture or overall price levels for a commodity. Price discovery pertains to how an individual farm or business arrives at a transaction price for their commodities. These two concepts are fundamentally different things.

Every farmer should have some basic understanding of the factors that affect price determination for the commodities they produce. This will help you anticipate the direction of price movements over time. Understanding how prices can be discovered and anticipated gives you the best chance of maximizing sales price. This in turn, gives you the best chance of being as profitable as possible. None of these pieces of knowledge or understanding are a guarantee and sometimes the price discovery mechanisms farmers use, tell something quite different than the price determination factors. Being able to observe and understand why price discovery is telling you something different is key to being able to avoid such situations in the future. It will also improve your chance of maximizing sales price.

Price determination is the interaction of the broad forces of supply and demand that determine the overall market price level. Feeder cattle supply in Ontario is driven by several factors including: cow inventories, lagged feeder cattle prices, time of year, and availability of feed. Feeder cattle demand in Ontario is driven by several factors including: fed cattle prices, feed prices, time of year, retail beef prices and frozen stocks of beef.

For Canadian livestock producers, price determination is based on global, but mostly United States (US), meat supply and demand forces. These forces, such as livestock inventories, production, competing meat prices, consumption and trade, all come into play to determine a base price level. As long as trade in meat and livestock is free and open, Canadian pricing is going to be determined through US markets. If Canadian prices get too out of line with US markets, supplies will either move into or out of Canada, rapidly. This process is called arbitrage.

In the case of cattle, the overall price level is ultimately expressed as a representative, or widely quoted US cattle price. This might be futures contract price or a regional price such as Nebraska steers. The representative price chosen and used for price determination is really determined based on where your farm is located and the major US markets most influential to your local market.

Price discovery is a transaction that can take place at the market or individual farm level. In general however, price discovery in Canadian agriculture and in this case cattle, takes the form of this formula:

$$\text{Canadian Price} = \text{US Price} \div \text{US/Canada Exchange Rate} - \text{Basis}$$

Whether the observed market price is an auction transaction, a formula price for a contract, or a spot market negotiation, the final price is going to follow this basic formula.

In the Ontario cattle sector context the US base or representative price is almost always the Chicago Mercantile Exchange (CME) futures market price for feeder or fed cattle. Note that market prices reported are in US dollars per hundredweight of live animal and further details on each futures contract are available at the links below:

Nearby Chicago Mercantile Exchange (CME) feeder cattle futures price
www.cmegroup.com/trading/agricultural/livestock/feeder-cattle.html

Nearby CME live cattle futures price
www.cmegroup.com/trading/agricultural/livestock/live-cattle.html

The basis is in many ways the most difficult part of the price discovery process. This is the local or regional component of the price. It's the difference in price between one region and a CME futures contract. Regions that have excess cattle will be on an export basis. This is often referred to as a negative basis where the local price is lower than the reference price (CME contract) adjusted for exchange rate. Normally, Ontario feeder cattle are on an export basis for most of the year. At times, local shortages for example can flip prices to an import basis and this has widely been the case for the last two years. The tricky part about the basis is that it is something that is only observed or understood after the cattle are sold. It is not known before you sell your cattle what the basis will be, rather all you know is what the basis has been lately, the factors that affect the basis and what the basis is normally for that time of year. Understanding these factors is key to helping you maximize the sales price you receive for your cattle.

OMAFRA does a weekly calculation of Ontario feeder and fed cattle basis and provides it on its statistics website:
<http://www.omafra.gov.on.ca/english/stats/livestock/weeklycattleprice.xlsx>

The following is an example basis calculation for November 15, 2017:

- BFO average 500 to 599 pound steer price \$225.5 per hundredweight
- CME Nov 2017 close \$158 USD per hundredweight
- CDN dollar exchange rate 0.783

Nov 15, 2017 basis = \$225.5 - \$158 ÷ 0.783 = + \$23.72

Note that the average feeder cattle basis for at or on Nov 15 for 2011 to 2015 was -\$10.5, an export basis. And the basis on this day in 2017 was + \$23.72, an import basis. This is a clear indication of the short supply of Ontario feeder cattle and the strong demand for what feeder cattle supply is available.

