

Canada's pork producers' technical and business information resource.

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## Cover Photo

A barn worker cleans sow stalls



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The Spring 2020 edition of the Canadian Hog Journal is here! I'm starting to get the hang of this, I think.

While society around us is dramatically shifting toward the unknown – probably the biggest single change-related event we have experienced since the September 11, 2001 World Trade Center attacks – the Canadian pork sector pushes forward.

Food security for Canadians is a priority for our provincial and federal governments, and, as always, producers and partners have stepped up to continue feeding Canadians and the world. Panic-buying aside, consumers can rest assured that the good people in our sector have their best interests at heart, and once everything virus-related eventually settles down, an incredible offer of thanks will be due for your ongoing, tireless efforts.

This edition provides mixed coverage of the impacts COVID-19 has had on our industry, in addition to a closer look at

the costs of biosecurity for producers, along with an examination of export profits on premium Canadian pork products. Also learn about food trends for this year and the latest research by the University of Alberta and Prairie Swine Centre.

Readers have started reaching out to me to provide comment on content, which is encouraging. See those messages shared in the “Letters to the Editor” section, and then see yours published in future editions of this magazine by emailing [andrew.heck@albertapork.com](mailto:andrew.heck@albertapork.com).

Once again, I want to ask you to help me publish the stories you want to read. There is a wealth of knowledge residing with many people I encounter, and sharing that knowledge helps us all be successful. I hope you enjoy what you see in this edition, and I hope everyone is staying safe, healthy and positive during this difficult time. The world is counting on you, and you are continuing to deliver! ■

Andrew Heck  
Editor

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# Letters to the editor

## In reply to “Quality assurance brings value, but who pays?” (Winter 2020)

“During the Alberta Pork 2018 annual general meeting [AGM], nearly 50 producers, with two abstaining, passed a resolution asking for compensation at \$7 per head for all hogs validated under the Canadian Pork Excellence [CPE] program. Following the meeting, federal packer representatives suggested during informal conversation with producers that there would never be compensation for CPE, since packers never asked for the program, and it is not required to maintain export markets. The entire transition from the Canadian Quality Assurance [CQA] program was a bureaucratic attempt to ram more regulations and costs down unprofitable producers’ throats.

“Fast-forward to the 2019 AGM: with Alberta Pork’s request already ignored for a year, the compensation resolution was upheld with even more producers present. All voted in favor, with the same two abstaining, but the resolution continues to be ignored in 2020. In the meantime, the functional, producer-friendly, packer-required CQA program was extended from the end of 2021 until the end of 2022, after producers were told emphatically that an extension was not possible. This extension happened because Alberta Pork stood up for producers. As a producer who has been raising hogs for more than 40 years, I find it offensive to be told that I must be re-trained on how to produce pigs, audited by a third party other than my veterinarian, and get no compensation for this from a processor.”

– Andy Vanessen, Picture Butte, Alberta

## In reply to “The right to farm is under fire” (Banff 2020)

“This article was more informative than many of our local news outlets are willing to provide. Hoping there are plans to develop future articles to help keep these ag issues from getting swept under the rug. It was good that this came from someone outside North Carolina as well. Having an extra slice of bacon today!” – John Jones, Richlands, North Carolina

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# HOT ISSUES

## Defending the pork value chain during COVID-19

Andrew Heck

At the time of this article's publication, more than two million cases of COVID-19 have resulted in more than 150,000 deaths in more than 200 countries and territories worldwide since first reported in China in late January 2020. The numbers are simply staggering, and the fallout has resulted in unprecedented societal and economic impacts.

For the general public, heightened fear regarding our food system is to be expected. And while fear can be a reasonable response to perceived threats, it also plays into the hands of market speculators, health officials, labour unions and other authorities who have the ability to impact our industry.

In the case of COVID-19, a high degree of uncertainty, an abundance of caution and rampant opportunism have taken their toll on the global marketplace in many ways, challenging the capacity for producers, transporters, suppliers, processors and retailers to deliver product to consumers while also sustaining their businesses.

### Market speculation hurts producers

"It appears, for some reason, lean hog futures traders believe coronavirus in China is going to have consumers stop eating pork," said Jim Long, President & CEO, Genesus. "Not sure



While the COVID-19 pandemic has left typically busy urban areas deserted, farms and processing facilities – essential services – fight an uphill but valiant battle to stay operational.

where that idea comes from. Is this rational or just panic by a group driven by the fear of margin calls?"

While the domestic pork price in China remains steady, indicating stable demand, market overreaction since COVID-19 first broke in China has caused undue harm for Canadian pro-

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ducers. For nearly two years, China has struggled to fill its protein needs since the rapid spread of African Swine Fever (ASF) devastated the country's pork industry. In theory, such a shortfall should have pushed prices upward, but the effect was minimal, thanks to an unfavourable political situation that closed China to Canadian pork for more than four months in mid-2019.

More recently, prices plunged as speculators suggested that COVID-19 would cause Chinese officials to abruptly halt the purchase of foreign goods like meat as a means of getting a handle on the virus. By reports in major news media and on social media, there is no doubt the Chinese government has taken strong action to prevent the further spread of COVID-19, but according to Freddie Xu, China Marketing Director, Canada Pork, food demand remains unchanged.

"Initially, there were rumors from North America that China has stopped pork trading, but I haven't found any signs that's the case," said Xu. "With the extended Chinese New Year holiday, warehouses filled up, since workers had yet to return. Due to efforts to control the coronavirus, disruptions to public highways and transportation systems created additional delays to moving products that were already stored."



*China is the world's largest pork consumer per capita. The country's wet markets may be responsible for COVID-19's spread to humans. Despite physical distancing and isolation guidelines, demand for meat remains strong.*

Xu added, "As the government encourages people to stay home whenever possible, urban residents in first-tier cities are relying heavily on online shopping, which includes food. Grocery and meal deliveries have doubled recently, with retailers and restaurants working hard to keep up."

Despite the overstated market hiccup, the damage was done, and margins reached a yearly low not even two weeks after the first reported case of COVID-19 – bad news for pork producers who have been struggling for many reasons, not the least of which is price-related chaos.

China is a country of 1.4 billion people. The country produces the most pork in the world by total volume and consumes

the most pork in the world per capita. If anything, disease outbreaks, whether they threaten animal or human health, should signal a greater need for food security. According to speculators, this was not the case, but it is important to recognize how every market ripple is amplified at the farm level.

### **Canadian meat industry supports partners**

In early March, the Canadian red meat industry made a \$50,000 donation to the Canadian Red Cross to support their work with the Red Cross Society of China and its efforts in responding to COVID-19 in the heart of the pandemic.

The donation received contributions from Donald's Fine Foods (B.C., Saskatchewan), Maple Leaf Foods (Alberta, Manitoba), Sunterra Meats (Alberta), HyLife (Manitoba), Conestoga Meats (Ontario), Olymel (Quebec, Alberta), Canada Beef, Canada Pork, the Canadian Pork Council and the Canadian Meat Council.

Our industry has a long-standing relationship with China. We have witnessed the virus' devastating impacts on families and communities that consume our products. As a result, industry stakeholders came together to recognize the need for support.



*The Red Cross Society of China has been instrumental in that country's COVID-19 response and recovery. The Canadian meat industry chose to recognize these efforts by offering financial aid toward the beginning of the pandemic.*

"We see daily what an impact this virus has had on our customers in China and are aware of all the efforts made on the part of the Chinese to address it. We felt compelled to assist," said Chris White, President, Canadian Meat Council.

### **Producer organizations take precautions**

Rather quickly in mid-March, provincial pork producer organizations and other industry partners made decisions to cancel, postpone or adapt upcoming in-person meetings.

As a result of widespread precautionary measures taken to address COVID-19, producer organizations in B.C., Manitoba and Ontario cancelled their previously scheduled spring 2020 annual general meetings. For all three organizations, there is no word yet on rescheduling. Other industry events have also been impacted. In Alberta, Red Deer's 2020 Pork Congress and Edmonton's 2020 Porkapalooza BBQ Festival have been deferred to 2021. In Ontario, the 2020 London Swine Conference and Stratford's 2020 Pork Congress have been cancelled.

But not all events have been lost. More than 80 registrants participated in the digitally re-imagined Livestock Care Conference, originally scheduled to take place in-person in Calgary, hosted by Alberta Farm Animal Care (AFAC). The conference featured virtual presentations by top experts, live

*CONTINUED ON PAGE 12*

chat and interactive Q&A, backed by vibrant social media conversation. The decision to shift to digital came just four days before the event.

“There wasn’t much time to make the transition,” said Annemarie Pedersen, Executive Director, AFAC. “But with everyone from the AFAC team, sponsors and participants pulling together, we made it happen. The result was a very special conference at an unprecedented time in history that we will always remember.”

