Ontario Sheep Industry Research Strategy

FACT PACK

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Sheep Sector Profile

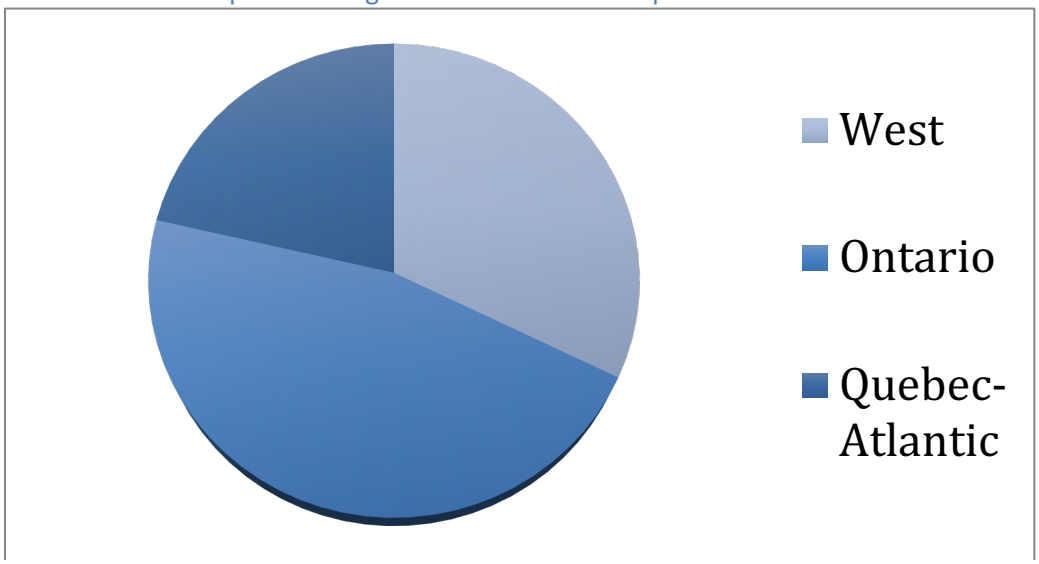
The sheep industry in Ontario consists of approximately 3,000 producers. Sheep inventories decreased 8.5% from January 1, 2012 to January 1, 2018, to 516,100. In contrast, the national sheep inventory dropped 7.2%, to 1,546,000, during that same period. The number of ewes, lambs for breeding and market lambs all decreased by 9.5%, 14.2% and 0.7% respectively[1].

Sheep and lambs imported into Ontario fell 11% between 2012 and 2016 from 112,900 to 110,900[2]. Despite the drop in ewe flock size, and number of sheep and lambs imported into Ontario, the number of animals slaughtered in Ontario increased 7% from 2012 to 2017[3]. Interestingly, between 2012 and 2017, Statistics Canada is only reporting a 500 head decrease in the number of sheep and lambs slaughtered in Canada; 721,500 and 721,000 respectively.

These industry statistics seem to contradict one another and speaks to need for producers to increase their record keeping and the importance of the EweGROW program.

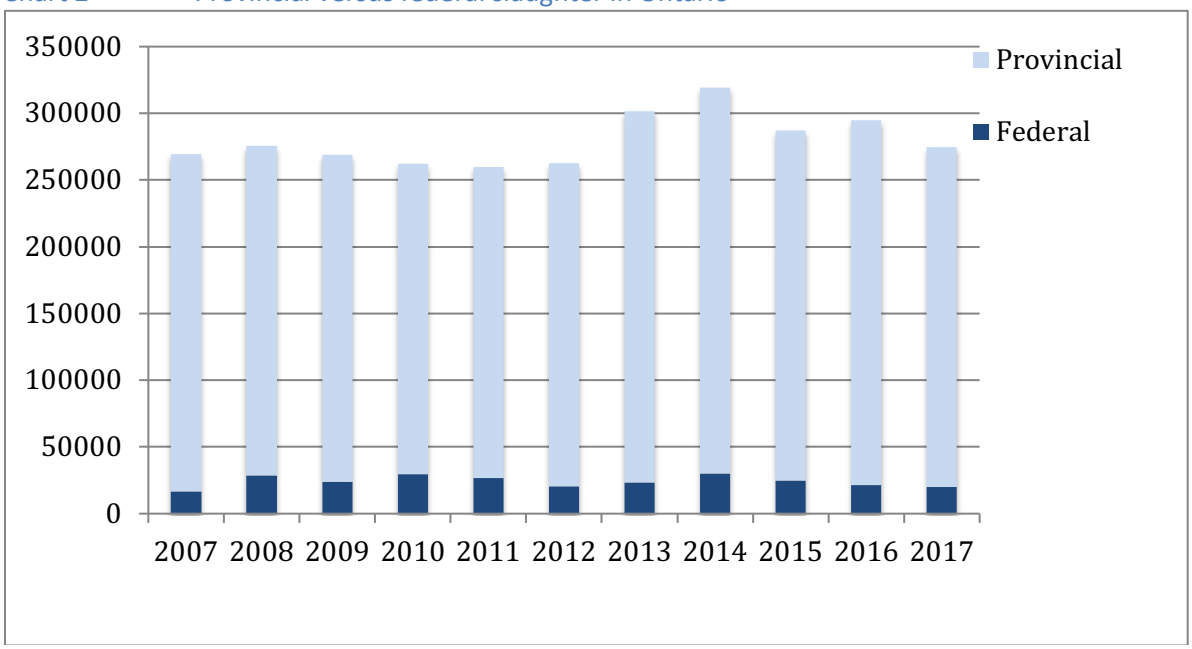
According to Agriculture and Agri-Food Canada, Ontario approximately 50% of all sheep and lambs in Canada. Over 92% of the lambs slaughtered in Ontario, are slaughtered in provincially inspected plants (Chart 2).