There are two very unique aspects about cattle that make using price discovery formulas and basis very challenging. First, feeder cattle, are one of the only agricultural commodities that are primarily sold by auction. The majority of other agricultural commodities, including fed cattle, tend to be sold on a spot cash market, a direct negotiated contract or a direct formula price. Second, cattle are not a homogeneous or standard product. Homogeneous products like a bushel of corn that are generally very similar can be easily standardized in terms of pricing and grades. Cattle have several attributes that greatly affect market price such as weight, sex, breed, frame, pre-condition (dehorned, castrated, vaccinated, age verified, etc.) and ability to be grouped and sold with one or more other cattle that have similar attributes.

Auction markets bring cattle buyers and sellers together and for feeder cattle provide the best method of price discovery. Market summaries are available online and for some of the auctions in farm newspapers such as the Ontario Farmer or BFO website on a daily and weekly basis. But as a potential seller, it is important to understand the characteristics each market has relative to the feeder cattle you are planning to sell. For example, some sales do not place requirements on the characteristics of the cattle being sold which can result in more variable numbers of buyers, sellers and available cattle from one week to the next. In many parts of Ontario there is a growing number of “special” sales that are designed to bring together a larger number of buyers and sellers and in turn provide buyers with a larger availability of feeder cattle that are very consistent in terms of a quality feedlot prep program [castrated, dehorned, bunk adjusted, vaccinated] and presentation. Previous virtual beef articles have shown these type of sales can be quite beneficial:

<http://www.omafra.gov.on.ca/english/livestock/beef/news/vbn1015a3.htm>

Regardless of where you sell your cattle or the characteristics of your cattle, the following are some key pieces of information that should be tracked every year to help you manage price expectations and hopefully give the greatest chance for success:

- Know your per sold animal cost of production and track over time
- Record your market prices received and the attributes your cattle had and if these attributes have changed over time
- If you sold at a specific auction, record the weight and frame category, low, high and average price and the volume sold and where your cattle fit into that range.
- If you didn't sell at a specific auction, pick one close to your area and record every year, using it as a reference, and relate the price you received to the average price.
- Record the CME feeder cattle futures and exchange rate for the day your cattle sold and calculate your own basis and compare to the weekly basis provided by OMAFRA

www.omafra.gov.on.ca/english/stats/livestock/weeklycattleprice.xlsx

In summary, Canada's cattle sector is part of a highly integrated North American market. One benefit of being a small price taker in this North American market is that it enables quite clear linkages for price determination and discovery. The CME futures prices provides Ontario farmers with a solid tool to help plan and manage price expectations. Using CME futures prices, coupled with local market info from the BFO, OMAFRA or your own sales results, producers can help see for themselves where their cattle fit into this broader market picture over time. Doing so provides each producer with the best possible chance for pricing success in a cattle world with clearly no guarantees.

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Investigating genetic markers using novel sequencing technology to improve the selection for feed efficiency in beef cattle

Stephanie Lam, Ph.D student, Animal Biosciences, University of Guelph

The importance of selecting for feed efficiency in the beef industry

Improving the selection for production traits, such as feed efficiency, may bring economic and environmental benefits for beef production. Currently, one of the major challenges in the beef industry includes high feed costs, which can represent approximately 70% of total production costs. Due to this, the selection pressure for feed efficiency in cattle has been increasing. Improved feed efficiency can reduce feed conversion ratio and production expenses, resulting in economic benefits for the beef industry. In addition, cattle with higher feed efficiency are expected to use metabolic energy more efficiently, which can lead to reduced enteric methane production and lower greenhouse gas emissions from beef systems. However, measuring feed efficiency is often cost-inefficient and impractical at the farm level. The most commonly used measure to calculate feed efficiency is residual feed intake (RFI; expressed as kg/d), which is the difference between expected and actual feed intake. Currently, this method, among others, is costly, time consuming, and labor demanding. This emphasizes the importance to investigate alternative ways to improve feed efficiency of the herd using genomics.

