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Cover Photo

The plate of food has long been the symbol for the Canada Food Guide, but where's the meat?



Canada Food Guide

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Canadian
Hog JOURNAL

Message from the editor

Hello, and welcome to Spring! Both the season and the magazine were a little late this year, so I apologize on behalf of Mother Nature and of course, myself.

You will notice that one of our stories is on the updates to the Canada Food Guide. I am sure most of you noticed or heard about it, mostly because of the switch to a more plant-based diet, and because industry wasn't allowed an opportunity to comment and affect the development of recommendations.

The guide asks Canadians to choose more plant-based proteins, but doesn't specifically say how much meat to eat. However, the plate photo that represents the guide is pretty telling – it's hard to even find the meat in the picture.

Will that change again in future years as we learn more about nutrition, and more research is done? Probably. And that's the important consideration – nutritional science doesn't change on a whim – it is changed by science. And science is ever-changing... that's just the nature of the beast. When you think about what we know now compared to 100 years ago, when you think about cancer treatments, life expectancy, infant mortality rates... the researchers get it right, through trial and error. There is no other way.

Personally, I'm ok that they didn't consult with industry. I mean, would we have wanted them to consult with Pepsi? Or the leading potato chip manufacturer? I think it's important to take a step back and think about the implications of industry influence on policy. In the meantime, we can funnel our disappointment into more research on human nutrition and what we can do as an industry to make our own product as nutritious as possible.

Speaking of science – our next issue is dedicated to it! So be sure to send in your research articles, or even your own story about how research and science in agriculture has changed your life. And please don't forget to start taking photos for our front page contests! There are prizes to be won, but only if we receive multiple entries.

Stay safe out there, and as always, thank you for your continued support, and for reading. ■

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Sheri Monk
Editor, business manager

OPINION The View from Grier

Slaughter Round-up

Federally inspected slaughter in Canada totaled about 5.3 million head in the first quarter this year. That compares to 5.2 million the first 13 weeks last year for an increase of 56,000 head or one per cent. The increase in the total slaughter in Canada is comprised of a wide array of results across the different provinces and packers. In Ontario for example, federal slaughter of market hogs is up by an estimated 7-10 per cent. Part of the reason for the increase was due to the back up in kills at one particular Olymel plant in Quebec. That increased availability of hogs in Ontario and both Conestoga in Breslau and Sofina in Burlington put on extra shifts on Saturdays. In addition, last year in the first quarter, Conestoga was working through 6,500 per day compared to the 7,200 this year.



By Kevin Grier

Looking to the second quarter, that big year-over-year increase in Ontario is not going to be repeated. First, supplies have been reduced or slowed early in the quarter due to production issues associated with vomitoxin in corn. The numbers will catch up, but early this quarter volumes have tightened. Another more positive reason is that the situation at Olymel in Quebec is back to normal. Numbers flowing from Ontario to Quebec are getting back to the 25-30,000 head per week norm.

With regard to Quebec, given the slowdowns and challenges at that Olymel plant noted above, total provincial kills in the first quarter were running lower by about three per cent or about 60-63,000 head this year compared to last. The second quarter will be more reflective of the overall supply situation in Quebec. I expect to see kills down in the second quarter by about one per cent or less. That is due to modestly lower inventory numbers in the province.

Another province that saw a big gain in the first quarter was Manitoba. I estimate that market hog numbers were up about 80-85,000 head year over year in the first quarter. That amounts to an increase of about 5-7 per cent year-over-year. A large part of the reason for the increase is the fact that last year in Q1, the province's packers were dealing with reduced volumes due to the previous summer's PED. Weanling losses in the summer and early fall 2017 meant fewer market hogs in Q1 of 2018.

Another part of the reason for the slaughter increase in Manitoba is the increased capacity at HyLife in Neepawa. They started last year at 6,800 per day compared to the current 7,500. I expect to see the year over year increases in Manitoba start to wane in the coming months. The PED impact will not be applicable much going forward. Furthermore, the overall inventory rates on the prairies do not suggest much room for Maple Leaf to grow. There will still be some year over year gains at HyLife, however, as they did not get to their current 7,500 rate until the summer of 2018.

In Saskatchewan, the one federal plant in Moose Jaw – Thunder Creek – is likely working through just under 1,200 per day. That is up a little from last year and right around the

CONTINUED ON PAGE 8

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plant's capacity. In Alberta, slaughter is down by a stark 5-8 per cent this first quarter compared to last. Weekly kills are probably just around 45-46,000 this year compared to 48-50,000 last year. I expect the Olymel Red Deer plant is running about 2-3,000 head per week lighter than last year.

In B.C., Thunder Creek's sister plant, Britco in Langley is probably running down by about 3-5 per cent this year versus last. Britco's challenges come from both B.C. and Alberta. B.C.-based hog slaughter is down by about 3-4,000 head in total during the first quarter compared to last year. Meanwhile, the numbers coming from Alberta into B.C. are down about 5,000 head this year compared to last in the first quarter.

The bottom line is that Canadian hog slaughter has stagnated or fluctuated around the 21 million head mark for about 10 years. Last year's kill was about 21.4 million and I expect to see less than 22 million this year.

The new WHE

There are three federally inspected hog slaughter plants in Alberta: Olymel, Red Deer; Maple Leaf, Lethbridge; Trochu

Meats, Trochu. Canadian Pork Council estimated weekly slaughter capacity for the three plants is 45,000, 7,500 and 3,500 respectively.

As noted above, weekly hog slaughter so far this year has been averaging about 45,000 head per week on non-holiday weeks. So far this year, Alberta hog slaughter is averaging about 3,500-4,000 head per week fewer than last year. Not surprisingly, almost all the decrease is due to reductions at Olymel. I estimate that Olymel has been slaughtering just 6,400-7,000 hogs per day in the 9,000 per day capacity plant. Of that total, it is likely that about 55-60 per cent are Olymel integrated hogs.

Based on the StatsCan January 1 inventory report, the Alberta sow herd has increased two per cent over the five years from 2013 to 2019. That increase, which amounts to 3,100 head, is the smallest of the hog producing provinces of Canada. It compares to 16 per cent growth in Ontario and three per cent in Manitoba.

It is against this backdrop of decline or stagnation that the Western Hog Exchange (WHE) continues to evolve into its new role as a marketer of hogs. The WHE is a non-profit hog marketing organization owned by hog producer shareholders and directors. It markets hogs for producers that chose to use its services. Until recently, I viewed the WHE as providing a procurement function for the Olymel plant in Red Deer. All hogs that moved through the WHE went to Red Deer. That has changed.

As noted here previously, the WHE now sees itself as a hog marketer offering hogs to all potential buyers. The new WHE has been putting out a Request for Quote (RFQ) on hogs that it is marketing. The RFQ has gone to all packers in the west, not just in Alberta and, most importantly, not just Olymel. Based on WHE estimates, the hogs offered on its first completed RFQ returned far more per hog than would otherwise have been the case if they had not been offered for bid.

Given the reported large increase in relative returns generated by the first RFQ sale, there is a great deal of added producer interest. There are now new WHE shareholders that have come on board. Some of these are past Alberta members that had left. Others are from Saskatchewan that are interested in taking part. The WHE is now dealing with more shareholders and hog volumes.

The WHE has been able to leverage that growth into one-on-one individual meetings with all the packers. The WHE purpose of these meetings is not so much about pricing and grid. Instead, their focus is on bigger picture industry supply and demand. That is, the focus is on what is necessary to grow the industry in the west. The WHE view is that tweaking a pricing formula is not going to lead to new barns.