Chart 1 Inspected slaughter of lambs and sheep in Canada[4]



[1] Statistics Canada, 2017
[2] Statistics Canada, 2016
[3] OMAFRA & CFIA Slaughter Statistics
[4] Agriculture and Agri-Food Canada, 2017

Chart 2 Provincial versus federal slaughter in Ontario



Lamb and sheep meat imports, increased by 20% from 2012 to 2016 and, imports to the end of October 2017 are predicting a 30% increase in lamb imports in 2017 over 2012.[5] Canada continues to import the majority of its lamb from New Zealand (54%), followed by Australia (41%), Ireland, the United States, Uruguay, the United Kingdom and Iceland. Canada continues to export limited amounts of lamb. In 2016 Canada exported just over 130,000 kg of lamb, which is a 78% increase over the 57,000 kg exported in 2012[6].

Canadian consumption of lamb is low in relation to other countries however, consumption has been rising over the past 5 years up 18% since 2012 to 1.02 kg/person/year. Consumption reached a historic high of 1.08 kg/person/year in 2007[7].

In 2009, 13% of Canadian households purchased lamb at least once during the past year. On average, each lamb buyer purchased lamb just under four times during the year, for a total of four kilograms, spending just over $48 in total. Not surprisingly, overall lamb purchase incidence is highest around the Easter period. Prices generally relate to volumes across all retail types, with higher prices leading to lower volumes[8].

Ontario is by far the best developed lamb market in Canada, despite just 16% of households in the province buying lamb during the year. Ontario lamb purchases account for 57% of total Canadian fresh lamb volume and 53% of frozen lamb volume[9]. Ontario is the third largest North

[5] Red Meat Division, Agriculture and Agri-Food Canada, 2017
[6] Statistics Canada 2013 and 2017
[7] Statistics Canada, 2017
[8] Lamb Value Chain Consumer Report, George Morris Centre
[9] Lamb Value Chain Consumer Report, George Morris Centre

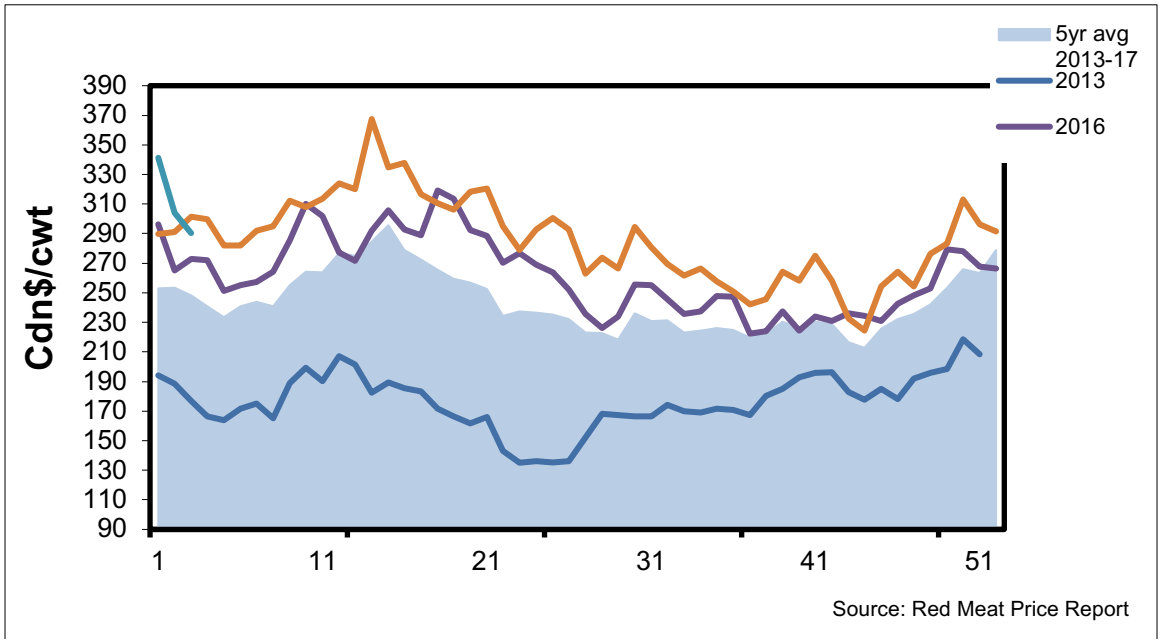
American market for lamb processing[10], behind Colorado and California and 55% of all lamb and sheep meat imported into Canada is consumed in the Greater Toronto Area[11].