One way to improve the efficiency of feed use is to incorporate selection for feed efficiency in breeding programs. Conducting functional genomics studies comparing cattle with high and low feed efficiency is an effective strategy to identify genetic markers (mutations or 'SNPs' found in the genome associated with a trait of interest) related to feed efficiency. These genetic markers can be incorporated into commercial breeding programs. Our research aims to detect genetic markers found within differentially expressed genes related to feed efficiency and improve the understanding of the biology and metabolic pathways underlying genetic markers and key regulator genes that may influence the function and regulation of feed efficiency in beef cattle.

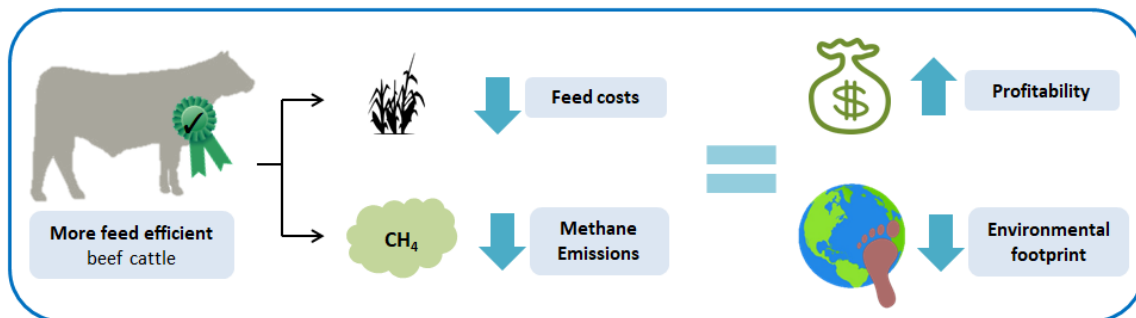


Figure 1. The importance of improving feed efficiency for beef production system profitability and environmental sustainability.

Current Research using genomics and novel sequencing technologies

Innovative scientific technologies are continuously being developed and improved to advance research methods in the field of livestock genetic studies. Among them, a new technology available is high-throughput transcriptome sequencing analysis, known as RNA-Sequencing (RNA-Seq). RNA-Seq is used to measure gene expression in the entire genome of the animal (approximately 24,000 genes in the beef cattle genome). In addition, this technology could be used to detect genetic variants and markers, such as SNPs (single nucleotide polymorphisms). Recently, this tool has been critical in the identification of functional genetic markers associated with economically relevant traits in livestock, which has helped provide a more in depth understanding of the genetic architecture of important production traits such as feed efficiency, health, fertility, and meat quality traits in beef cattle.

In this study, we used RNA-Seq analysis to identify genetic markers within genes that are expressed in different tissues related with feed efficiency (ie. muscle and liver) of high and low feed efficient beef steers.