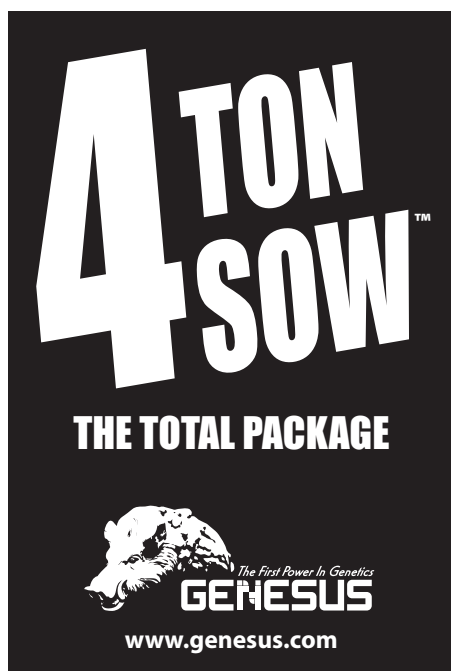
In other words, the WHE is taking a two-pronged approach to marketing. It is strategically marketing hogs to generate the highest return as hogs come available. Perhaps more importantly, it is attempting to facilitate an environment where packers and producers can work together to see if there is growth potential.

The first part makes perfect sense and is long overdue. The second part is necessary given the state of stagnation in the Alberta and western industry.

Growth in Ontario

The StatsCan January 1 inventory report showed that the Ontario sow herd was up less than one per cent or 2,100 head year over year. That compared to a Canadian sow herd that was virtually unchanged and a Quebec decline of one per cent.

It is likely that the StatsCan estimate of the Ontario increase, which brings the herd to 322,000 sows, is an understatement of the actual number. Industry suppliers across a wide range of services and products assert that there has been numerous expansions and new facili-



ties that would more than offset closures or retrenchments. Those individual additions typically range anywhere from 200 head to 2,500 head. The likely increase in sow numbers is probably closer to 4,000 during 2018 in Ontario.

Of course, there have been contractions for the usual reasons. Older hog farmers with family members that are not interested in taking over are typical examples. These are often smaller operations of less than 500 sows. In some cases, a retired sow barn has been converted to a grow-finish operation.

Regarding expansion, however, there are several operations that are in the process of or are planning on expanding in 2019. Some producers that are renovating for the new pig code are also adding sow capacity as part of the job. There are notable examples of farmers that have decided to retire old barns and have built brand new facilities. Instead of having an old 1,200 sow barn they are building a new 2,500 head barn. If they have made the decision to re-invest, they are not re-investing in small numbers. Next year at this time, the StatsCan data is likely to show a 7,000-10,000 head increase in its Ontario sow inventory.

Another part of the reason for the expansions in Ontario has been the pricing experienced by the Conestoga shareholders. There would have been many producers across Canada that were deciding to throw in the towel during last summer's collapse. Last summer may have been the last straw for many producers frustrated with pricing, especially in the West. The Conestoga growers would not have experienced that challenge, given the ownership structure.

This year there are likely to be fewer retrenchments than usual given the Chinese African Swine Fever driven market. As usual, there are plenty of examples of older farmers or older operations that were considering leaving. This year, however, these operators are likely to

put that off in anticipation of one more round of solid returns this year.

It is interesting to note that more younger people have been taking the reins in the last 3-5 years than there has been in the previous 10-15 in Ontario. They are not only taking over the family operation, but they are expanding or building new operations.

As noted here previously, there is also robust demand for finishing space. Of course, there is a big difference between demand for space and actual supply or new facilities. In addition, there are thousands of spaces that need work or that need to be retired. One big challenge is the lack of construction capacity. Construction operators and services are outstripped by demand for those services. That is especially the case after such a long period of docile demand from the mid-2000s to the mid-2010s due to the financial stress. The infrastructure of builders is a key limiting factor on finishing spaces in Ontario. With that said, there may have been up to 50,000 spaces added over the past year or two.

Regarding finishing spaces in 2019, as noted above, there is an argument to be made that the industry has maxed out its construction capacity. Of course, the situation as it relates to construction costs is obvious given supply and demand.

The main point is that there will be expansion of both sows and finishing spaces in Ontario this year and likely for the following two years. The optimism regarding the Chinese situation as well as the circumstances with the Conestoga growers is the basis for that statement. ■

Kevin Grier Market Analysis and Consulting provides industry market reports and analysis, as well as consulting services and public event speaking. You can reach him at kevin@kevingrier.com to comment or to request a free two-month trial of the Canadian Pork Market Review.

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Canadian Hog JOURNAL

HOT ISSUES

Canada Food Guide update isn't bringing home the bacon

Pork industry associations weigh in on the new guide's emphasis on plant-based protein

By Treena Hein

Unless you were on another planet for the past year, you couldn't have missed the fact that many headlines in 2018 and early 2019 focussed on the impending update and subsequent release of the new *Canada Food Guide*. The revision was completed by a multidisciplinary team at Health Canada that

included researchers, policy experts, registered dietitians and communications specialists, but both the process and the new content have frustrated Canadian livestock commodity groups.

In the past, any industry stakeholder had the opportunity to comment on planned revisions, but that changed during the preparation and research phase of the most recent edition.

"Officials from Health Canada's office of nutrition policy and promotion did not meet with representatives from the food and beverage industry," explained Health Canada spokesperson Geoffrey Legault-Thivierge, because "it was important to ensure that the development of dietary guidance was free from conflict of interest."

Let's not fool another generation in the process to understand that animal protein is good protein as well.

Darcy Fitzgerald, Alberta Pork

In terms of the eventual release of the new Guide in January 2019, various commodity groups were not pleased with some major changes. Since 1977, there had been four food groups in the Guide – milk and milk products, meat and alternatives, grain products, and fruits and vegetables – that has now been reduced to three. The 'milk and milk products' category is gone, as is the 'meat and alternates' group, and both have now been combined into one larger category called 'protein.'

There is also a much greater emphasis in the new guide on consuming plant-based protein. Even the main visual itself, the plate of food that every Canadian recognizes as being the symbol of the guide, hardly shows any meat. Legault-Thivierge says Canadians are now being encouraged to eat