Canadian, New Zealand, American and Australian lamb prices are interrelated. The Canadian producer price is affected by the American price. Fluctuations on the US market account for 31% of the changes in the Canadian producer price. In the long term, the Canadian price is affected by the American, New Zealand and Australian price. Canada's price has no influence on any of these three country's markets.

Prices

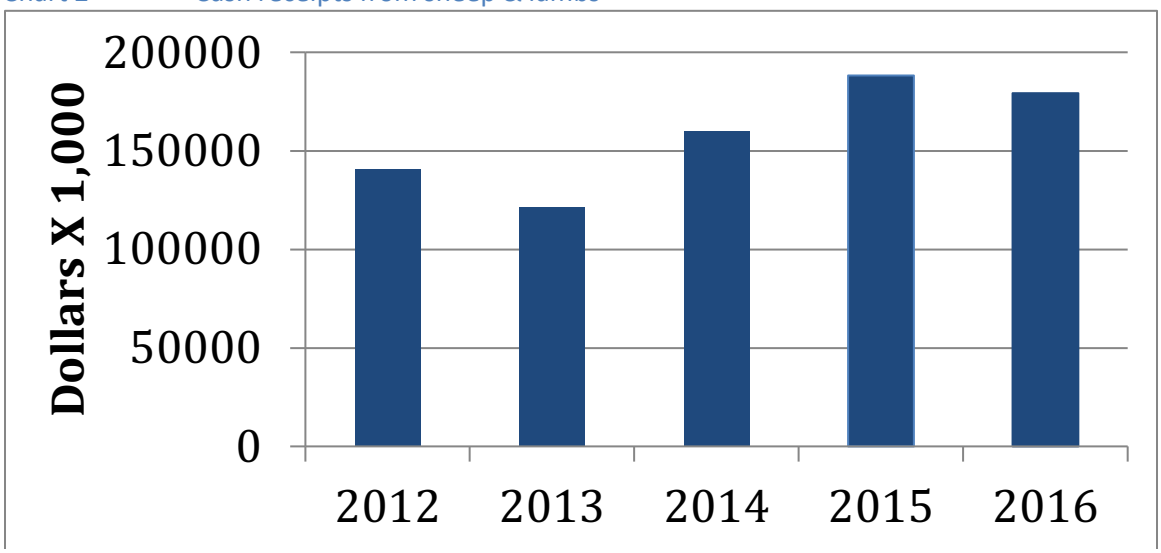
Prices for lambs in Ontario were higher in 2017 than in the previous 5-year average (Chart 3). Despite these high prices, Ontario producers continue to enroll in Ontario's Business Risk Management Program supported by the Provincial Government and have fewer risk mitigation programs in comparison to crop producers.

Chart 3 Price/cwt in Ontario markets 79 lb lambs



[10] USDA, 2018
[11] Statistics Canada 2017

Chart 2 Cash receipts from sheep & lambs



Issues facing Ontario sheep producers

Ontario sheep producers do not have access to medications and wormers that are available in New Zealand, Australia and the US. Due to the small sheep industry in Canada, pharmaceutical companies do not see value in the market since they would have to pay a significant amount of money to obtain Canadian approval of the drugs. That said, over the course of the last five years, Startect, Closantel, Deccox, Metacam and long-acting oxytetracyline have been approved for use. This is the result of the work being done by the Health Strategies Working Group of the Sheep Value Chain Roundtable. The OSF has also invested money into research to develop vaccines and genetic improvement to provide farmers with alternative tools to help manage flock health.

The Ontario Sheep Farmers has been developing an emergency management manual that will assist both producers and the organizations on how to manage an animal disease outbreak. For the sheep industry, the concern is growing around midge-borne diseases such as Cache Valley Virus that is already impacting the industry.

Having just completed a Life Cycle Analysis (LCA), the sheep industry has benchmarked the environmental impact of lamb production from birth to slaughter. In coming years the industry will need to increase its focus on mitigating its impact on the environment and on how to mitigate the impact of climate uncertainty on livestock.