### **Producer organizations formulate proposals**

By late April, hog futures had plunged to nearly \$60 below cost of production – numbers briefly seen in September 2018, but not for more than a decade before that time. Various market factors, especially COVID-19, influenced provincial pork boards and the Canadian Pork Council (CPC) to step up and request financial support for the sector.

The CPC has requested changes to business risk management programs federally and has similarly offered its support for changes to provincial programs. One such recommendation includes increasing the reference margin floor to 85 per cent of earnings from the previous year. This would make it easier for producers to receive payouts.

“Pork producers simply cannot afford to continue raising animals under these conditions,” said René Roy, Vice Chair, CPC. “We love what we do, and we love being able to feed people a safe, high-quality protein, but we feel very lonely shouldering the impact of this global crisis.”

In response to the crisis south of the border, U.S. President Donald Trump announced \$19 billion in funding for U.S. producers in all sectors, following a previous announcement of \$12 billion in July 2018. Both announcements have proven unhelpful for Canadian pork producers, due to the absence of a uniquely Canadian pig price, in favour of a U.S. default, which continues to hammer the industry. As a result, the CPC

also asked the Government of Canada for an immediate injection of \$20 per hog to help producers overcome the projected direct financial losses caused by COVID-19 in 2020.

In Alberta, Brent Moen, Chair, Alberta Pork authored a letter to Premier Jason Kenney asking the province to establish a targeted advance payment program for pork producers, citing a potential loss of \$58 per pig for a six-month period, totalling \$66 million for overall production in the province. Following the request, Alberta Pork hosted a town hall teleconference for producers, industry partners and media to outline the steps the organization is taking to help producers.

“Existing business risk management programs were established to act as a rainy-day fund,” said Moen. “We are currently in a hurricane.”

### **Human resources strained by uncertainty**

COVID-19 can certainly be measured in terms of its impact on human health, but the economic aftershock can have an even wider-reaching implication on human resource availability for labour-intensive commodity sectors. For producers and processors who rely on Temporary Foreign Workers (TFWs) especially, much concern was generated in mid-March when all non-essential cross-border travel was banned by the Government of Canada.

Only a couple of days following the initial ban, it was announced that agriculture would be given an exemption, relieving the industry but also raising new questions as to how the existing process would change. With the sudden influx of unemployed Canadian workers now looking for jobs due to COVID-19, industry will need to take steps to attract these workers to agriculture.

As industry stakeholders and the public adjust to the COVID-19 situation, Immigration, Refugees and Citizenship Canada (IRCC) has vowed to support TFWs, to ensure the

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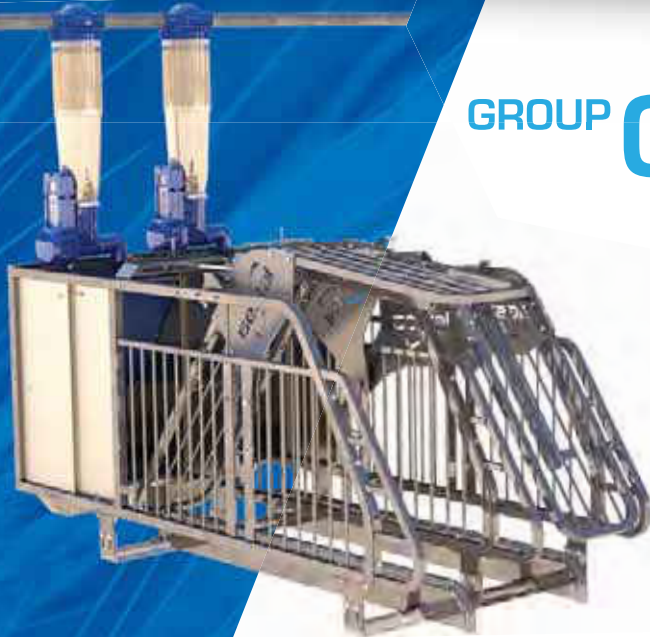
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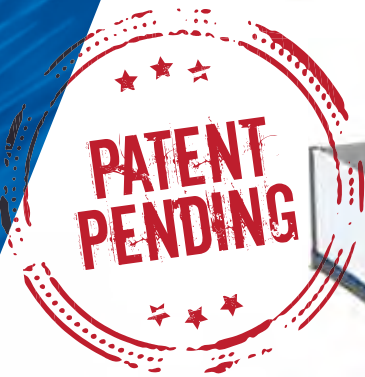
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continued flow of workers needed to support the essential services provided by the Canadian pork industry. To protect public health, all TFWs arriving in Canada are required to complete a mandatory two-week quarantine at their arrival location, at the employer's expense. In mid-April, the federal government pledged \$1,500 for each TFW under the agriculture stream, to help producers cover the period of time for which workers must isolate.

In response to the virus' blows to business on the whole, the Government of Canada did outline some new financial supports for the agriculture sector to help offset further unexpected costs. These new measures included a \$5 billion increase in lending capacity for Farm Credit Canada on behalf of producers, agribusinesses and food processors. In addition, all eligible farmers who had an outstanding Advance Payments Program loan due by the end of April received a Stay of Default, allowing them an additional six months to repay their loans. While these measures may be helpful to some producers in other agricultural sectors, they are of little importance to hog producers who need cash advances to offset losses taken in the critical spring and summer months.

**Processors and retailers feel the impact despite efforts**

COVID-19's threat to staffing and business continuity was felt very strongly by Canada's meat processors. Recognizing that the virus could jeopardize their ability to slaughter animals and cut meat, processors including Olymel and Maple Leaf announced hourly wage bonuses of \$2 per hour for workers.

Since late March, several pork, beef and poultry plants in Canada and the U.S. have experienced temporary or indefinite shutdowns, which have caused disruptions to processing. The shutdowns have also resulted in market volatility and headaches for producers who ship animals to those locations. Toward the end of April, two Canadian plant shutdowns had directly impacted pork producers: the Olymel facility halfway between Quebec City and Montreal, at Yamachiche, which halted operations for two weeks after nine employees tested positive for COVID-19, along with the Conestoga plant at Breslau, On-



*The United Food and Commercial Workers Union (UFCW Canada) worked with major meat processors nationally to secure premium pay increases and asked for more worker safety protections to be put in place.*

tario, northeast of Kitchener, which closed for a week after first discovering a positive case. The closures caused a backlog of more than 90,000 hogs raised by producers in Quebec and Ontario, who were forced to hold pigs and find alternate marketing options. Thanks to the quick implementation of recommended worker health protocols, processors have been able to safeguard workers and maintain slaughter numbers. While the pandemic is creating daily challenges, the pork industry is showing flexibility and innovation when it comes to employee safety.

On the beef side, in Alberta, tensions increased in late April with the death of at least one worker from the Cargill plant at High River, south of Calgary – one of more than 900 COVID-19 positive cases at that location alone, the country's greatest concentration of positives at any single site. In response, the United Food and Commercial Workers Union (UFCW Canada), which had previously called for preventative shutdowns at the Cargill plant and JBS plant at Brooks, southeast of Calgary, issued a harsh indictment of how worker safety was handled.

Thomas Hesse, President, UFCW Local 401 wrote in a statement, "Cargill and the Government of Alberta ignored UFCW Local 401's request to shut the plant to keep employees safe and told employees it was safe to go to work. Now a member of our union has died in the epicentre of the largest outbreak in our province. I hold the company and the Government responsible."

*CONTINUED ON PAGE 16*

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Following the death of the Cargill worker, it was reported that anywhere between 500 and 1,000 employees of the JBS plant had failed to show up for their shifts, prompting the plant to cut back to one shift per day. Shortly thereafter, it was announced that a worker at the JBS plant had succumbed to COVID-19, causing a two-week shutdown and resulting in an occupational health and safety investigation by Alberta's Ministry of Labour. The two beef plants together represent approximately 70 per cent of Canada's beef slaughter capacity. Such unpredictable circumstances have increased strain on the meat industry as a whole.

The Canadian Food Inspection Agency (CFIA) continues to work with Alberta Health Services and Alberta Labour to determine the need for future plant closures, the length of time of the closures and when business operations on-site can resume. The federal government has committed an additional \$20 million in funding to support CFIA staffing requirements and safeguard Canada's food supply. And in Alberta, provincial meat inspectors have been trained to help backstop CFIA, should the need arise.

Further down the value chain, major retailers across Canada have also implemented safety measures such as limiting business hours and customer numbers in-store, constructing physical barriers for face-to-face interactions between customers and staff and issuing pay increases for those who are able to continue working.

"We have made the decision to temporarily increase compensation for our store and distribution centre colleagues by approximately 15 per cent, in recognition of their outstanding and ongoing efforts keeping our stores open and operating so effectively," said Galen Weston, President & CEO, Loblaws, which operates more than 2,000 grocery stores under the Superstore, No Frills, Independent Grocers, Zehrs, L'Intermarché and other names across the country.