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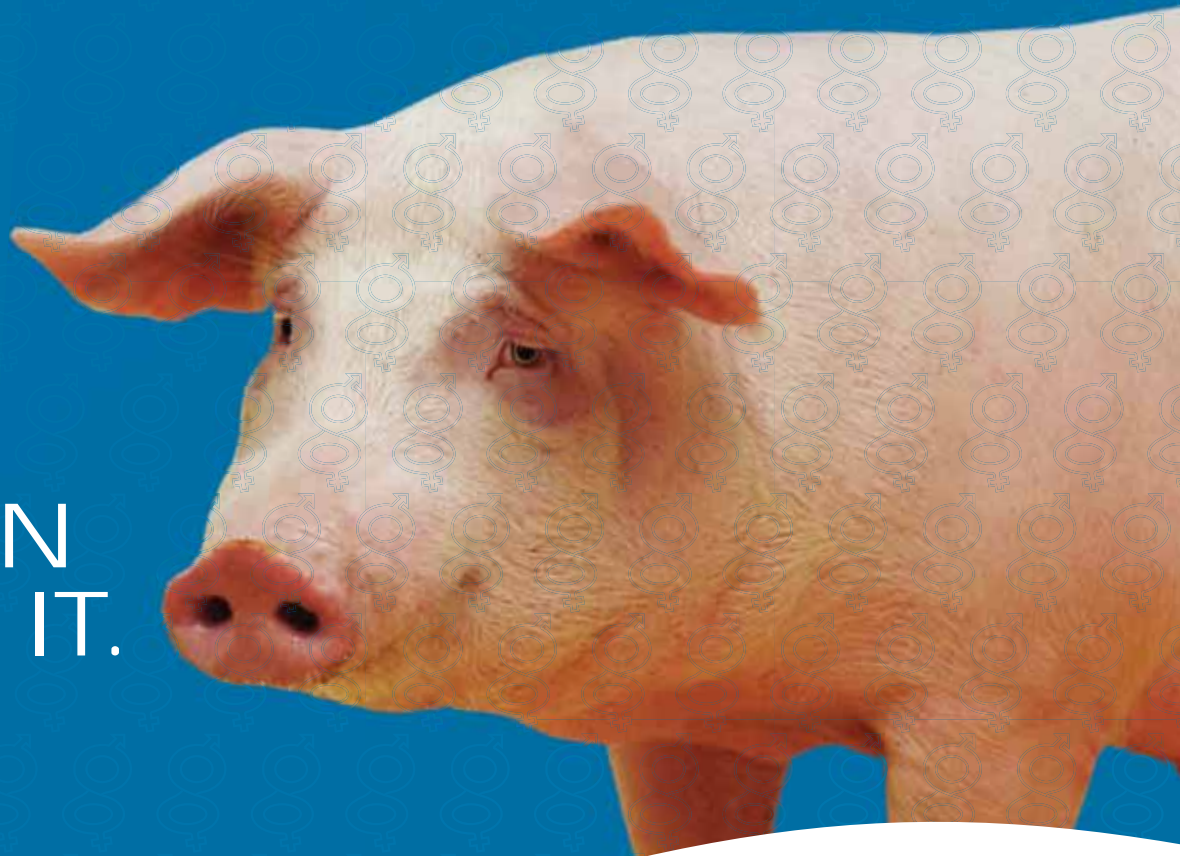
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plant-based proteins (such as beans, legumes, rice, quinoa, soybeans and nuts) “because eating more nuts or soy protein is linked to improved blood lipid levels, and the higher fibre intake of plant-rich diets is linked to improved blood lipid levels and a lower risk of cardiovascular disease, colon cancer, and type two diabetes.” He adds that “processed meat has been linked to colorectal cancer, and foods that contain mostly saturated fat are linked to unfavourable blood lipid levels and a higher risk of type two diabetes.”



Mary Ann Binnie, Canadian Pork Council says lean meats are still a foundation food. Photo courtesy Canadian Pork Council

Reaction

The reaction to this emphasis on getting more protein from plant-based sources has not been received favourably by the meat industry. For example, Rick Bergmann, chair of the board at Canada Pork, stated in a news story that he’s concerned Canadians might interpret the new version as a recommendation to reduce meat consumption in favour of plant-based proteins.

“It would be unfortunate if Canadians interpret this bias toward plant-based proteins as a

signal to remove red meat from their diets,” read a statement from the Canadian Cattlemen’s Association.

Mary Ann Binnie, manager of nutrition and industry relations at the Canadian Pork Council, agrees. She notes off the top that the new plate graphic isn’t very much different compared to those of previous versions of the guide.

“Healthy eating remains a balance and variety of lean meats, plenty of vegetables and fruits and whole grains. We would have obviously preferred to have pork included as a protein

Canada’s new food guide raised the eyebrows of the meat and livestock sector across the country.

shown in the protein group, but there wasn’t a piece of pork in the last version, released in 2007,” she explains. “In terms of animal protein, the previous version had illustrations of a roast, eggs, a whole fish. Animal and plant proteins have always been in the same food group.”

As to the name change of the ‘meat and alternates’ category to ‘protein,’ Binnie believes it highlights the fact that Canadians are

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Health Canada didn't consult with the meat and livestock sector because the agency wanted to stick to the science of the matter. Other than the reduction in animal-based protein, the meat industry isn't taking issue with the other messaging.

looking for more protein in their diets, and that it also helps clarify for them what protein includes. "It sounds strange, but there are some people out there who don't realize that meat is a protein source, so in that light, the category name change is positive," she observes. "There has been so much buzz around protein shakes and protein bars that some people have been misinformed."

Officials from Health Canada's Office of Nutrition Policy and Promotion did not meet with representatives from the food and beverage industry because it was important to ensure that the development of dietary guidance was free from conflict of interest.

Geoffrey Legault-Thivierge, Health Canada

Another big misperception out there about our diets, adds Binnie, is that we eat too much meat. She warns that if groups such as young women interpret the guide's emphasis on eating more plant-based protein as a directive to reduce meat consumption, there may be serious health consequences for them from Vitamin B12, iron deficiency and more.

Indeed, Binnie believes any discussion of eating less of certain foods to accommodate the consumption of more plant-based protein should focus on eating fewer low-nutrition convenience food products, commonly known as junk food or empty calories. "Chips and cookies and other highly-processed food products should be the focus as to what should come out of the diet," she says. "It shouldn't be lean pork."

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In her submission to HESA during the consultations before the guide was released, Dr. Sangita Sharma, professor in Indigenous and global health research at University of Alberta, echoed the concerns.

“Some of the recommendations...focus on promoting plant-based protein foods and recommend reducing Canadians’ overall consumption of animal-based protein foods, particularly red meat. Given current research from both my group and others, this is extremely concerning and we believe this could result in some negative health impacts, including nutrient inadequacies and deficiencies. Plant-based sources of protein do not provide anywhere near the nutrients as provided by animal-based proteins and certainly do not provide the nutrients we know many Canadians are lacking.”

We are relying on dieticians and other health professionals to convey to Canadians that lean meats are, and have always been, a foundational food in the diet.

*Mary Ann Binnie,
Canadian Pork Council*

Will the new guide actually affect and lower pork consumption long-term?

“We are hoping not,” said Binnie. “We are relying on dieticians and other health professionals to convey to Canadians that lean meats are, and have



Consumers are getting creative with their meat consumption, using it sparingly and pairing it with a diverse assortment of veggies and whole grains. Photo courtesy Canadian Pork Council

always been, a foundational food in the diet. We are, in collaboration Canada Beef and the Canadian Meat Council, having an exhibit and offering resources at the Dieticians of Canada Conference in June.”

The Canadian Pork Council is also developing a new strategic plan based on updated Guide, and it’s going to conduct some surveys of dieticians across the country to determine their level of knowledge about protein, the value of lean meat and so on, and to discover the questions that dieticians might have about the same topics. They are then going to develop more resources accordingly.

For his part, Darcy Fitzgerald, executive director at Alberta Pork, notes that in the past, consumers were told animal fats, butter and eggs were bad for them – but that things certainly do change.

“Only to discover that eggs are truly a superfood and those plant-based trans fats and sugars that replaced healthy animal fats have plagued a generation or two with significant health problems,” he said, questioning when moderation, balance and omnivore became bad words. “Let’s not fool another generation in the process to understand that animal protein is good protein as well.” ■

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African Swine Fever — can it be stopped? What actions are needed? What can you do to protect your investment?

A Banff Pork Seminar 2019 presentation with Dr. Egan Brockhoff, Prairie Swine Health Services

By Meristem

African Swine Fever (ASF) may move more slowly than other diseases in the hog industry, but it is more serious than anything Canada has dealt with in the past. At the 2019 Banff Pork Seminar, Jan. 8 to 10 in Banff, Alta., Dr. Egan Brockhoff, veterinarian and pork industry analyst and advisor, shared insights from his travel to countries currently battling the deadly disease such as China and parts of Europe, and his thoughts on ways Canadian pork producers can mitigate the risk.