The industry will also need to focus on how sheep production can positively impact the environment (e.g., grazing animal impact on soil structure and decreased nutrient run-off). The environmental benefits of wool should also be further investigated and promoted.

Protection of endangered wildlife species poses a concern for producers who have perennial forage and pasture land, as regulations to protect breeding habitat may interfere with farming practices. Over this past year, the proposed Recover Strategy for the Algonquin Wolf and the

changes to the Ontario Wildlife Damage Compensation Program have been of particular concern for producers.

Cultured Meat

By Jared Yantzi, Livestock Research Innovation Corporation

Is the phrase "raised without antibiotics" transitioning towards "raised without animals"? It certainly may be with the significant research and growth currently underway in the development of cell-cultured meat.

As a young livestock farmer studying Food & Agriculture Business at the University of Guelph, I believe the invention of lab-grown meat is a disruptor to our industry that we must be aware of and prepared to fight against.

Cargill, a large North American meat processor, and billionaires Richard Branson and Bill Gates have recently made multi-million dollar investments into the Silicon Valley start-up company Memphis Meats, a producer of cultured meat products. Investments of this size are paving the way for mass scale production of cultured meat.

And Memphis Meats is not alone; they are one of many cultured meat companies trying to strike gold in the future of food. In fact, Pat Brown, the CEO of Impossible Foods, stated on CBC's The National that the development of cultured meat will "completely replace animals as a food production technology by 2035."

With growing opposition from our society to raising livestock for meat consumption due to animal welfare and environmental implications, cultured meat has the potential to entice consumers. Latest testing reports indicate that cultured meat is becoming very similar to the taste and texture of red meat. Furthermore, there are nutritional and health benefits as a result of the absence of cholesterol and lack of fat.

The combination of these factors make it plausible to believe that the infrequent red meat purchaser could entirely transition to buying cultured meat once the price between the two products is comparable. With the extensive amount of research and development underway for cultured meat, we may not be too far away from this happening. It is expected that cultured meat will be in our major grocery retail chains in the next five years.

The transition towards innovative products is not new for the food industry. The cultured meat development is not dissimilar to the history of butter and margarine in North America. In the 1940s, it was a novel idea to envision mass consumption of margarine. Yet by the 1960s, it was consumed more than butter, and it sustained that popularity until recent years.

Will we see the same progression to popular acceptance for cultured meat? The livestock industry needs to be prepared for that possibility.

The magnitude of the danger facing the livestock sector lies with the potential number of consumers that will make the conversion to eating cultured meat. From an economic

perspective, any factor that drives down demand for a product will initially decrease the product's price. For livestock farmers, the lower price they receive for their animals will make it less appealing to continue raising animals and the quantity supplied for meat production will decrease. This will lead to an increase in meat prices at the grocery store, potentially to a level in the future where it is more expensive than cultured meat.

An important note to make is that it won't just be the livestock farmers that will feel the effects of consumers buying cultured meat. Everyone involved in the livestock industry will be negatively affected at some capacity. This includes veterinarians, butchers, feed nutritionists, truck drivers, etc.

So what needs to be done to make sure that the impact of cultured meat on the livestock sector and all those that work in it is minimized?

Applicable and effective research into the livestock industry will be key. The continuation of research focusing on feed conversion efficiencies, greenhouse gas emissions, and animal welfare will be essential to lowering production costs while maximizing production and meeting societal expectations.

Our society has plenty of false perceptions about livestock production that everyone involved in the industry must work to refute.

We need to know why some consumers are inclined to make the transition to buying cultured meat. We need to conduct consumer studies to see how many people will purchase cultured meat so we understand the potential market share that cultured meat will displace.

The livestock industry has experienced many innovations and technological advancements that have been a benefit for farmers. For example, automatic feeders and smartphone apps have increased productivity and efficiency. However, this invention has the potential to disrupt our entire industry. Will this force changes in the production, processing, and nutritional content of real meat? We can't ignore cultured meat; we need a plan of action to fight it.

Wool Market Report

By Eric Bjergso

During the 2016/17 wool marketing season there has been a very significant contrast comparing the fine and coarse wool markets. Fine wool has experienced solid global demand and record prices have been achieved for many wool types 22 micron and finer. A number of factors can be attributed to this success including the positive international branding of Merino wool. As well, new and innovative wool products such as double faced and fake fur fabrics being manufactured in China have created new consumers for wool and these products require significant quantities of fine wool to produce.

The specifications for Chinese government uniforms including military, railway and postal etc have recently been changed to favour more fine wool content and huge quantities of wool are required for these contracts. In China mills are currently focused on increasing productivity and

product quality, they have also made significant capital investment in order to comply with new stringent government environmental regulations.