On the food service side, provincial restrictions vary, but in most provinces, eating out has practically become an impossibility. As such, many brick-and-mortar restaurants that previously offered only dine-in options have been compelled to switch to delivery and non-contact order pickups.

Restaurants Canada, formerly the Canadian Restaurant and Foodservices Association (CRFA), represents food service in Canada. The organization conducted a survey that has revealed many jobs lost due to COVID-19 might not return, as nearly one in 10 restaurants have already closed permanently and many more might close. Across the country, Restaurants Canada estimated that upwards of 800,000 food service jobs have been lost as a result of COVID-19.

**No end in sight for virus woes**

As the entire world eagerly awaits the end of COVID-19's reign of destruction, it is unclear what will happen next week, next month or next year. The virus will have a lasting, profound impact on how we all do business, whether in agriculture or another major industry.

For now, what is clear is that this virus has touched people and businesses across the pork value chain, and if there is any saving grace, a possible positive outcome may be the Canadian and global consumer's increased awareness of agriculture's importance and just how lucky we are to have a reliable food system in Canada. ■



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# Buying into biosecurity can be a burden

Andrew Heck

Effective biosecurity management is key component of a successful hog operation. Proper biosecurity protects both herds and humans from disease incursions that can affect animal welfare, staff health and business continuity.



Biosecurity protocols, including signage, are a reality of modern, commercial hog production.

Over time, the pork industry has been compelled to adapt biosecurity practices to fit the evolving reality of production, which means fewer but larger farms, workers travelling overseas, imported feed and equipment and other considerations that challenge the disease-free status of a farm.

Dr. John Harding, Professor, Western College of Veterinary Medicine, University of Saskatchewan, acknowledges that biosecurity remains the number one defence against disease: “We have a very complex animal health intensive livestock sector now involving multiple sites and large airspaces, with pigs being transported great distances,” he said in an inter-

view with Farmscape. “We also have emergence of diseases or new viruses, new pathogens, emergence of antimicrobial resistance, potential zoonotic diseases – so there’s a lot of change that’s happened over the years.”

For producers, it is a constant battle to establish a biosecurity culture within a farm. Biosecurity is demanding, and most would sooner ignore it, if that was a reasonable choice. Ideally, biosecurity principles are backed by formal, written documentation, such as on-farm protocols. After that, discipline and conscientiousness must take over.

## Standards demonstrate producer commitments

In January 2010, based on recommendations of the former Canadian Swine Health Board Biosecurity Advisory Committee, a first draft of the National Swine Farm-Level Biosecurity Standard was created. This voluntary standard is a tool for producers and industry stakeholders to tailor biosecurity measures to individual farm needs and provincial regulations.

The adaptable biosecurity standard addresses various planning considerations, direct and indirect routes of potential contamination and on-farm animal health. Underscoring these considerations are routine veterinar-



Alberta Pork's cost of production study, launched in January 2020, is seeking to better understand producers' on-farm costs.

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ian check-ups, the use of medicines and many material costs including disposable gloves, masks and booties, plus disinfectants, degreasers and other products that are required for an effective program. All of these considerations come with a price tag, and those costs are often buried or overlooked, which is why further efforts are being made in some provinces and nationally to understand exactly what producers are paying when it comes to biosecurity.

The dilemma for producers is understanding and appreciating the importance of these practices while having little or no money to cover them. With that hit to producers' pocketbooks constantly hammering away at already meagre farm incomes, it adds to the list of stresses that have producers reconsidering their hog operations altogether.

Every little bit adds up over time, creating a "death by a thousand cuts" scenario. When producers look across the table and see processors' profits continuing to roll in, they are left wondering what value there is to their additional efforts.

### **Cleanliness does not come cheap**



*Blue Water Wash in Red Deer, Alberta features 20 wash bays and Canada's first industrial-strength drying and baking bay for livestock trailers, but this level of clean comes with a cost.*

From one producer to the next, the realistic implementation of biosecurity protocols differs. Implementing biosecurity protocols extends beyond putting words to paper. Words require action, and action requires paying the running tab of costs associated with cleanliness. One of the most critical precautions and significant costs is truck washing.

In Alberta, nearly half of all pigs are self-hauled, while the other half are hauled commercially. In either situation, thorough cleaning is required after each load is delivered to the plant. The price to thoroughly wash and bake a livestock trailer commonly reaches into the hundreds of dollars.

Specifically, a proper truck-and-trailer cleaning job often costs no less than \$1 per pig for a load of 200 pigs. This adds insult to injury after already having shipped a full load at a loss of several hundred dollars, with no direct financial incentive to reinforce the good behaviour. For many producers, the cost raises a series of questions: *Do I wash with detergent, rinse with water, bake and disinfect? Or do I just wash and rinse? If no-one notices, can I get away with only rinsing?*

Sadly, this process of rationalization is well-known. Experts agree, and most stakeholders in the value chain are aware, that enhanced biosecurity requires extra attention to detail

*CONTINUED ON PAGE 20*

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and a concerted effort. But if the money is not there, is it surprising that any person in this situation might consider cutting corners? It is a dire prospect. In a world where several hundred dollars can put food on a family's table for a matter of weeks, a truck wash might, unfortunately, not look like the best investment, even if it is critically important.

While all transport trucks are required to be clean before arriving on-farm, for a very small minority of producers who self-haul pigs, on-farm wash bays are an enhanced biosecurity feature used before the truck leaves the farm, which helps further eliminate potential biosecurity gaps. What does not change, no matter the producer, is that making use of appropriate post-delivery truck washing services means paying for the service each and every time he ships pigs, usually weekly... unless he decides not to, due to the prohibitive cost. That decision fundamentally challenges the quality assurance guarantees that processors rely on to influence consumers' perceptions of food safety further down the line, which demands the implementation of additional best practices at the processing and retail levels.

### Quality assurance depends on producer action

All commercial pork producers in Canada – those that sell their pigs to federally inspected slaughter facilities – are cer-

tified under the Canadian Quality Assurance (CQA) program or the new Canadian Pork Excellence (CPE) program. Quality assurance covers biosecurity at the farm and plant level, but these conditions inform mostly food safety, not farm management, in the strictest sense.

In 2019, the CPE program was launched with the intention of phasing out and modernizing CQA, which was first implemented in 1998. While CPE program adherence varies across Canada, the number of certified producers is steadily growing. In Alberta, objections to the cost of CPE have stalled the implementation of the program.

CPE includes 10 modules, including one for biosecurity. Under the biosecurity module, there are recommendations for feed and water, proper handling of live animals, pest control techniques, equipment maintenance and more. Program recommendations are consistent for all producers, but it is left up to producers to make choices that fit their individual operations. Almost universally, these choices are driven by financial impact. Whatever choices are made must be deemed acceptable by program validators, which is a measure of the program's integrity. Individual producer choice does play a role in keeping costs down, but across the country, in most jurisdictions where pigs are raised, options are often limited.

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The challenge of maintaining strict biosecurity is compounded by the increasing costs producers must pay to meet quality assurance demands, which, for processors, are the basis on which their brands' reputations are built.

For producers, the decision whether or not to embrace quality assurance places them between a rock and a hard place: pay for the program and sell to federal packers, or choose not to, and rely on other outlets such as provincially inspected plants or other marketing routes, which are few. Most often, this kind of decision would completely change the nature of an operation. For large-scale producers who raise the vast majority of hogs across the country, supplying our largest processors, it would be unconscionable.

A safe food system is paramount for Canadians and our international export partners. If food safety cannot be guaranteed, everyone in the value chain suffers. Food safety starts with proper biosecurity undertaken by producers and continues with further proper handling by processors and retailers. Food service establishments and consumers too have a role to play when preparing food in restaurant kitchens and at home.