Dr. Egan Brockhoff

ASF was unknown outside of Africa, where the native wild pigs are carriers but remain largely unaffected by the disease, until 1957. At that time the disease entered Portugal on a ship through contaminated waste which was fed to pigs. ASF entered the population and circulated slowly throughout Europe from 1957 to 1986.

However, in 2007 a highly infectious strain showed up in Georgia, in Eastern Europe. “From 2007 until 2019, ASF has spread consistently and broadly across Eastern Europe and now into Western Europe. Once again, feeding contaminated waste from international aircraft or ships has been identified as the primary method of moving the virus along. This is a human driven disease not an animal driven disease. Humans are spreading this disease around the world,” says Brockhoff.

And the spread continues. In the last four months, Brockhoff advises that nine European countries have reported 1,000 new cases. The primary modes of transmission are through uncooked

pork and the transport of frozen pig meat through Europe and the U.K. “While everyone is aware of the situation in China...this virus is moving throughout Europe and in a significant way.” The infection of the wild boar population in Europe, which isn’t naturally resistant as the African boars seem to be, is another core driver that keeps the virus moving through Europe.

This raises a concern in Canada as North America has a massive wild pig problem. There are three million wild pigs in Texas alone and in Canada we have large wild boar populations in the prairies and further east at least as far as Quebec. European wild boars were brought over to farm and either got out or were released and if these animals contracted ASF, it would be almost impossible to eradicate.

Different transmission

Transmission of ASF is quite different from other diseases. Transmission through direct contact with infected pigs, ticks or stable flies is a slow process, and while still deadly, there is also a high risk of unwitting transmission before ASF is diagnosed. Because this virus is concentrated in the meat, muscle and body fluids, indirect contact is the fastest transmission of the disease. “When a pig dies, in the forest or a slaughter plant, all of that meat is incredibly infectious. This makes it an easy virus for humans to move - in uncooked product for example,” says Brockhoff.

Even worse news is that there is no vaccine, no treatment, many of the symptoms are easily mistaken for other swine diseases, the highly virulent strains have 100 per cent mortality and there can be a slow incubation period, which may allow further spread if undetected.

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Feed is another high-risk factor in delivering the virus to hog farms. “Dr. Scott Dee has identified organic soybean meal as an amazingly good vector for ASF. The virus survives well in soy products,” says Brockhoff. He goes on to add that today Canada is importing organic soybean meal from China for livestock feed. If producers are still using high-risk feeds, they should use quarantine to minimize the chances of spreading ASF. Feed kept at 20 degrees Celsius for 20 days will likely have killed the virus.

Canada has a huge backyard pig population. There are about 6,500 premise IDs for commercial hog operations in Canada. But also in Canada there are about 6,500 small backyard, outdoor hog farms. These farmers may not know or understand the severity of AFS to the hog industry worldwide. And should they get AFS on their farm, it could shut down trade for the entire Canadian hog sector.

High risk

What does all of this mean for Canadian pork producers who may be feeling a false sense of security, because to date there has never been a case of AFS in Canada or the United States? Brockhoff believes the risk is high if Canadian producers continue to operate as they have always done. He has worked with the CFIA on a feed risk mitigation plan and has an action list for the industry.

- Engage Government- Ministers, CFIA, industry partners – build a wall around North America.
- Voluntary ban of high risk feed ingredients – the government can’t do it but producers can make those choices.
- Feed ingredients quarantine – the ones that are still purchased, must be quarantined following proven protocols.
- More border enforcement – Canada currently has 17 sniffer dogs at airports across the country. Due to the high risk of infected meat products being brought into Canada, many more of these dogs are required.
- More traveler awareness – airlines and ships, should play a role in informing passengers.
- CPC working with Animal Health Canada – an organization that will work across Canada to prepare for animal health crises, similar to Swine Health Ontario.
- Communication Cooperation Collaboration – the industry must work together.

Brockhoff has a list for producers too. Ensure producers are quarantining high risk feed ingredients for the correct length of time and at the correct temperature. Producers should be talking with their feed specialists, nutritionists and veterinarians about biosecurity and feed. Stop bringing any kind of pork product into a hog barn. Create biosecurity audits and bring the team together to discuss. Lastly, small farms must be engaged and educated regarding the risks as well.

“Never before has the risk of transboundary and emerging diseases been so real,” says Brockhoff. “We live in a globalized, highly mobile world and that is moving disease extremely effectively.” ■



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Research on pig health is irresistible

Submitted by Swine Innovation Porc

No pork producer wants to handle a 300 lb pig with a fever. It's not a pretty picture, and neither is the bottom line for the producer when the herd is sick. That may be why the industry is excited about the potential of a research project for harnessing genomics to improve disease resilience and sustainability in Canadian pork production.

If an animal is not in good health, there's no chance for it to express its genetic potential. And, due to the low heritability of health traits, it was always thought that genetics couldn't contribute to disease prevention.

That thinking changed with the advent of genomics and research efforts like the *application of genomics to improve disease resilience and sustainability in pork production* project.

"All animals are susceptible to disease, but those with resilience will recover faster and have less effect on production," said Dr. Graham Plastow, professor and CEO at the Livestock Gentec Centre, agricultural life and environmental sciences, agricultural food and nutritional science at the University of Alberta.

Bracing for impact

Dr. Plastow defines resilience as the ability of an animal to respond to any disease challenge in a way that minimizes its impact. It's a concept that's easy to grasp even if you're not a sci-

entist, as long as you have experience with sickness.

"We see in humans that some people get the flu, go to bed and drink fluids and are back to work in one or two days. At the same time, others with the exact same condition may be laid low for weeks before they recover. For the purposes of this project, we are interested in pigs that take a break when they're sick, but then are up and active again quite quickly."

Pig disease can plague the bottom line

As fascinating as the phenomenon of resilience is to researchers, it's equally interesting for pork producers, and for good reason – animal disease represents a sizable expense to the pork industry. Though feed costs get most of the attention these days, the economic impact of health issues in terms of treatment and mortality is often underestimated.

Fortunately, researchers appreciate the toll that a disease challenge can take on a farm, and are determined to harness the power of genomics in addressing the problem; to accomplish that, however, they face challenges of their own.

Exporting genetics, not disease

"When we look for variation in resilience or susceptibility to disease, there is defi-

nately a genetic component. For breeding companies, though, it can be hard to get a hold of that variation as we try and keep the nucleus herds that produce genetic improvements as healthy as possible. In part, this is because we want to export our genetics around the world, and we can't do that if they take disease with them. Also, because we are generally selecting for genetic potential, we keep disease away so we can select the best animals with the best potential."

The conflict arises as you go down the production pyramid – you have more pigs, more farms and more pathogens, and it becomes harder to maintain biosecurity. As well, some clinical diseases tend to be more severe on the lower rungs of the pyramid.

"For those reasons, we are trying to discover with this project how to develop new tools to identify the genetic potential of animals in those high health environments, while also predicting the performance of their offspring in commercial herds where disease challenges are greater. That is a unique element here, and it's why a key component of our research is creating new tests to assess the strength of an animal's immune response. These are animals that are not exposed in the nucleus herd, but we look at what we can do through introducing disease to explore their potential immune response when they are challenged."