The broader crossbred wool market has struggled the past 18 months and to this point in time has not been able to ride the coat tails of the rising fine wool market. The main driver of price trends continues to be China, which in 2016/17 accounted for 63% of exports from the five major wool exporting countries. Excess stocks of coarse wool products that had built up in China throughout the supply chain, from greasy wool through to finished fabric are slowly being consumed. Current projections are a little more positive with predictions that demand and market prices for crossbred wool will soon start to improve.

The wool trade seems to be firmly committed to the need for further industry programs within the education, promotion and innovation fields. The International Campaign for Wool is an excellent example of collaboration between all members of the supply chain including farmers, retailers, designers, manufacturers and consumers. The objective of this organization is to promote the incredible benefits and versatility of wool which in turn supports many small businesses and farmers whose livelihoods depends on the wool industry. The Dumfries House Wool Declaration is a 10 point declaration that has been developed whereby the global wool industry commits to protect the environment, to care about the welfare of sheep and to uphold the best possible practices in growing, trading, manufacturing and marketing wool fiber and its related textiles.

In Canada our wool volume has slipped after many years of marginal growth, we hope that this is only a temporary situation. This can be directly attributed to lower sheep numbers which may be mainly due to drought conditions and expensive feed in some provinces the previous year. We continue our practice of orderly wool marketing throughout the year of our graded, value added, and objectively measured wool types. Due to the recent weaker demand from China for coarser wool types we have reached out to develop new market opportunities for Canadian wool in Europe and the Middle East. In addition to our wool sales in Canada, export destinations for Canadian wool currently include China, USA, Czech Republic, Egypt, Bulgaria and India. Canadian wool enjoys an excellent reputation in these markets due to our consistent quality deliveries which is a credit to our wool grading staff. Our Shareholder Wool Shipper Loyalty Reward Program (SWSLRP) continues again this year at the rate of 7 cents per pound to our shareholder / wool shipper consigners. The annual dividend will be 7% for shareholders of record date December 31, 2016.

Labour Trends

NATIONAL

AGRI-LMI
LABOUR MARKET INFORMATION

Canada's agriculture sector faces significant labour challenges that put its viability and growth potential at risk.

Lots of Farm Job Opportunities in rural Canada!

On-farm agriculture has the **highest job vacancy rate** of any industry at **seven percent**.

7%
JOB VACANCY RATE

Producers are losing

$1.5 BILLION

or **2.7%** of the industry's **total value in sales**.

Canadian agriculture stands out as the **star performer on productivity** more than any other sector. **Output per worker** increased

45%

from 2000-2015.

The current **labour gap** is

59,000

and in **10 years the ag industry could be short workers** for

114,000

jobs.

CANADIAN AGRICULTURAL HUMAN RESOURCE COUNCIL
CONSEIL CANADIEN POUR LES RESSOURCES HUMAINES EN AGRICULTURE

Canada Funded by the Government of Canada's Sectoral Initiatives Program

SHEEP AND GOAT

AGRI-LMI
LABOUR MARKET INFORMATION

Canada's agriculture sector faces unique labour market challenges in the coming years, and so will the sheep and goat industry.

The sheep and goat industry includes operations that are primarily engaged in raising sheep and goats and feeding or fattening lambs.

1/2

of sheep and goat employers said **insufficient skills and experience** are key issue in recruiting employees.

5.4%

of **sales** were lost in 2014 **due to labour shortages** costing **$8 million**

33%

of **workforce will retire** in **next ten years**

Production predicted to increase

2.3%

per year in the next decade.

CANADIAN AGRICULTURAL HUMAN RESOURCE COUNCIL
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Canada Funded by the Government of Canada's Sectoral Initiatives Program

Ontario Farmland Values[12]

The average value of Ontario farmland increased 4.4 per cent in 2016, following gains of 6.6 per cent in 2015 and 12.4 per cent in 2014. Values in the province have continued to rise since 1988.

Most of the province continued with a stable upward trend, reflected by modest, single digit increases in all regions. A mix of transactions was observed, including real estate brokered, property auction and sales through tender.

Ontario's overall farmland values increase was fuelled by high demand for a limited amount of available land, expansion of supply-managed farm operations and strong demand for farmland to grow cash crops throughout the province. Softer demand was seen in areas where expansion had already taken place or areas affected by lower commodity prices.

Southern and northern Ontario led the province with the most significant increases at 6.9 and 6.2 per cent, respectively. Within some regions of the province, land values appeared to have levelled off. The demand for land still remains, but only at a realistic price level that can be supported by crop production.

Ontario farmland regions
Annual % change in farmland values
Northern – 6.2%
Eastern – 5.1%
North Western – **4.2%**
North Central – **2.6%**
South Western – **1.6%**
South Central – **5.0%**
Southern – **6.9%**
South Eastern – **1.5%**

There was an increase in the demand for land in eastern Ontario, which reported a 5.1 per cent increase in farmland values. This was due to local farmers wanting to expand their operations, as well as more farmers coming from other regions of Ontario and Quebec, where land prices are higher. These factors, combined with a strong and diverse farm economy, helped strengthen the demand for land in the region.