While producers are more than willing to take seriously the demands of biosecurity, shrewd business considerations can



*Food safety in Canada continues to evolve. In January 2019, the Canadian Food Inspection Agency (CFIA) released its latest food regulations.*

undermine proper procedure, begging the question: if producers are not reasonably able to cover biosecurity costs, who will be left to produce the safe food that is generating record-setting revenues for some in the supply chain while taking every last penny from others? In the end, biosecurity on-farm and food safety in the plant, grocery store and at home are only as strong as the weakest link. For our part, as an industry, that means sharing the burden fairly. ■



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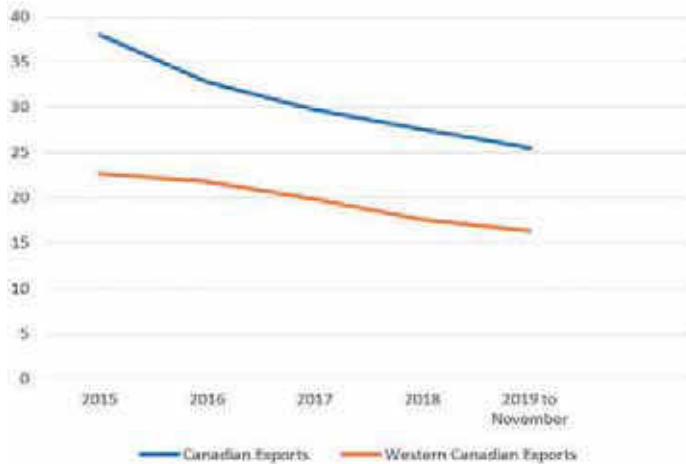
# Producers should seek better share of export prices

*Bijon Brown*

*Editor's note: Bijon Brown is the Production Economist for Alberta Pork. He is currently working on a cost of production study for producers, to use as a benchmark for comparing profits across the value chain. He can be contacted at [bijon.brown@albertapork.com](mailto:bijon.brown@albertapork.com).*

Hog production differs regionally not only by the feed inputs used but also by the pork markets served. Looking at the current trends in the Alberta pork export market, we can examine the difference between Alberta exports and exports from the rest the country. By acknowledging those differences, we can begin to understand where Alberta producers sit relative to producers in other key provinces.

## U.S. share of Canadian pork export market on the decline



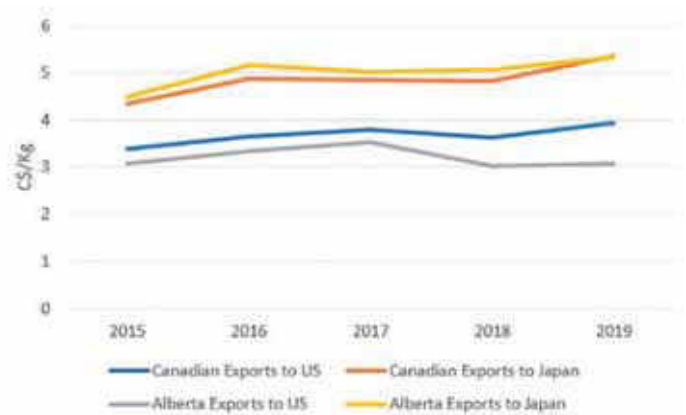
U.S. share of western Canadian and all Canadian exports. Source: Statistics Canada, Prepared by AAFC/MISB/AID/Market Information Section

Although the Canadian export market is largely dominated by shipments destined for the U.S., its relative share of the Canadian export market has declined over the past five

years. From January to November 2019, roughly a quarter of all Canadian pork exports went to the U.S., down from about 40 per cent in 2015. Meanwhile, the share of exports destined for Asia trended up to 21 per cent from 18.5 percent in 2015. The largest export market for central Canada continues to be the U.S., but Japan is the largest export market for western Canada.

From January to November 2019, western Canadian pork export volumes were about 440,000 tonnes, close to 2015 levels, but about 14 per cent below the five-year peak in 2017. Manitoba and Alberta accounted for most of the pork exports. Alberta exported more than 110,000 tonnes of pork products, down roughly 10 per cent from the corresponding period in 2018. This largely reflected a 29 per cent drop in exports to the U.S. and was partially offset by increased exports to Japan and Mexico. The decline in pork exports to the U.S. has resulted in the share of total Alberta pork exports dipping from 25 per cent in 2015 to 20 per cent in 2019. In the meantime, the Japanese share of the export market rose from 35 per cent in 2015 to 42 per cent in 2019.

## Alberta exports fetch a premium in Asian markets



Canadian and Albertan pork export price to select destinations. Source: Statistics Canada, Prepared by AAFC/MISB/AID/Market Information Section

The shift towards Asian markets and away from the U.S. market has been mainly driven by economic incentives. Over the past five years, Canadian exports to Japan have attracted a premium over U.S. exports, averaging almost \$1.20 per kilogram, with the Alberta export price premium averaging \$1.80 per kilogram. Over the past two years, Alberta export prices for shipments to the U.S. dipped below \$3.10 per kilogram from a five-year high in 2017 of around \$3.50 per kilogram. Meanwhile, the average export price at the national level was \$0.40 per kilogram higher, indicating that Alberta pork is being discounted in the U.S. market relative

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to pork shipped from other provinces. In contrast, Alberta pork shipments to Asia received a higher price than pork shipped from other provinces.

**Alberta producers paid less for hogs**



Monthly hog base prices in select provinces. Source: Statistics Canada-Table: 32-10-0077-01.

Despite the shift to higher valued export markets, the value of Alberta pork exports eased 13 per cent over the past five years, largely reflecting a 24 per cent decline in overall ex-

ports. In a region that exports over 40 per cent of its pork to markets paying a premium, it appears the price signals to Alberta producers have become distorted.

While Alberta pork attracts a premium, Alberta producers have seen base prices that were \$0.08-0.20 less per kilogram for their hogs compared to producers in Ontario and Quebec. Currently, producers are paid a price that is derived from U.S. markets, which represents less than 20 per cent of wholesale export value. The economic realities in the U.S. market are no longer consistent with a significant portion of western Canadian wholesale pricing; it ignores the preferential premiums accessed in Asian markets.

Accordingly, farmers face lower prices, and these lower prices disincentivize investment and production. Lower prices signal that Alberta producers should reduce pork supply, which would reduce pork processed, marketed and, ultimately, exported. All this, even though there is increased demand through higher price signals coming from Asian trading partners. Prices to producers must more accurately depict prices earned downstream in the value chain. Otherwise, the inability to clearly send price signals through the value chain will leave money on the table for the entire industry, not just producers. ■

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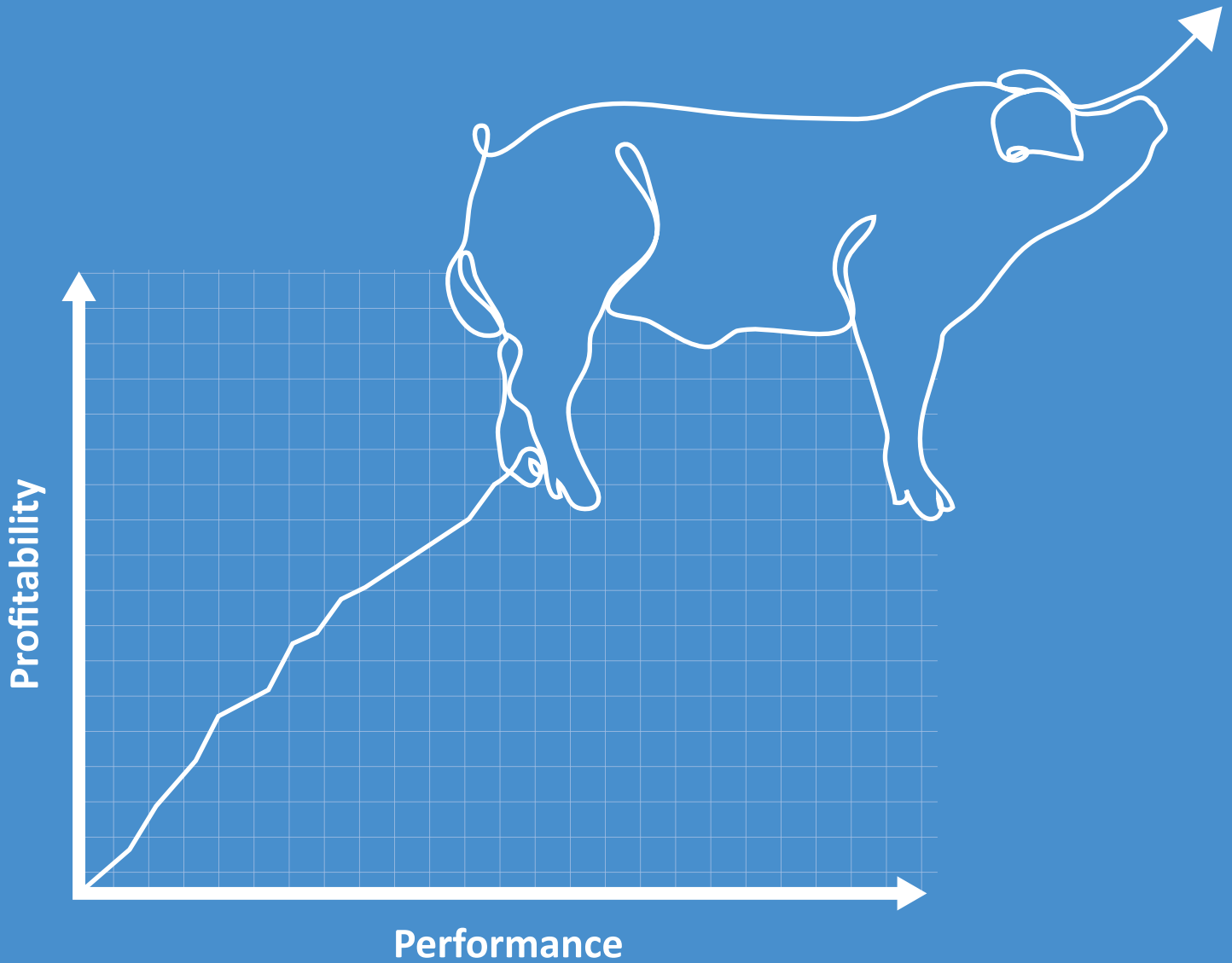
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# News and Views

## Domestic meat demand remains strong

The U.S.-based North American Meat Institute has released its 15th annual in-depth study of meat and poultry through shoppers' eyes. *The Power of Meat 2020* explores consumption trends, sales growth and consumer preferences and found demand for meat is accelerating with \$50.5 billion in sales for 2019.