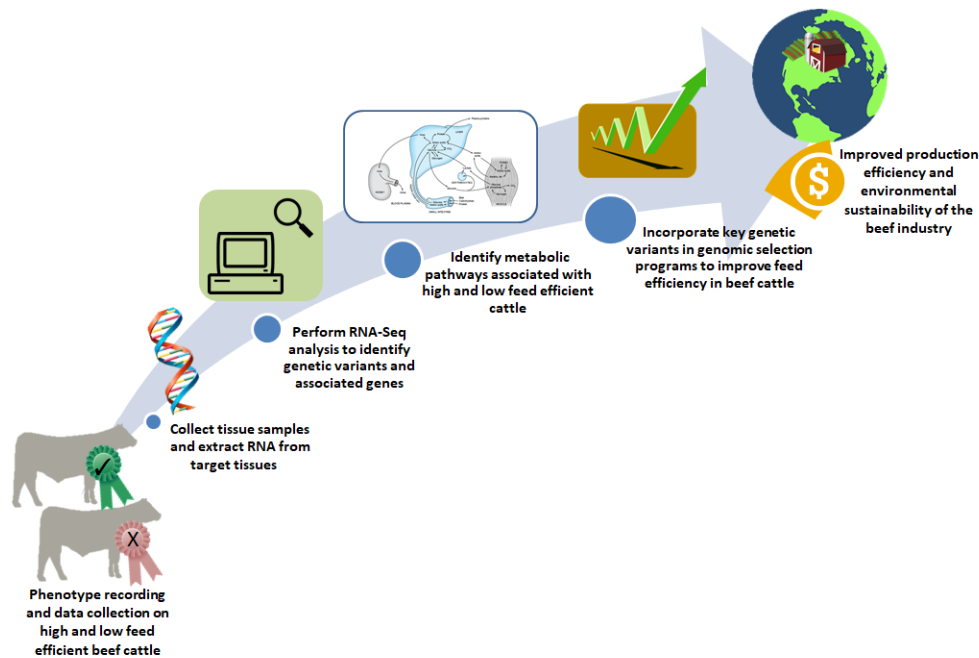


Figure 2. Workflow diagram to identify genetic markers related to genes and metabolic pathways involved with feed efficiency in beef cattle.

Key Regulatory Genes and Candidate Markers (SNPs)

The liver and muscle are important target tissues used to study the genetic architecture regulating feed efficiency. Studies have found that protein coding genes related to striated muscle contraction are differentially expressed between high and low feed efficiency groups, suggesting the involvement of muscle function in the efficiency of energy use in cattle. Liver tissue function is associated with the regulation of metabolic energy and nutrient supply and previous studies have found that liver metabolite concentrations are associated with feed efficiency. In addition, the liver is known to be involved with circadian control of gene expression which regulates nutrient uptake and organ function alignment. Much evidence exists supporting the many differentially expressed genes found in muscle and liver tissue due to the importance of these key target tissues to study feed efficiency.

In total, 180 differentially expressed genes in liver and muscle tissue were identified and involved with regulating feed efficiency in beef cattle. Of the 180 identified genes, 68 were differentially expressed in muscle tissue and 112 genes in liver tissue, with 5 being the same between both muscle and liver tissue. This is reasonable, as these tissues are biologically involved in different metabolic processes such as energy metabolism (liver tissue) and efficiency of energy use (muscle tissue).

The five genes that were regulating gene expression in both liver and muscle tissue are interesting, as this may suggest that these genes function in multiple tissues to regulate feed efficiency. One of the genes included early growth response protein 1 (*EGR1* gene). *EGR1* is involved with the regulation of circadian patterns of genes expressed in metabolic pathways such as growth response pathways and cell differentiation. These metabolic pathways may play a key role in the efficiency of energy use for animal growth and biological functions of tissues and cells.

Using RNA-Seq analysis, we also identified genetic markers associated with high or low feed efficiency and determined how many markers are located within the five genes found differentially expressed in both liver and muscle tissue, for both high and low feed efficiency groups. A total of 26 markers (SNPs) were identified in the low group, and 18 markers (SNPs) were identified in the high group within those genes. For example, one marker from the low feed efficiency group was associated with the *EGR1* gene, which may serve as a candidate marker that is influencing low or high feed efficiency in an

animal. The markers found exclusively in the more efficient animals may be contributing to the regulation of feed efficiency, allowing for higher accuracy in the selection for more feed efficient animals.