There was strong demand for farmland in some areas within southern and south central Ontario, as the favourable soil types allow for a variety of specialty crops to be grown, thus creating potentially higher returns for producers in that area.

Southeastern and southwestern Ontario reported the most modest farmland value increases at 1.5 per cent and 1.6 per cent, respectively. There are various pockets

[12] FCC Farmland Values Report, April 10, 2017

throughout southwestern Ontario that continued to show signs of extended vibrancy, with some areas having experienced record values in 2016.

Higher feed prices may outweigh benefit of a low loonie

By: Craig Kemmer
December 17, 2017

Feed costs are always one of the two largest expenses for a livestock operation - as much as 55% for farrow-to-finish hog operations, and up to 60% of lamb production. Tighter supply of feed grains at home and globally will lift feed costs and may pressure margins of livestock operations.

Lower production of feed grains to disrupt trade patterns

Dry conditions in Alberta and Saskatchewan reduced barley production nearly 10% from last year, while Canadian corn production increased approximately 5% due record acres and yields. In the U.S., corn production is expected to decline 4% from last year due to reduced acres harvested and despite record corn yields. Internationally, declines in production of feed grains in Ukraine and Russia are resulting in a decline of 3% for world supplies of coarse grains. Areas that are dependent on Russian grains will be looking to other suppliers, possibly the U.S. Despite tight barley supplies in Canada, Chinese buyers are likely to ramp up their imports of feed barley.

Feed demand slightly higher

World demand for coarse grains is forecast to be relatively unchanged from last year; however, slightly lower production will result in lower ending stocks and help to support world feed grain prices. In North America, demand for feed grains will likely increase as livestock production expands on increased domestic consumption and export opportunities. Continued improvements in the Canadian and U.S. economies and labour markets will be supportive of consumer spending and increase the demand for meat proteins. Investment in hog slaughter facilities in Canada and the U.S. will be supportive of a larger hog herd.

Tight supply can lead to higher feed prices

USDA forecasts that U.S. corn prices will average US$ 3.20 per bushel for the 2017/18 crop year. The Canadian corn market should move in tandem with the U.S. market; however, the barley market will continue to trade at a premium due to tighter supplies and potentially increased exports. Interestingly, Canadian livestock operations may be forced to import corn from the U.S. at a time when barley exports climb.

A low Canadian dollar makes Canadian livestock and meat more competitive globally and raises profit margins. Currently the U.S. has a feeding advantage over Canadian operations due to their large supplies of corn, offsetting any advantage that the lower Canadian dollar may have created for the finished livestock.

Top economic trends of 2018: Farmland values

By: J.P. Gervais
January 9, 2018

As we head into the new year, the Ag Economics team wants to help you anticipate 2018 with a look at five economic trends likely to affect Canadian agri-food this year.

The evolution of farmland values is the second of our five important trends to monitor. Values will likely continue to grow but, as in the last two years, their growth will moderate. That may sound worrying, but the forecasted slower rate of appreciation in values makes sense. It reflects a period when we expect crop receipts will be pressured by a growing supply of commodities, and interest rates will rise.

2018 starts with a strong balance sheet

Farmland represented 68% of all farm assets in Canada in 2016 (the most recent data available). It has gained as a share of total assets in recent years, after recording significant price increases each year. The strong balance sheet in Canadian agriculture has been supported by revenues that, for instance, reached record levels for grains and oilseeds in 2016.

Balance between supply and demand determines prices of grains and oilseeds

We expect that same robust relationship between revenues and values to hold in 2018. Interest rates and farm cash receipts—but, primarily, crop receipts—drive movement in farmland values. Overall farm cash receipts, projected to grow 3.1% in 2018, will still support Canadian farmland values in the coming year.

But high ending stocks, fed by several commodities' record production, have strongly subdued the marketplace since 2015. Without weather-related disruptions, key agricultural markets are likely to remain oversupplied in 2018. Global oilseed production will record a sixth straight year of significant growth in 2017-18. Even considering some weather challenges in Canada in 2017, production expanded: corn, soybeans and canola increased 7%, 18% and 9%, respectively, from 2016 levels.

In this context, price pressures for many commodities aren't surprising. Slowing Canadian revenues and farmland values might have occurred earlier in fact were it not for the strength of demand in global markets and a low loonie shielding Canadian producers from commodity prices that remain under their robust 5-year average. A healthy world economy will continue to mediate prices in 2018, and we expect the loonie to average US$0.78 - supporting crop producers' 2018 margins.

Navigating a higher interest rate environment

Movement in interest rates will also limit growth in 2018's farmland values. Trending upward since late 2017, they should climb again in 2018, although we're uncertain about the timing.