Influenced by healthy and ethical living, production claims remain popular. Shoppers would greatly welcome protein content on-pack and tips on superior nutritional choices that do not cost more and are equally tasty. Organic, grass-fed and no-antibiotics-ever offerings saw robust sales gains but overall trust in such claims is only moderate. Building trust and understanding of claims is key to continued growth – particularly given the importance of production claims to those looking to reduce their meat intake due to animal welfare, environmental or health concerns.

## Alberta Pork welcomes incoming directors

The Alberta Pork Board of Directors welcomed Marcel Rupert of Rupert Lansink



Marcel Rupert (left) and Martin Waldner (right) are Alberta Pork's latest elected Board Directors.

Farms and Martin Waldner of Hartland Colony as its latest members in March 2020.

Rupert is a partner in an 850-sow farrow-to-finish operation near Three Hills, Alberta. He rejoins the board after having previously served between 2012 and 2016. Waldner manages a 750-sow farrow-to-finish operation near Bashaw, Alberta. He returns for an extended term after joining the board for the first time in 2017.

Rupert feels strongly that the existing western Canadian hog pricing model, based on the U.S. price, does not bring fair value to producers. Martin has been working to help make the Canadian pork industry more successful by participating in several strategic initiatives on the provincial and national levels.

## Municipal leaders tackle western economic challenges

In February 2020, the Federation of Canadian Municipalities held a full-day summit for its Western Economic Solutions Taskforce (WEST) in Leduc, Alberta.

WEST was launched in the wake of the 2019 federal election to ensure the priorities of western communities are clearly heard in Ottawa. The taskforce unites rural and

urban municipal leaders from Manitoba, Saskatchewan, Alberta and British Columbia. WEST is exploring a full range of economic solutions—both to fuel recommendations to the federal government and to share among municipalities from coast to coast.

“Western municipal leaders are on the front lines of economic challenges,” said Randy Goulden, City Councillor, Yorkton, Saskatchewan & Chair, WEST. “We see people in our communities losing their livelihoods and their hopes for the future, so today we’re digging deeper to identify solutions that will make a difference.”

## Alberta government consults producers on research



The Alberta government has asked producers about their priorities for agriculture research investment. Consultations took place across the province, including at Lakeland College in Vermilion.

Alberta Agriculture and Forestry hosted engagement sessions across the province in January 2020 to consult with farmers on setting priorities for provincial research. Break-out sessions were held with farmers and representatives from government, industry and academia to facilitate the discussions.

Provincial investments in crop and livestock research

have experienced a 50 per cent reduction in recent years from approximately \$25 million to \$12 million contributed to the Alberta Livestock and Meat Agency (ALMA), Alberta Crop Industry Development Fund (ACIDF) and Alberta Innovates-Bio Solutions (AI-Bio). ALMA and ACIDF were formally dissolved, and AI-Bio was amalgamated with a re-structured Alberta Innovates organization.

In March 2020, Devin Dreeshen, Minister, Alberta Agriculture and Forestry announced the creation of the Results Driven Agricultural Research initiative, which will make use of \$2 million in funding through the Canadian Agricultural Partnership (CAP) in its first year. Projects will begin receiving support starting in September 2020, with full operational capacity by March 2021.

## Maple Leaf CEO comments on plane tragedy

Michael McCain, CEO, Maple Leaf Foods, provided comment on Twitter in early January 2020, related to the Ukraine International Airlines Flight 752 disaster in Tehran, Iran. McCain took the unusual step of using his company's corporate Twitter account, rather than a personal account, to make the statement:

“I am very angry, and time isn't making me less angry. A [Maple Leaf Foods] colleague of mine lost his wife and family this week to a needless, irresponsible series of events in Iran... The world knows Iran is a dangerous state, but the world found a path to contain it... A narcissist in Washington tears world accomplishments apart; destabilizes region... We are mourning and I am livid.”



The tweet was widely publicized in major news media and was questioned by some for its appropriateness but praised by others for its candor.

## New name for Coop fédérée



Olymel's parent company, Coop fédérée, will now be known as 'Sollio Groupe Coopératif.'

La Coop fédérée, parent company of Olymel, has changed its name to "Sollio Groupe Coopératif." Quebec's National Assembly approved the change in December 2019, which makes the co-op's agribusiness segment, dubbed Sollio Agriculture since 2018, its namesake division. La Coop fédérée most recently changed its name in 2005. Prior to then, it was known as Cooperative fédérée de Québec.

## Hormel joins Tyson Foods, JBS in removing ractopamine

Minnesota-based Hormel Foods announced in February 2020 that it would be

removing ractopamine from its production. Hormel joins major U.S. processors Tyson Foods and JBS on the list of American pork processors that can now sell in China, where ractopamine is banned.

Ractopamine is a feed additive that promotes pig leanness and is central to the controversy that saw Canadian pork imports banned from China in June 2019. Canadian producers certified under the Canadian Quality Assurance (CQA) program voluntarily removed the additive from production in 2014.

## Genesis welcomes new geneticist

Genesis is very pleased to announce the appointment of Dr. Chad Bierman to the position



Chad Bierman is Genesis' newest Geneticist.

of Geneticist. As a Geneticist, Bierman will oversee genetic improvement programs at genetic nucleus farms, provide leadership for the company's health R&D program and provide genetic improvement technical support for customers.

"We look forward to Chad's contributions to our program. His skill set, experience, and desire to develop the best genetics for our pork industry make him an excellent choice for this position," said Bob Kemp, VP of Genetic Programs and R&D, Genesis.

Bierman has more than 18 years of experience in the pig genetics industry in various genetic improvement and research and development roles and holds a Ph.D. from the University of Wisconsin-Madison. He was born and raised on a livestock and crop farm in southwest Minnesota and currently resides in Indianola, Iowa with his wife and children.

## Canarm promotes sales director

Canarm is pleased to announce the promotion of Paul Fallis to Director of Sales - Canarm Ag Products. Fallis has been with the company for over 20 years and has held several positions, including Sales Manager and

International Sales & Market Development.

In this new position, Fallis will continue to lead the Canarm AgSystems sales team based in Arthur, Ontario, and will take on the responsibility of leading the newly acquired Faromor sales team in Shakespeare, Ontario.

## Hypor expands Ontario sales presence

Hypor has hired Bryce Vantygghem as a Sales Representative with its Ontario swine business unit. Vantygghem is a graduate of the University of Guelph and has spent several years working in the feed industry in technical service and sales roles.

"I'm very eager and ready to start meeting with producers and building relationships," said Vantygghem. "I look forward to exploring solutions that help minimize challenges while enhancing what Hypor has to offer our customers."

In his role, he will be working with Hypor's dealer, Genex Ontario, to expand their sales presence and assist with commercial and trial data collection and the operation of Hypor's export barn

CONTINUED ON PAGE 28

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## Hanneke Feitsma leaves lasting impact



PIC's Hanneke Feitsma passed away in late March.

With great sadness, Genus Plc and PIC share with the company's customers, partners and friends in the industry that Hanneke Feitsma, Quality Assurance

Manager, Global Gene Transfer Center (GTC), PIC passed away in late March at the age of 59.

Feitsma was born in Leeuwarden, the Netherlands and received her veterinary degree from Utrecht University in 1987. For 25 years, she worked with the Dutch pig AI industry. In 2013, Feitsma moved to the USA. She joined PIC in 2015.

Feitsma has published more than 38 articles in different journals and was frequently asked to present on boar semen preservation, boar stud and AI procedures, and hygiene control in boar semen production. She will be greatly missed.

## Topigs Norsvin's 45th million pig

Pigbase, Topigs Norsvin's breeding database, now contains data from more than 45 million breeding pigs. The 45th million pig, a Norsvin Landrace, was born in mid-March at a farm in Norway.