When it comes to enhancing disease resilience through genomics, research doesn't yet have all the answers. But by asking the proper questions, they're moving in the right direction, towards healthier pigs and a more robust bottom line for producers. ■

For more information on this project, please contact:
Dr. Graham Plastow
Email: plastow@ualberta.ca

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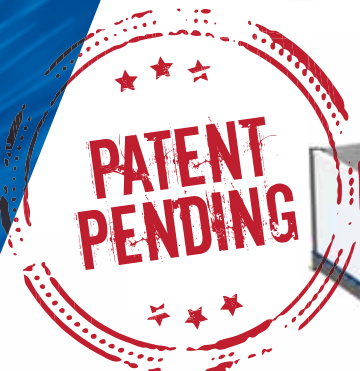
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RESEARCH AND INNOVATION

Mitigation of accelerated deterioration of pig buildings

B. Predicala^{1,2}, J. Cabahug^{1,2}, A. Alvarado¹, R. Baah¹

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Introduction

When we look across the Canadian pork industry it becomes apparent that due to the age of most facilities a large percentage will need to be replaced or renovated over the next few years. Most buildings average between 20–30 years old. The majority of hog barns are completely enclosed utilizing a negative pressure ventilation system to maintain pig comfort. In order to reduce heating costs during winter months ventilation is generally turned down to a minimum ventilation rate. The combination of minimum ventilation and, in some areas high winds, causes exhaust air to recirculate within the facility leading to poor air quality. This in turn increases deterioration due to increased exposure to moisture and corrosive gases.



This project set out to determine Canadian specific strategies for decreasing the current pace of barn deterioration. With the overall focus of this project being to combat the rate of deterioration of swine facilities a critical literature review was undertaken that identified solutions that were applicable to Canadian pig barns. The second phase of the project included a survey which was presented to various stakeholder groups across Canada. The survey included producers, builders, material and equipment suppliers and academic and research and development organizations. The survey revealed that approximately 60 per cent of producers struggle with rapid deterioration. Specifically, the structural components that they had issues with were roofing (50 per cent of respondents), penning/ stalls (50 per cent), exterior walls (40 per cent), ceilings, trusses and/or attic, and feeding and drinking system (30 per cent). No significant issues with accelerated deterioration have been identified in partition walls between two rooms, manure and drainage system, and barn foundations.

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Results

Table 1 summarizes the issues encountered by producers and builders related to barn deterioration and their recommendations for mitigation. The most common issue was corrosion/rusting of barn roof, penning/ stalls, exterior walls, ceiling, trusses, and feeding and drinking system. Some respondents have pointed out issues related to moisture decay in trusses, and cracks in penning/stalls, and feeding and drinking system.

Table 1. Summary of responses from producers, builders and equipment supplier on current status of pig barns in terms of barn degradation and their recommendations to mitigate them.

Structural components	Issues encountered (% of respondents reporting the issue)	Mitigation strategies
1. Roofing	- corrosion/ rusting (100%)	- use of a thicker gauge of tin - better screws - application of paint on both sides of tin - modification of ventilation system so that barn air does not get in contact with the roof

Structural components	Issues encountered (% of respondents reporting the issue)	Mitigation strategies
2. Penning/stalls	- corrosion/ rusting (86%) - cracks (29%)	- stronger support, use of heavier anchors (1/2" rather than 3/8") - use of solid rod; avoid welds in wet areas - use of stainless steel for first 6" of post or anything that has contact with manure or the floor - use of plastic (if not costly) instead of concrete or steel
3. Exterior walls	- corrosion/ rusting (100%)	- plastic walls filled with concrete - thicker tin - concrete construction - better exhaust fans; proper ventilation
4. Ceiling	- corrosion/ rusting (60%)	- use of screws, not nails - application of paint - use of plastic or fiberglass products

CONTINUED ON PAGE 22

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Structural components	Issues encountered (% of respondents reporting the issue)	Mitigation strategies
5. Trusses	<ul style="list-style-type: none"> - corrosion/ rusting (80%) - moisture decay (60%) 	<ul style="list-style-type: none"> - installation of ridge ventilation - use of galvanized or stainless steel, protective coatings and insulation - better ventilation to avoid back drafting
6. Feeding and drinking system	<ul style="list-style-type: none"> - corrosion/ rusting (40%) - cracks (40%) 	<ul style="list-style-type: none"> - thicker PVC for drinking system - use of steel feeders - use of plastics above pig level and steel at pig level - all intake hoppers and drive units should be stainless steel

Mitigation Strategies

Among the solutions to improve the building life span such as surface treatments, new material, ventilation system, control and maintenance (guide information), the latest has been pointed out by the participants as the least expensive one and the

easiest to adopt by producers. However, few consider maintenance improvement as the best option to improve building life span. If the cost would not be considered as a decision parameter, new building material and ventilation system improvement should be the priorities. For producers, when the cost of the technology is not considered, an adequate ventilation system, sufficient insulation and high durability wall materials are the most attractive solutions to improve building life span.

Table 2. Summary list of potential solutions to rapid barn deterioration and their applicability to Canadian swine barns based on literature review and survey.

Category/Potential Solution	Description	Applicability
A. Building Design		
1. Wood		
Durable design	- use of timber with bigger dimensions, well-seasoned and with good detailing	Applicable
2. Metal		



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Category/ Potential Solution	Description	Applicability
Durable design	<ul style="list-style-type: none"> - rigid or batt insulation (e.g. 4-6 mil polyethylene) plus vapour barrier especially on truss assembly - appropriate design gap between insulation and wall or ceiling for moisture drying in the event of penetration - good vapour barrier on areas in close proximity to fasteners 	Applicable
3. Ventilation (in general)	<ul style="list-style-type: none"> - use of stacks or discharge tubes to release exhaust air away from the animal building 	Applicable; extent of current application in Canadian swine/livestock buildings not confirmed

Category/ Potential Solution	Description	Applicability
	<ul style="list-style-type: none"> - extension of insulation and vapour barrier from inside the building to underside of vented overhangs - chimneys installed intermittently between trusses for ridge ventilation - separate ventilation for barn interior and the attic 	
B. Building Material Selection and Treatments		
1. Wood	<ul style="list-style-type: none"> - use of naturally durable wood 	
Chemical preservation	<ul style="list-style-type: none"> - oil-based preservatives (Creosote oil) - fixed water soluble preservatives - organic solvent preservatives 	Applicable

CONTINUED ON PAGE 24



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Category/ Potential Solution	Description	Applicability
Impregnation of wood with polymers	<ul style="list-style-type: none"> - improve the physical and mechanical properties of low grade wood species - use of copolymer derived from allyl alcohol and methyl methacrylate (optimum compatibility and compressive strength perpendicular to fiber increased by approximately 100 times while water absorption was reduced by 50%; biodegradation did not occur) 	Applicable; Further investigation of effectiveness against deterioration needed
Bio-control	<ul style="list-style-type: none"> - wood treated with urea and ureolytic bacteria (Proteus sp. and Bacillus sp.) - combination of Proteus sp. and Trichoderma viride to inhibit growth and kill fungi 	Further investigation of effectiveness needed
Titanium dioxide nanoparticles	<ul style="list-style-type: none"> - used to prevent fungal Hypocrea lixii (white-rot) and Mucor circinelloides (brown-rot) growth in wood - applied on surfaces by spraying or simple brushing 	Further investigation of applicability/ feasibility for use in livestock buildings needed
2. Metal		
Stainless steel	<ul style="list-style-type: none"> - known resistance to dry corrosion (oxidation) and attack of acidic condensates 	Applicable