Inflation remains low, but with unemployment currently declining, job gains will help lift wages, and ultimately, inflation.

We expect two 25-basis point increases in the overnight rate of the Bank of Canada in 2018, gradually rolled out. Rising borrowing costs will limit what potential buyers can afford in the farmland market.

What's the bottom line?

Farmland is usually producers' most important asset. It's often bought using debt—which needs to be serviced by increasing farm revenues. Higher farmland values only strengthen the sector when they're matched by proportional increases in revenues. This is the story behind Canada's strong agriculture economy of the last decade, an economy projected to continue throughout 2018.

There are potential disablers on the horizon however. Large production volumes from major crop- producing regions could shift prices, and therefore Canadian revenues. A CAD that strengthens beyond what's expected for 2018 could also dampen income. A higher interest rate environment means higher costs. Our advice? Monitor those pressures and plan ahead.

https://www.fcc-fac.ca/en/ag-knowledge/ag-economics/top-economic-trends-of-2018-farmland-values.html

Top economic trends of 2018: Energy prices

By Leigh Anderson
January 16, 2018

As we head into the new year, the Ag Economics team wants to help you anticipate 2018 with a look at five economic trends likely to affect Canadian agri-food this year.

Energy is our third trend to monitor, with its potential to increase input costs at the farm level and its impact on the Canadian dollar.

We think input costs are going to remain fairly consistent overall with 2017 costs — a good news story for producers. And with a relatively low loonie expected for the year, the story around energy is positive for Canadian agriculture.

The forecast

2018 average Alberta farm input prices, with year-over-year change. Expect the same direction in movement of farm input prices in your province.

- Diesel: $0.98/ litre – 10% ↑
- Gasoline: $0.97 litre - 7.5% ↑
- Ammonia phosphate $700/ tonne – 2.1% ↑
- Urea $500/ tonne – 1.5% ↑

- Anhydrous ammonia $830/ tonne – 6% ↓

Source: Alberta Agriculture and Forestry's database

Despite a generally positive price forecast, these outcomes could disrupt the story of 2018 energy prices and their impacts on Canadian producer margins.

China and the U.S.

These two global superpowers could affect energy markets in 2018—but if or when they do, the effects would move farm margins in opposite directions.

U.S. demand will drive fertilizer prices in 2018 due to the number of input-heavy corn acres relative to soybeans. As of January 2018, soybeans continue to be favoured over corn. But corn demand could easily pick up in the year. With U.S. ethanol-blended gasoline expected to increase 2.1%, corn used to produce ethanol is expected to increase to 5.5 billion bushels.

Unlike the U.S. where production appears to have flattened, China's ethanol production could grow in 2018. This is due to strong demand and supported by high tariffs. Their proposed E10 ethanol policy mandate which will expand its current 11 province pilot program to the entire country (details unknown) could have far-reaching consequences, driving up demand for corn and reducing the demand for oil.

Several high-cost Chinese fertilizer plants (China's main fuel source is coal estimated at 75%) have closed recently, bringing some balance to an oversupplied global urea market.

Their rising production costs contrast lowered U.S. production costs from low natural gas prices, forecasted to be US$2.88 MMBtu in 2018. Low natural gas prices and fertilizer plant investments expected to continue into 2018, have boosted production and helped North American farm margins. Always a wild card, any unanticipated Chinese fertilizer production could bring more uncertainty to the price forecast.

Global oil production must balance demand

Well-supplied energy markets will likely keep fertilizer prices and farm fuel costs low in 2018. We project WTI crude oil will trade in the US$55 per barrel range in 2018, a slight increase from 2017 when oil averaged US$50 per barrel. OPEC has set crude oil production quotas to manage the current oversupply and possibly raise prices. But the quotas could be disregarded by member states within the organization, and/or by non-members.

Similarly, U.S. shale oil production could be at levels sufficient to exceed existing demand. In either instance, this could keep oil prices from rising significantly.

At the other end of possibility, global demand for oil is expected to pick up in 2018 based on a strengthening of U.S. and global economies. If that demand exceeds expectations and reduces some of the current glut, prices could rise.

Large oil production this year could keep the lid on a strengthening CAD. A US$0.78 loonie — our forecasted average for 2018. This will keep Canadian ag exports competitive in world markets, supporting increased production and demand for fertilizer. It it will also help to increase or, at least, maintain higher costs of imported energy sources and farm inputs.

What's the bottom line?

Energy markets impact Canadian agriculture. OPEC production cuts may reduce the oversupply of global crude oil, corn acres may disrupt the supply and demand balance in the fertilizer market. But, any significant movement in energy markets will impact farm input prices and the value of the Canadian dollar.