Breeding database Pigbase contains pig data gathered at nucleus farms, commercial farms and slaughterhouses. It also contains genomic data and data gathered from CT scans, cut-out sessions and other innovative measuring protocols used in our breeding program and research.

Pigbase links the Topigs Norsvin breeding farms with each other, thus creating a single large population of breeding pigs. This makes it possible to achieve high genetic progress and to rapidly disseminate to customers around the world.

## Efficacy of Virkon™ against COVID-19

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## Australia, U.S. pledge new African Swine Fever funding



In October 2019, Australian authorities seized pork products from Vietnam brought in a traveller's luggage. The traveller was denied entry into the country as a result.

In December 2019, the governments of Australia and the U.S. pledged new support to combat African Swine Fever (ASF) from entering those countries. In Australia, the support is worth \$67 million and includes the hiring more than 100 new frontline biosecurity officers and new X-ray equipment at airports and mail centres, while in the U.S., the support is worth \$20 million and includes new inspectors at land border crossings, marine terminals and airports. In March 2019, the Government of Canada announced \$31 million of funding for detector dogs and other forms of support to combat ASF.

## Wild pigs eradicated in Colorado

Colorado Parks & Wildlife declared the state free from wild pigs in February 2020, thanks to a 15-year collaboration with various branches of the U.S. Department of Agriculture and other state and federal partners.

"This achievement points to the value of collaborative efforts in staffing, funding and resources to accomplish a common goal," said Wayne East, Wildlife Liaison, Colorado Department of Agriculture.

Wild pigs are an invasive species in North America, and their presence in many parts of Canada and the U.S. has large implications on disease transmission, crop destruction and livestock safety. ■

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## Exploring four key food trends for 2020

Jo-Ann McArthur

When we look at trends, we are not passing judgement or making value statements. We are just reporting what we see coming. Looking back, we are happy to say that all the trends we have covered since 2017 are still actively reshaping the food industry and providing opportunities for producers, manufacturers, retailers and food service providers.

Here are some of the trends that could affect you most in 2020 – both positively and negatively.

### Make way, Millennials: Gen Z is on the rise

In our 2019 *Nourish Trend Report*, we identified a shift from Millennials to Generation Z as one of the top eight trends to watch in the food industry. Gen Z members today are roughly between the ages of four- and 24-years-old. They comprise a quarter of the current population, which makes Gen Z more numerous than both Baby Boomers and Millennials. Over the next few years, that figure will balloon to 33 per cent.

Remarkably, while they are still establishing behaviours, even the youngest are already influencing their parents' and grandparents' buying decisions. What we are learning is that they are markedly different from previous generations, especially when it comes to the way they view meat.

Gen Z is engaged, aware and optimistic about their ability to effect change. Almost half of all surveyed said they believe they can make the world a better place. Importantly, they have grown up in a digital world where no question cannot be answered with their mobile device, so they expect radical transparency. And they want proof – a claim without evidence (or a picture) is just noise.

We call this "Made Matters." It is shorthand for things consumers care about: quality, ingredients, health, animal welfare, environmental and labour concerns. They want to know how and where food was grown or raised. Both Gen Z and Millen-

CONTINUED ON PAGE 30

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## Pork Culture and Trends

nials are more likely to purchase animal-welfare-certified products.

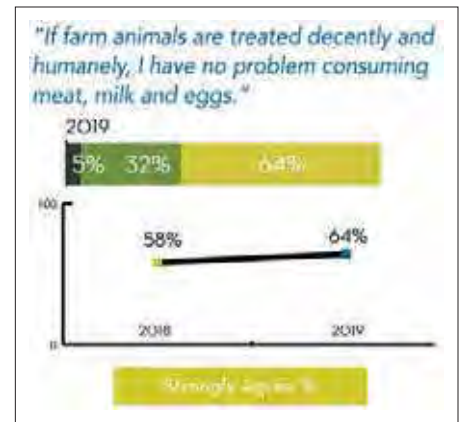
The “Eating Clean” definition is expanding to include not just what is in food but the entire journey, from how it was raised and by whom, to the treatment of workers, animals and the environment. All these factors are growing in importance and are top-of-mind with younger consumers.

### Canadians have a lot to learn about farming

Unfortunately, while Canadian consumers trust Canadian farmers, they do not fully trust our food system. The Canadian Centre for Food Integrity’s 2019

*Public Trust Research* demonstrated a dangerous disconnect between consumer perception of the food system and reality that needs to be addressed. Consistent with last year’s data, it shows that only one in three Canadian consumers believes Canada’s food system is on the correct course. Fortunately, those who feel the food system is going in the right direction outnumber those who think it is headed down the wrong track.

The same research shows that 91 per cent of Canadians know little or nothing about modern farming practices, but 60 per cent of Canadians are interested in knowing more – a trend we reviewed in the 2020 *Nourish Trend*



*Social licence still matters for producers.*

*Report.* The disparity between consumer beliefs and on-farm practices must be addressed. As insiders, you and I

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know Canadian agriculture has world-class standards, but consumers are less clear on that fact.

### Eating meat is no longer a black-and-white issue

The number of Canadians who identify as vegan or vegetarian is on the rise. Still, 64 per cent of consumers said they had no issue consuming meat “if farm animals are treated decently and humanely.” Consumers are looking for reassurance about how the animals were treated, backed by audits and robust standards. Producers have an opportunity here to share their best practices and excellent records on animal welfare.

In the 2018 *Nourish Trend Report*, the rise of “plant-based” eating was one of the disruptive trends we shone a light on. More Canadians across cultures and generations are reducing their meat intake and adopting a flexitarian lifestyle to support animal welfare, the environment and their health – the top three reasons cited in a Dalhousie University study. People under the age of 35 are three times more likely to consider themselves vegetarians or vegans than people 49 or older.

In 2020, attitudes towards sustainable consumption are reaching a crucial tipping point away from aspiration and toward necessity. Research conducted with online Canadian members of the Angus Reid Forum (on behalf of *The Meatless Farm*), found that 77 per cent of consumers say they understand the damaging environmental impact of eating red meat, and 74 per cent believe it is important to reduce their carbon footprint. Yet, only 38 per cent of Canadians reduced their meat consumption to do so.

Will we see the emergence of a “climatarian” diet, where consumers start making food choices not based on food preferences or values but instead based on carbon footprint and environmental impact?

### The plant-based trend is here, and it is not leaving

Blended or hybrid products (such as mixed plant and dairy, or plant and meat) are starting to emerge as an easier way for consumers to moderate their carbon footprint without giving up their preferred taste for animal products. Rather than doing flexitarian as an “either/or,” it can be done as an “and.” Blended protein is an old concept that recent economic prosperity has

taken us away from. During the Second World War period, there were Victory posters in Canada about protein rationing. Boomers grew up with mothers who mixed ground meat with oats to make the grocery money extend further. What is old is new again!

In the U.S., Tyson Foods recently launched *Raised & Rooted*, a blended meat and pea-based protein, shortly after selling its share in Beyond Meat, a totally plant-based processed meat substitute. Perdue, a major chicken processing company, offers a Chicken Plus line of products combining chicken and vegetables.

These products leverage the technology necessary to make plant-based products stable but incorporate real meat to deliver the taste and texture consumers crave. Given that plant-based ingredients are in short supply, this may soon be the only way new players can enter the market while staying competitive.

In Canada, Maple Leaf Foods, shifted its vision to focus on becoming “the most sustainable protein company on Earth.” (Note the exclusion of the word “meat.”) It has positioned itself for the future by creating a separate plant-based division and building a \$300 million facility in Indiana to support growth.

We have seen rapid changes in consumer behaviour with the COVID-19 crisis. Some of that behaviour will have a legacy effect on our food system. We have already seen a shift-in-stomach from food service to grocery as more people cook at home. Consumers will want to support their communities and neighbours, so we should also see an even more significant move to locally- and Canadian-grown food. ■



Maple Leaf Foods' plant-based Lightlife product line is an example of how traditional meat companies are diversifying and rebranding as “protein” companies.

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# Growth performance of weaned pigs fed raw or heat-processed field pea

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## Take Home Message

We evaluated the nutrient and energy digestibility, and growth performance of 236 weaned pigs fed 40% raw or heat-processed field pea: cold-pelleted (70–75°C), steam-pelleted (80–85°C) or extruded (115°C), to replace 30% soybean meal (SBM) and 10% wheat grain in a 3-week trial. We found that:

- Compared with a SBM diet, field pea diets had lower digestibility of protein and energy, thus lower energy value. Heat processing did not improve nutrients digestibility.
- Compared with a SBM diet, pigs fed field pea diets had similar weight gain, but greater feed intake, thus poorer feed conversion. Heat processing did not improve feed conversion. Pigs fed these diets had similar final body weight.
- Weaned pigs can be fed 40% raw field pea in substitution for 30% SBM and 10% wheat in diets without affecting growth performance.
- Heat processing did not improve the feeding value of field pea for weaned pigs.