Category/ Potential Solution	Description	Applicability
G90 hot-dip galvanized (G90 HDG)	<ul style="list-style-type: none"> - treated with zinc phosphate - recommended by U.S Steel for metal connectors in animal housing, G90 zinc coating are typically used in Canada (G60 for US) 	Applicable
Duplex System	<ul style="list-style-type: none"> - e.g. G90 Duplex = G90 connector + paint and G185 Duplex = G185 connector + paint - G90 duplex or G185 connectors with vapour barrier and separate ventilation for attic space is recommended in animal buildings 	Applicable
Avoidance of galvanic corrosion	<ul style="list-style-type: none"> - e.g. using stainless steel nails for stainless steel hangers and galvanized nails for galvanized hangers 	Applicable
Use of other materials such as ceramic materials and polymers		Applicable
Galvanizing	<ul style="list-style-type: none"> - zinc layer application on steel and iron structures 	Applicable
Coatings	<ul style="list-style-type: none"> - epoxy coating that is lead and chromate-free recommended for metal truss plates 	Applicable

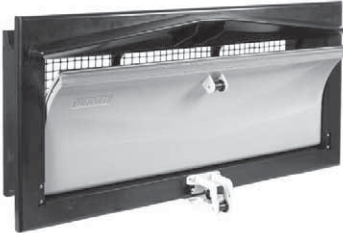
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Category/ Potential Solution	Description	Applicability
Repair of corrosion-attacked metals	- cleaning as a de-rusting method remains the advised method over use of rust converters	Applicable
3. Concrete		
Concrete mix composition	<ul style="list-style-type: none"> - use of sulphate-resistant binder-like type 50 Portland cement (equivalent to CEM III B concrete based on CSA A3000, 1998) as most effective among 8 concrete treatments - use of other supplementary cementing materials such as slag, fly ash and silica fume to minimize tricalcium aluminate (C3A) content of concrete mix - use of additives for concrete top layers (e.g. product "S" based on ground tuff) to increase life of concrete compared to regular sand-cement mix for top layer of animal housing flooring - also applies for protection of steel reinforcements 	Applicable; feasibility and cost analysis needed for application in livestock buildings

C. Building Management/Production Practices

Interior cleanliness and maintenance	- proper cleaning and disinfection; high pressure washing and use of cleaners to effectively remove aggressive residues and manure on surfaces	Applicable
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Category/ Potential Solution	Description	Applicability
	<ul style="list-style-type: none"> - periodic inspection for leaks through vapour barriers and corrosion on connectors and fasteners - removal of corrosive agents from the attic and additional protective coatings must be provided to connectors 	
Feeding method	<ul style="list-style-type: none"> - wet feeding method can make the degradation problem on barn floors worse - greater feeder-drinker distance to minimize lactic and acetic acid attack on concrete by the feed-water mix 	Applicable
Others	<ul style="list-style-type: none"> - putting concrete or brick bin underneath nipple drinkers - protection of concrete floor itself by fibre cement-board, metal plate, rubber sheet, or a top layer "product S" 	Applicable

Conclusion:

When considering all the potential strategies to mitigate building deterioration, it was apparent that considering appropriate ventilation, environmental control and air treatments, improvement of corrosion protection efficiency of building materials, and adequate building maintenance would have the greatest impact within Canadian swine facilities. These strategies still need to be evaluated in a barn to determine their full potential in increasing the lifespan of Canadian swine facilities. ■





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Smart systems in pig production

A presentation from Banff Pork Seminar 2019

By Bryan Passifiume

“Big Data” is more than a catch-phrase – it’s a methodology of using powerful computers to analyze, compute and, in some cases, make decisions on enormous amounts of information. It’s revolutionizing how producers control and organize their production, with current advances suggesting a powerful future where every aspect of farm operations can be controlled and accessed at any time, and anywhere.

Part one: Smart Systems in Pig Production



Tom Stein, DVM, Senior Strategic Advisor, Maximus Systems

Advancements in the art and science of pork production means producers need to be ahead of the curve when it comes to technology.

Even production methods of only a few decades ago seem antiquated compared to the modern marvels available to today’s farmers – from recordkeeping to genetics.

Tom Stein, senior strategic advisor for Maximus Systems in Quebec, said producers should be making these important technology systems now in order to “future-proof” their operations.

“Producers will want to have a single system that can connect to or integrate with these new technologies,” he said.

He describes what he calls a ‘smart barn control system’ – a sort of ‘brain-in-the-barn’ that acts as this single management and control platform for integrating associated technologies.

He suggests asking questions of control, management, networking, integration and servicing when it comes to wiring-up their operations – particularly with some of the new technologies looming on the horizon for today’s farmers.

Planning ahead and ensuring a single, integrated control system, he said, will ensure the ‘farm of the future’ will be both effective, easy to control, and a sound return on investment.

“Brains in the barn will communicate in real-time and in both directions with brains in the office to spearhead the next evolution in pork production management,” he explained.

And that starts with a smart control system.

“Modern, intelligent barn controllers fully integrate the function of all components of climate control into a single unit, eliminating the need to program and coordinate several smaller controls,” he said.

“With this ability, tighter temperature bands can be maintained, with some controls able to regulate the temperature with a band of plus-or-minus one degree Celsius.”

This control system seamlessly ties in actuators for ventilation systems, from a broad view down to precise control of inlets, fans, static pressure, et cetera – and allow producers to accurately log and record temperature, humidity and air quality data from numerous points.

Aside from the economic benefits of such precise ventilation control, it allows operators to immediately pinpoint and diagnose faults, which could lead to hazardous and often fatal atmospheric conditions within the production floor.

“The data-tracking and alarm systems give equipment and service providers a direct line to your controller from a remote location and provide you with premium technical service, even if they can’t be there immediately,” he said.

“Software links you to your sites and barns 24-hours a day – you can check on the situation in the barn, no matter where you are in the world.”



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Producers should be aware of ‘vendor lock-in’ when it comes to integrated control systems – networks of proprietary systems that only work with one manufacturer’s systems.

“You don’t want that,” Stein explains. “You want to isolate and separate the control from any particular proprietary brand. In other words, a smart control should be able to work with any brand – any fan, any heater, any curtain, any bin load cell, any hog sorter, any stand-by generator, any inlet.”

Stein outlines a list of 28 factors producers should consider before purchasing or installing any control system:

1. Single product that works for any;
2. Single product that can be configured to run any barn/barns;
3. Independent: control any brand of fans, curtains, heaters, inlets, etc.,;
4. Online and networked (status always known);
5. Accessible directly via Internet;
6. Robust and secure data transfer to private cloud database;
7. Immune to power failure;
8. Robust surge protection;
9. USB backup of all control settings for restoring the controller if power outage;
10. Remote (cloud database) backup of all control settings;
11. Module diagnostics (diagnose problems with a specific sensor or output);
12. Be able to create user-friendly names for all inputs and outputs;
13. Location tracking (latitude and longitude);
14. Multiple languages;
15. User authentication, authorization and permission system;
16. Create, delete, and manage users from phone, tablet, laptop, desktop;
17. Robust security to prevent unauthorized access;
18. Message users by SMS text, email or phone;
19. Multiple phone and email addresses for each user/contact;
20. User-specific settings for messaging availability;
21. User-specific settings for what messages should be sent to whom;
22. Be able to quickly see current conditions in the site/barn;
23. Robust local data storage for at least two years;
24. Maintain history of interaction with controller to see who set or changed what;
25. Frequent software updates every six to eight weeks;
26. User-controlled ability to manage software updates to the controller;
27. Extensible (ability to add functionality in the same box), and;
28. Robust accessibility to settings, programs, functions (phone, tablet, laptop, desktop).