Implications and Conclusions

This study revealed interesting preliminary results regarding the potential regulatory genes and genetic markers associated with feed efficiency in beef steers. From this, further investigation will be performed including validation of genetic markers across purebred and crossbred beef cattle and different management systems. This information can be further evaluated and potentially applied to genomic selection strategies by including markers in genotyping platforms for commercial herds and in selection protocols, leading to improved production efficiency and environmental sustainability of the beef industry.

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Early Bird Registration Now Open for the Canadian Beef Industry Conference

Allana Minchau, Executive Director, CBIC

Canada's beef cattle industry will be 'Driving Demand' at the third annual Canadian Beef Industry Conference (CBIC), being held this year in London, Ontario. This one-of-a-kind industry event will be held August 14-16 at the London Convention Centre with registration now open.

Early bird registration is available for \$450 plus HST until June 15, after which registration will be \$550 plus HST. For the first time this year, daily-rates are also being offered.

"We are planning an action-packed event with many great speakers and panels to keep you informed about the current issues of the Canadian beef industry. There will be many opportunities to network with people from all aspects of the beef industry. We look forward to hosting the national meeting place of the beef industry in London, Ontario," says 2018 CBIC

Chair, Tammi Ribey. "Together, we will find ways to continue *Driving Demand* in the beef industry at the Canadian Beef Industry Conference."

This conference will combine semi-annual and annual meetings of several stakeholder groups, along with learning and networking opportunities to create a one-of-a-kind experience for participants from across all the various regions and sectors of the Canadian beef industry.

The CBIC 2018 program will feature an engaging speaker lineup, headlined by keynote speaker Rex Murphy. A trusted face and voice across Canadian media, Rex will simultaneously inform and entertain with his provocative commentary.

Other program highlights include:

- Topics related to the pillars of the National Beef Strategy with a focus on demand
- Bov-Innovation: Educational presentations for producers and interactive workshops on applicable production innovations
- Networking with stakeholders in all stages of the beef supply chain
- Pre-conference farm tour hosted by the Beef Farmers of Ontario and AgSights
- Canadian, U.S. and international market outlooks
- Canadian Beef Check-Off Agency, CCA, Canadian Roundtable for Sustainable Beef and Young
- Cattlemen's Council board meetings
- Cattlemen's Young Leaders selections and graduation

Those interested are encouraged to watch www.canadianbeefindustryconference.com and follow on Twitter and Facebook (@CDNBeefConf/canadianbeefindustryconference) for updates.



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Allana Minchau, Executive Director,
Canadian Beef Industry Conference

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Free Agri-food Courses to Grow Your Business

Are you interested in developing a strong business and growing your success? Sign up for free agri-food online courses and — for a limited time — free in-person workshops.

Take advantage of the courses to sharpen your competitive edge by gaining skills and knowledge in farm business practices, food safety and traceability. These courses will provide you with foundational information to:

- reduce risks to your business and customers;
- improve efficiencies; and
- access new markets.

You can explore the options that best suit your schedule and learning style.



In-person workshops and webinars

These courses for producers are offered by the [Ontario Soil and Crop Improvement Association \(OSCIA\)](http://www.ontariosoilcrop.org):

- Environmental Farm Plan (workshops)
- Growing Your Farm Profits (workshops)
- Biosecurity (workshops)
- Food Safety (workshops and webinars)
- Traceability (workshops)

To sign up, go to www.ontariosoilcrop.org. In-person workshops will wrap up during March.

Online courses

E-learning courses are available on [Agriculture and Food Education](http://www.agricultureandfoodeducation.ca) website.

For producers:

- Water Use
- Worker Practices
- Maximizing Your Traceability Investment
- Growing Your Farm Profits
- The Basics of Traceability
- Food Safety Foundations

For processors:

- Sanitation
- Recall
- Personnel
- Profiting from Traceability
- The Basics of Traceability
- Food Safety Foundations

To sign up, go to www.agandfoodeducation.ca.