## Why are we trying to test heat processing of field pea?

Growing pulse crops, such as field pea, offers favourable agronomic benefits that include atmospheric N fixation by root rhizobia, breaking crop disease cycle and diversifying soil nutrient use in crop rotations. Field pea is produced mostly in Western Canada with annually production of ~4.3 million tonnes. Field pea is a good source of dietary starch (~30%) and protein (~20%). Excess or non-food grade field pea can replace soybean meal (SBM) in swine diets to reduce feed cost. However, anti-nutritional factors in field pea, such as trypsin inhibitors and lectins, may reduce growth. Heat processing can destroy the heat-labile protease inhibitors and lectins in pulse grains, thereby increasing nutrient digestibility, and may improve growth performance of pigs. However, previous reports showed inconclusive effect of heat processing on field pea. Thus, we set up a trial to test the effects of heat processing field pea on nutrient digestibility and growth performance of weaned pigs.

## Field pea and processing

One batch of yellow field pea (*Pisum sativum*) was sourced from a commercial supplier (WA Grain and Pulse, Innisfail, AB) and ground through a 4.0-mm screen using a hammer mill. After initial grinding, the batch of the field pea was divided into four parts: (1) remained ground (raw), (2) was cold-pelleted at 70–75°C (Model PM 1230, Buskirk Engineering, Ossian, IN, USA), (3) steam-pelleted at 80–85°C (Model 1116-4, 70 hp; California Pellet Mill, Crawfordsville, IN, USA), or (4) extruded (Model X115, Wenger, Sabetha, KS, USA) at Agri-Food Discovery Place (Edmonton, AB). A speed of 420 rpm and medium intensity were set up for extrusion through a 7-mm die. Steam and water were added at 14 and 5% in the preconditioner and at 1 and 3% in the extruder, respectively. The extruder had 5 zones with increasing in temperature by 5°C from 95°C to 115°C. Following heat processing, all field pea samples were re-ground through a 3.2-mm sieve using the hammer mill.

CONTINUED ON PAGE 34

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## Weaned pig trial set up

In total, 236 crossbred pigs (Duroc × Large White/Landrace F1; Hypor, Regina, SK) weaned in four groups at 21 days of age were fed commercial phase-1 and phase-2 diets for 7 days each before being offered the test diets.

A wheat-based control diet containing 30% SBM and four diets containing 40% field pea replacing 30% SBM and 10% wheat grain were formulated to provide 2.4 Mcal net energy/kg and 1.2% standardized ileal digestible lysine. Diets contained 0.8% acid-insoluble ash as an indigestible marker to measure nutrient digestibility. Diets did not contain antibiotics or growth promoters. Diets were fed as mash.

Pigs began the test 2 weeks after weaning (initial body weight, 10 kg) and were on test for 3 weeks. Pigs had free access to feed and water throughout the trial. Individual pigs, feed added and remaining were weighed weekly to calculate average daily feed intake, weight gain and feed conversion. Freshly-voided faeces were collected hourly from pen floors on day 19 and 20 to determine nutrients digestibility of diets.

## What we found

Heat processing slightly reduced the woody fibre content, but did not affect protein content or cause protein damage in field pea. Extrusion deactivated most trypsin inhibitor in field pea. The reduction in trypsin inhibitor activity in field pea can minimize its adverse effect, such as reducing protein digestion. However, trypsin inhibitor activity in the tested field pea was already low (1.6 g/kg) that rendered the effect of heat processing less obvious.

As field pea contained less protein than SBM, diets with field pea provided up to 77 g/kg less protein than the SBM diet. In addition, field pea contained double the amount of dietary fibre than SBM. Young pigs had limited ability to digest fibre in diets. As a result, field pea diets had lower total tract digestibility of protein and energy than the SBM diet. Consequently, field pea diets had 167–182 kcal/kg lower net energy value than the SBM diet, contrasting to the formulated equal energy value. This finding suggests that a safe margin is required to account for the fluctuation in energy value of field pea. Rapid estimation of net energy of field pea could be achieved by scanning samples with near infrared spectroscopy.

Heat processing did not increase nutrients digestibility and energy value in field pea diets. However, we balanced amino acids content in field pea diets by supplementing crystalline lysine, methionine, threonine and tryptophan to counteract the lower protein content and digestibility of field pea to support pig growth.

Over 3 weeks, pigs consumed 40–69 g more field pea diets per day than the SBM diet (Figure 1), which may indicate pigs were trying to meet their energy requirement by increasing feed intake, but growth was similar among pigs fed field pea

Figure 1. Growth performance of weaned pigs fed diets including 40% raw, cold-pelleted, steam-pelleted or extruded field pea in substitution for 30% soybean meal (SBM) and 10% wheat grain starting 2 weeks post-weaning for 3 weeks



or SBM diets. Consequently, feed conversion was poorer for pigs fed field pea diets than pigs fed the SBM diet, suggesting energy density of field pea diets was limiting. Different heat processing of field pea did not increase weigh gain, feed intake or feed conversion. The final body weight of pigs fed raw, cold-pelleted, steam-pelleted, extruded field pea or SBM diets were 21.0, 21.1, 21.3, 21.4 and 21.7 kg, respectively, and was not affected by feeding raw or processed field pea.

## Cost vs. benefit

Dietary inclusion of field pea saved the cost of using costly SBM and reduced the amount of liquid oil needed to balance the energy value of the diets. Based on assumed market prices (\$/tonne) of wheat 235, soybean meal 600, field pea 265, canola oil 950, limestone 115, mono/dicalcium phosphate 900, L-lysine-HCl 2,150, DL-methionine 3,200, L-threonine, 2,150, and L-tryptophan 12,500, dietary inclusion of 40% raw field pea in substitution of 30% SBM and 10% wheat grain reduced feed cost by \$76.02 per tonne. Without counting the heat-processing cost, feed cost savings of 4.71, 2.73, 5.95, and 5.07 cents per kg of body weight gain, or 0.52, 0.30, 0.68, and 0.58 dollars per pig, respectively, were calculated for weaned pigs fed raw, cold-pelleted, steam-pelleted, or extruded field pea for the 21-day trial.

## Recommendations

Considering that heat processing did not improved growth performance, we do not recommend heat processing before feeding field pea to weaned pigs. However, with adequate balance for energy and essential amino acids, 40% field pea can be included in diets for weaned pigs to substitute 30% SBM and 10% wheat grain without compromising growth of pigs weighing 10 to 20 kg.

## Acknowledgements

We appreciate funding for this research from Swine Innovation Porc (Quebec City, QC, Canada), Alberta Pork (Edmonton, AB, Canada) and Evonik Nutrition and Care GmbH (Hanau-Wolfgang, Germany). ■



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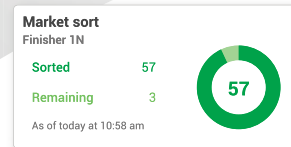
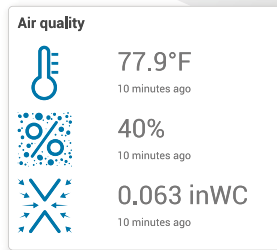
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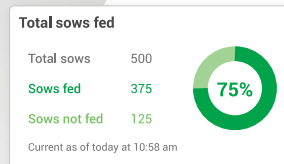


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# Functional amino acids above requirements enhance the ability of pigs to cope with an enteric challenge

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## Highlights

- Average daily gain and feed efficiency in diseased pigs may be improved by a combination of functional amino acids supplemented above requirements for growth
- Functional amino acids improved the immune response associated with *Salmonella* infection
- Bacterial shedding and intestinal colonization can be reduced by functional amino acid supplementation
- Dietary protein level had limited effect on pig response

Research conducted at the Prairie Swine Centre and the University of Saskatchewan investigated the interaction between functional amino acid (AA) supplementation and dietary protein during disease challenge in growing pigs. To achieve this, growing pigs were either inoculated with an enteric pathogen (*Salmonella typhimurium*, ST) or received saline (Control, CT) and had ad libitum access to diets differing in crude protein content (low (16%, LP) vs high (20%, HP) containing either basal supplementation of amino acids at requirements according to NRC (2012) (AA-) or supplemented with a functional amino acid profile in which threonine, methionine, and tryptophan were provided at 20% above requirements (AA+). Diets contained no animal products or antibiotics.