What’s coming and what’s here now?

- *Real-time activity or behaviour monitoring*

In a busy production barn, everything is data.

Stein points to a 2016 study where researchers put tracking tags on finishing pigs matched with sensors on feed and water stations to track visits by each animal.

“For pigs, changes to their daily eating and drinking patterns can be used to detect sickness and provide an early-warning system,” Stein said.

The research produced models that accurately tracked behaviour changes and created warnings about suspicious behaviour in each animal.

“Among pigs detected with health problems, frequent issues included lameness, reduced growth, infections, respiratory problems or fever,” he said.

The most interesting conclusion was that the system was better at diagnosing problems than trained observers – at least 24 hours earlier in many cases.

Stein points out similar technology designed for use in poultry operations that use real-time image data from ceiling-mounted cameras that analyze bird activity.

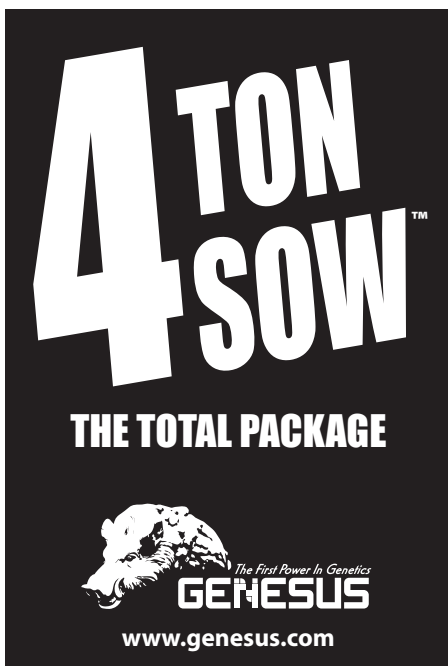
“An algorithm compares actual distribution with a predicted value for that particular time of day,” he said.

“There is more work to be done to make a system like this practical in finishing barns, but it’s clear that this is where we’re headed.”

Real-time sow estrus monitoring

Infrared monitors in gestation stalls are beginning to provide producers with valuable data intended to perfect breeding and sow productivity.

Developed by Conception Ro-Main in Saint-Lambert-de-Lauzon, Québec, *PigWatch* uses machine-learning algo-



rhythms to not only detect when a sow is in estrus – it actually can provide data on optimal times for breeding.

And the system does show positive results, Stein said. Sows under *PigWatch* monitoring showed an average 95 per cent conception rate, according to recent studies.

Detecting respiratory problems through audio monitoring

Using roof-mounted microphones, technology by Belgium’s Soundtalks NB called the *Pig Cough Monitor* is able to detect and analyze coughing sounds from herds.

Based on a decade of trials throughout Europe, the system is adept as an early-warning system for potential herd health issues, in many cases up to two weeks earlier than observations by producers or veterinarians.

Using advanced pattern analysis technology, the system can not only suggest causes of the issues, it’s capable of integration with existing smart ventilation systems to identify possible technological causes of the problem.

Neonatal crush death detection and protection

Technology is currently being tested in the midwest United States that shows startling results in preventing piglet death by crushing.

Developed by Cedar Rapids, IA.– based SwineTech, *ECHO* uses microphones to detect the squeal of a piglet being crushed by its mother and activate sow-mounted vibration patches that immediately force the animal to stand up.

“Early results show a statistically-significant reduction in crushing deaths – 70 per cent lower versus control, and an increase in day-four livability by 0.5 to one pigs per litter” Stein said.

The system, he said, proved more effective than conventional means of preventing crushing deaths, which currently relies on workers on slapping the sows with their hands until she stands up, and proved no more stressful.

Voice-enabled data entry

AgVoice, a technology developed by Atlanta-based TekWear LLC, allows workers to enter data and manage workflows using only their voice, freeing their hands for other tasks.

“The hands-free, voice-interactive technology that the platform offers has the potential to fundamentally shift the way food and agriculture professionals capture usable insights and data,” he said.

Weighing pigs via real-time image processing

With a margin of error between two and four per cent, 3-D imaging technology developed by researchers at the French Pig and Pork institute have developed systems that use cameras to visually estimate weight of animals in real-time.

EyeGrow, developed by Dutch-based Fancom BV, uses 3-D infrared imaging to weigh pens of finishing pigs – not individual animals – and produces data on average daily weight gain.

Biosecurity tracking via bluetooth

Technology can even track staff and create alerts to potentially hazardous movements within the production plant.

Using bluetooth tracking beacons worn by workers, the system is capable of tracking three separate movements within barns:

- Correct: Higher health barns to lower (gestation to lactation areas, for example)
- Incorrect, low risk: Lower health barns to higher (lactation to gestation)
- Incorrect, high risk: (Finisher barns to gilts)

Real-time GPS-based feed traceability via geofences

An integrated cloud-based hardware/software system designed for automated animal feed tracing, *FeedTrackur* – developed by DP Techlink out of Des Moines, Iowa – consists of a database that continuously tracks everything to do with feed: orders, load-out information, driver and feed-truck data, and GPS-based location tracking.

CONTINUED ON PAGE 30

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Using virtual 'geofences' surrounding key sites such as barns and feed bins, feed truck drivers interact with the system using in-vehicle tablet computers that tell them what to do and where to go, and provides warnings if it detects a feed pickup/delivery is about to happen in an unintended area.

Medical treatment monitoring using WiFi, bluetooth and RFID tags

Two separate firms have developed smart-dosing devices that permit for the automated delivery of medication – weight-based fixed-amount smart-dosing that record treatments, manage medication inventories and deftly communicate with other livestock tracking software. The system also integrates with existing scale systems and RFID animal tag readers to better control itself, and provide user-based apps to allow for real-time monitoring and control.

Part two: Artificial Intelligence (AI) in swine breeding

Bram Visser, Hendrix Genetics, Netherlands

Helping to link genetics with trackable, plotable data is the next-step in smart production technology.

Bram Visser of Hendrix Genetics in the Netherlands described advances put forward by their swine AI project that predicts individual aspects of animals prior to processing.

"The technology is very promising, because it would allow geneticists to connect genes to traits like toughness, intramuscular fat, net carcass weight and taste," Visser said.

"This closes a knowledge gap and helps connect processing traits with traditional phenotypic traits like growth rate, fat thickness and weight at different days."

Geneticists, Visser explained, work to match different types of genes with different types of traits.

"The challenge that is often faced with animal breeding, is that there are many individuals, and those individuals are

not always available to be tracked and studies throughout the value chain," he said.

"A clear example of this is found in swine, where there are many individuals and when they go to slaughter and are processed, it becomes difficult to observe their individual traits at the plant."

Where AI fits into the puzzle, he says, is crunching available data into useful information – an attempt to increase the accuracy of selection for a number of traits difficult to measure in a live animal.

"Data that cannot be connected to an individual animal is not very useful," he explained.

"We realized that investing in proper data-collection creates costs in the short term, and value for us and our customers in the long term.

Ongoing research projects by Hendrix Genetics include a non-invasive loin weight prediction using ultrasound imaging.

"We were interested in training a deep-learning model to predict loin weight of individual animals, given standardized ultrasound images," Visser said.

"If successful, the model would allow us to measure carcass quality traits, like loin weight, from non-invasive ultrasound measurements."