Our advice: monitor all energy markets, not just oil, throughout the year.

https://www.fcc-fac.ca/en/ag-knowledge/ag-economics/top-economic-trends-of-2018-energy-prices.html

Ontario Sheep Industry Current Research Priorities

The previous Research Strategy is attached for your review. Briefly though, the priorities identified in 2012 were:

Animal Health

> In 2020 the lamb mortality average in the Ontario sheep industry is reduced to less than 10% and breeding ewes are more productive and therefore more profitable than in 2013.

This target is proven almost impossible to track on an industry-wide basis given the lack of reliable statistics.

- Sheep Flock Health Clubs piloted in 2017
- Maedi Visna in sheep and potential interaction with Mycobacterium avium spp. Paratuberculosis
- Effect of targeted selective deworming at lambing on *Haemonchus* burdens on Ontario sheep farms with anthelmintic resistance
- Development of a vaccine to protect against Toxoplasma gondii
- Development of a respiratory vaccine for sheep
- Investigation of immune response to sheep to gastrointestinal nematode
- Emergency management
- Diagnosing pregnancy and litter size

Nutrition

> Producers understand ‘how to feed’ in their context to maximize profitability.

Given the lack of original benchmarking on producer understanding of how to feed, the success of this objective has been impossible to measure.

- Nutritional value and integration of hybrid willow and poplar as fodder for sheep
- Preliminary investigation into ewe feed efficiency
- Alternative feeds
- Fibre requirements for market lambs

Marketing, Product Quality and Economics

As a result of a better understanding of the economic drivers along the value chain, the Ontario sheep industry is growing sustainability year after year through increased market penetration and displacement of imported sheep meat products.

Ontario sheep producers have the information on the economic production, business and market opportunities necessary for them to make profitable business decisions.

- Price predictability tool developed
- Growth strategy & launch of EweGROW
- Seasonal anestrous ewe bred to a novel estrus synchronization protocol for timed AI
- Understanding ethnic market opportunities for veal, goat, lamb and rabbit
- Master Shepherds Course
- Opportunities to diversify Ontario wool production and marketing
- Sheep Finance Project
- Grading project

Genetics

Fifty per cent increase in Ontario sheep numbers of the Canadian Sheep Genetic Evaluation System (GenOvis) testing program using genetics and genomics as a tool to produce the high quality consistently uniform product that profitability meets market requirements.

- Investigation of immune response to sheep to gastrointestinal nematode

Reproduction and Production Systems

Production systems that consistently provide a basis for the growth of the sector in Ontario.

Environment

To provide the Ontario sheep industry with the ability to demonstrate its environmental management credentials and the Life Cycle Analysis of its products.

- Life cycle analysis was completed in 2017. Report attached.

Food Safety

Ontario sheep industry is acknowledged as a producer of high quality, healthy product.

Animal Welfare

Producers and industry service personnel are able to recognize the early symptoms of sheep becoming distressed and alleviate the conditions that are causing that reaction.

- Captive bolt euthanasia training provided to producers in 2017
- Development of sheep welfare videos
- Producer mental wellness

Canadian Research Priorities

Developed by the Research Working Group of the Sheep Value Chain Roundtable, June 2017
All projects should address industry sustainability through the key performance indicators: social; economic; and environmental.

1. Optimizing production performance

• Nutrition
  - Animal performance and sustainability through improved nutrition
  - Improve flock rations (by-product feeds, toxins such as ergot, and health-related issues)

• Management
  - Improve milk production in the dairy sheep sector
  - Improve management systems for highly productive ewes

• Genetic selection
  - Optimal genetics / breed types
  - Selection tools for a variety of traits (e.g. Parasite / disease resistance)

• Meat and carcass quality / performance and supply chain practices
  - On-farm feeding
  - Farm to market handling and transportation
  - Processing improvements focused on quality, quality assessment, grading, and technology

• Flock health
  - Reduce perinatal and neonatal death loss
  - Reduce impact of chronic disease and parasites (e.g. T. ovis, Haemonchus) on flock productivity
  - Improved understanding of the costs of and major reasons for early culling and death loss in ewe flocks
  - Improve access to medications in use for disease management in the global lamb sector (drugs, anthelmintics); also includes vaccines, many of which would be alternatives to anti-microbials
  - Improve understanding of the emerging diseases to Canada and their treatments

2. Managing market expectations (food safety, traceability, biosecurity, animal welfare, market access, market intelligence)

• Improve animal welfare in sheep production

• Contribute to reduced use of antimicrobials without compromising animal welfare
• Increase understanding of consumer preferences and ability to meet them
• Increased industry uptake of existing tools for food safety, traceability, biosecurity, sustainability, and animal welfare to maintain public trust

3. Improving business performance and profitability of Canadian flocks
• Rising production cost management (feed, labour, energy, overhead, etc.)
• Flock models and production systems adapted to changing environmental and societal demand
• Business sustainability