## Clinical signs associated with infection

The post-weaning period is a stressful time for growing pigs, with increased susceptibility to several enteric pathogens, including *Salmonella*. Pigs infected with *Salmonella* experience a pronounced inflammatory reaction in the gut, consequently showing compromised performance. The researchers monitored body temperature, fecal score and demeanor daily for each pig over a period of 7 days (day -1, 1, 2, 3, 4, 5 and 6 relative to inoculation). Fecal score and demeanor were then scored from 0 to 3 according to severity (Table 1). Inoculation with *Salmonella typhimurium* increased body temperature within 24 h which remained elevated for the duration of the study (Figure 1). Demeanor and fecal score were negatively affected by ST inoculation during the first 3 and 5 days after challenge, respectively (Figure 1). There were no diet effects on any clinical signs.

Table 1. Scoring of clinical signs

Clinical sign	Score	Classification
Fecal score	0	Normal consistency
	1	Semisolid, no blood
	2	Watery, no blood
	3	Blood tinged feces
Demeanor	0	Normal behavior
	1	Listless, will stand
	2	Recumbent, will not stand
	3	Moderately depressed

## High protein diets: are they harmful?

More susceptible post-weaned pigs also experience an abrupt change from a milk-based to a cereal-based diet. Besides that, highly digestible nutrient sources are not always available, and pigs are commonly fed diets high in protein sources potentially harmful for gut health. As a result, current dietary recommendation in the post-weaning period is to provide lower protein diets that have been supplemented with necessary essential amino acids to meet requirements. This reduces the amount of undigested protein available for fermentation in the gut, reducing the inflammatory response. Therefore, it was hypothesized that the severity and incidence of diarrhea in *Salmonella*-challenged pigs would be aggravated by high protein diets. However, there was no effect of dietary protein content on fecal score. On the other hand, *Salmonella* counts in cecal digesta were increased in HP pigs compared to LP pigs. Thus, lowering dietary protein levels may be useful to suppress proliferation of microbial metabolites and consequently minimize intestinal disturbances in commercial settings with enteric problems.

## Feeding the immune system of pigs with functional amino acids

Protein and AA, which are utilized for growth in healthy animals, are redirected towards immune support in diseased animals. In this sense, there is a disproportionate use of specific amino acids from body reserves during immune challenge, decreasing their availability for protein deposition. Thus, supplementing functional AA may be necessary to support both the immune response and growth performance, reducing the negative effects of disease on performance.

As expected, inoculation with ST resulted in reduced average daily gain and average daily feed intake in the post-inoculation period compared to CT pigs regardless of dietary treatment (Table 2). However, ST pigs fed the AA+ diet had increased ADG and a tendency for improved feed efficiency (gain:feed) in the post-inoculation period, regardless of dietary protein level. While this performance was still reduced compared to healthy pigs, this shows that functional AA supplementation may provide an additional strategy for reducing the negative impact of disease challenge on animal performance.

In addition to the impact on performance, the supplemental AA profile attenuated the immune response through modulation of acute-phase protein levels in *Salmonella*-challenged animals. Disease-challenged animals showed increased se-

rum concentration of haptoglobin and decreased concentration of albumin, respectively. However, when fed the AA+ profile, challenged pigs showed reduced overall levels of haptoglobin and increased levels of albumin compared to those fed the AA- profile. These findings corroborate the role of functional AA as regulators of metabolic pathways during inflammation, particularly through regulation of immune response.

Functional AA supplementation also decreased overall shedding of *Salmonella* compared to pigs fed AA- diets and *Salmonella* counts in colon were reduced in AA+ pigs compared to AA- pigs. Pathogen shedding is important as infected feces are a major source for cross infection between individual pigs and in a commercial setting reduced shedding could reflect in decreased incidence of natural exposure.

Overall, supplementation of key functional amino acids (methionine, threonine, tryptophan) above requirements appears to be a potential strategy for improving growth performance and health status of pigs exposed to an enteric pathogen.

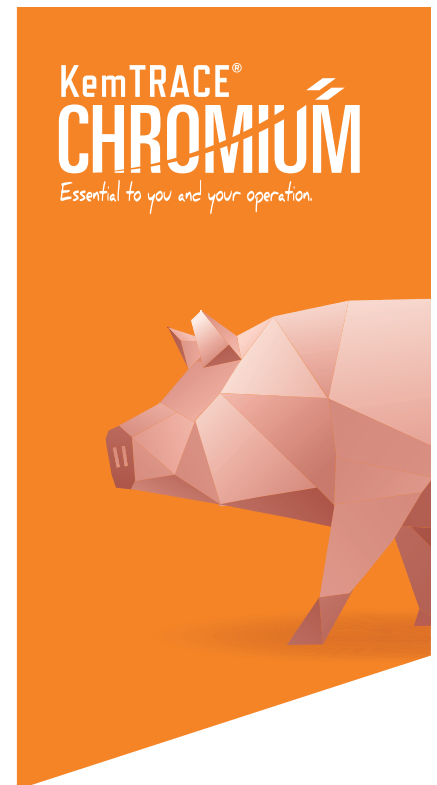
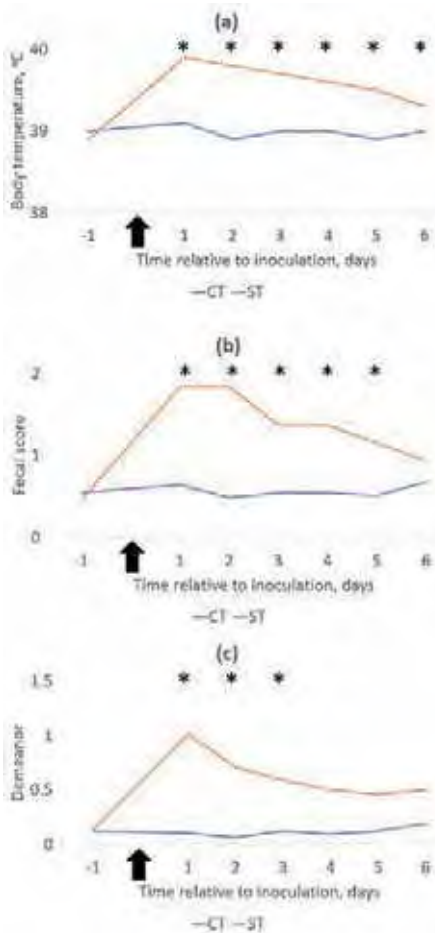
*Acknowledgments: Funding for this project was provided by Swine Innovation Porc and Evonik Nutrition & Care GmbH. Prairie Swine Centre receives program funding from the Government of Saskatchewan, Sask Pork, Alberta Pork, Manitoba Pork, and Ontario Pork.* ■

Table 2. Performance parameters of growing pigs challenged or not with *Salmonella typhimurium* and fed diets differing in protein content and functional amino acid supplementation.

Item	CT <sup>1</sup>				ST <sup>1</sup>				SEM <sup>4</sup>
	LP <sup>2</sup>		HP <sup>2</sup>		LP		HP		
	AA- <sup>3</sup>	AA+ <sup>3</sup>	AA-	AA+	AA-	AA+	AA-	AA+	
Average daily gain, kg/d									
Pre-inoculation	0.423	0.486	0.450	0.463	0.451	0.456	0.460	0.474	0.051
Post-inoculation	0.571A	0.576A	0.586A	0.580A	0.297Bb	0.458Ba	0.300Bb	0.456Ba	0.063
Average daily feed intake, kg/d									
Pre-inoculation	0.580	0.602	0.563	0.636	0.614	0.646	0.632	0.648	0.054
Post-inoculation	0.880A	0.906A	0.916A	0.936A	0.738B	0.673B	0.744B	0.686B	0.086
Feed efficiency (gain:feed), kg/kg									
Pre-inoculation	0.73	0.81	0.80	0.73	0.73	0.71	0.73	0.73	0.109
Post-inoculation	0.65	0.64	0.64	0.60	0.40+	0.68*	0.40+	0.66*	0.104

<sup>1</sup>CT = control group; ST = *Salmonella*-challenged group.  
<sup>2</sup>LP = low protein diet; HP = high protein diet.  
<sup>3</sup>AA- = basal dietary amino acid profile; AA+ = supplemented dietary amino acid profile containing 120% of NRC (2012) requirements for Met, Thr, and Trp.  
<sup>4</sup>SEM = pooled SEM. Means are presented as least squares means.  
 AB = means lacking the same letter are significantly different (CT vs ST) [P ≤ 0.05]  
 ab = means lacking the same letter are significantly different (STAA- vs STAA+) [P ≤ 0.05]  
 \*† = means lacking the same sign showed a trend towards significance (STAA- vs STAA+) [P < 0.10]

Figure 1. Body temperature (BT [a]), fecal score (FS [b]) and demeanor (DM [c]) of pigs prior to saline (CT) or *Salmonella typhimurium* (ST) inoculation and monitored for 6 d post-inoculation. The arrow indicates time point of inoculation and asterisks indicate statistical difference between CT and ST at each time point.



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