Using a machine-learning scheme called an artificial neural network, the system autonomously receives and interprets data from individual animals, drawing conclusions based on the information it learns.

"During the training phase, every layer of the neural net creates abstractions automatically without human input," he explains.

"The output layer gives the predictions of loin weight from the input data."

Compared to real-world observations, the results were promising.

"The predicted loin weights were moderately positively corre-

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lated with the true loin weights measured with a scale,” he said. “This means that, without slaughtering the animal, the model can predict with reasonable accuracy the loin weight phenotype.”

Another project involves fat-depth value prediction using DNA data from individual animals.

The same system was trained using data from around 40,000 animals, learning and predicting values and performance data on its own.

“The trained model was able to predict the genomic breeding values for fat depth with good accuracy,” he said. “Using artificial intelligence we can now accurately predict breeding values from DNA information.”

Along with accuracy, the new systems are also exceedingly fast – with Visser saying systems could predict breeding values for millions of individual animals in a time span of less than 10 minutes.

Rather than a future of robotic, autonomous farms, Visser sees this technology as an invaluable tool for producers, rather than a replacement.

“It is unlikely that AI will replace humans completely, I see more in a synergetic relationship between computers and humans,” he said. “I think we should call it ‘augmented intelligence,’ in the sense that human intelligence is enhanced by the computer, rather than replaced or superseded by it.”

Part three: Farm’s Mother, a practical approach

Ricardo Segundo Cochran, OPP Group, Uruguay

One practical application of ‘big data’ in a pork operation is *Farm’s Mother*, a software platform developed by Spain’s Optimal Pork Production (OPP.)

Farm’s Mother, says OPP representative Ricardo Segundo Cochran, links and synchronizes a farm’s entire network of computers and PLCs (Programmable Logic Controllers.)

“*Farm’s Mother* is a web-based software platform,” Cochran said. “This means it has infinite expandability and has the option of being server-less.”

This cloud-based system makes for a very versatile system, he said – and is connectable to various management, EFS and genetic company’s servers through a secure link.

The guts of the system is a dedicated on-farm module, an industrial-grade server based on the linux operating system, with control and data presented on a familiar web-based interface, as well as PDA and smart device apps.

Some of the areas *Farm’s Mother* is capable of intervening include feed intake and conversion efficiency data from birth to weaning, sow optimization and ranking, and tools to assist in herd selection and culling.

Reproductive events, such as abortions or heat returns, are also tracked and recorded, Cochran said. ■

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Feeding *Brassica juncea* canola cake to weaned pigs

Anh M. H. Le¹, Lifang Wang¹, José Landero^{1,2}, Eduardo Beltranena^{1,3}, and Ruurd T. Zijlstra^{1*}

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Take Home Message

Feeding increasing inclusions of yellow-seeded *Brassica juncea* canola cake up to 24 per cent in substitution for soybean meal in diets for weaned pigs maximized feed intake at 12 per cent inclusion and weight gain at 18 per cent inclusion.

Remaining oil in cake costs about one-third of liquid oil added to pig diets, so feed cost was ~9 cents per kg gain or \$1.6 per pig cheaper feeding 24 per cent cake in 35 days than soybean meal-only nursery diets with equal energy value.

Cake vs. meal –what’s the difference?

Most people celebrate birthdays eating cake. Pigs like cake too, but not such a sugary treat. Let us explain. Cleaned canola seed with ~45 per cent oil is pressed (Figure 1) first to remove a large portion of the oil. ‘Cake’ is what we name the resulting product, which depending on how good the press is, leaves some oil in



Figure 1. Expeller-pressing canola seed. The seed is pressed by a rotating screw with narrowing flight against a barrel made of steel bars. Oil drips at the bottom; cake comes out at the other end. Photo by E. Beltranena®.

it (10 to 20 per cent). If cake is washed next with a solvent to squeeze out nearly all the remaining oil and dried, that’s what we call ‘meal’. This solvent-extracted meal is what you buy for animal feeding from big crushers that refine oil for human consumption. But if seed is simply pressed, not washed with solvent, the remaining oil in cake has far greater energy value

compared with oil-depleted meal for feeding pigs. And if you bought canola cake at nearly the price of meal, the remaining oil in cake would cost you about one-third per kg compared with stocking liquid canola oil to add to pig diets.

Dark vs. yellow canola –what’s the difference?

Most canola cultivars grown in western Canada have a dark seed coat (*Brassica napus*). These cultivars grow well on organic matter-rich Black, Dark Gray and Dark Brown topsoils of the subhumid central plains. But yellow-seeded canola cultivars (*Brassica juncea*) grow better on the dryer, warmer Brown soils of the southern Prairies. Yellow-seeded canola seems more tolerant to heat and drought stress and offers greater resistance to disease. Yellow canola also has a thinner seed coat and thus lower fibre content than dark-seeded canola resulting in greater feed energy value. However, yellow-seeded canola contains about triple the glucosinolate content than dark-seeded canola, and it is specifically high in a very bitter one named ‘gluconapin’ that is well known to reduce the feed intake of pigs.

The weaned pig trial

Given that cake with remaining oil provides more feed energy than oil-depleted meal and that yellow-seeded canola provides more feed energy because of its thinner seed coat and thus lower fibre, we decided to evaluate feeding increasing levels of *juncea* canola cake to the most sensitive pig, weaned pigs. Knowing too about the high content of bitter-tasting gluconapin in yellow canola, we thought to not just press the seed, but extrude it first

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and then press it to deactivate as much gluconapin as possible. To achieve this, we sourced the *juncea* seed from southern Saskatchewan and took it to Apex Nutri-Solutions Inc. in Edberg, AB to extrude and press. The resulting cake contained 17 per cent fat, 35 per cent protein and 1.6 per cent available lysine. However, it still contained 11 μmol total glucosinolates per gram, of which most (9.7 $\mu\text{mol/g}$) was the bitter-tasting gluconapin.

We conducted this trial at the Swine Research and Technology Centre, University of Alberta (Edmonton, AB). Starting seven days post-weaning, 240 pigs weighing ~7.5 kg housed in 60 pens, four pigs per pen, were fed Phase 1 diets for two weeks (day 1–14) and subsequently Phase 2 diets for three weeks (day 15–35). The 5 wheat-based test diets for each of the 2 growth phases included 0, 6, 12, 18, or 24 per cent *juncea* cake in substitution for soybean meal. Increasing inclusions of *juncea* cake reduced diet protein, and increased fat and fibre content slightly. Diets without antimicrobials or growth promoters were formulated to 2.4 Mcal NE/kg and 5 g SID lysine/Mcal NE in Phase 1 and 2.3 Mcal NE/kg and 4.5 g SID lysine/Mcal NE in Phase 2. Pigs had free access to the pelleted diets and water throughout the 35-day trial. Individual pig body weight, pen feed added and remaining were weighed weekly. Faeces were collected at the end of each feeding phase to determine total tract digestibility of feed energy and protein.

What we found

Increasing the dietary inclusion of more fibrous yellow-seeded canola cake replacing less fibrous dehulled, solvent-extracted soybean meal marginally reduced the total tract digestibility of both feed energy (from 86.3 at 0 to 83.3% at 24% cake inclusion) and protein (from 83.8 at 0 to 78.8% at 24% inclusion) for both phases. As a result, diet digestible energy (from 3.5 at 0 to 3.45 Mcal DE at 24 per cent inclusion) and calculated net energy values (from 2.5 at 0 to 2.46 Mcal NE at 24 per cent inclusion) linearly decreased for both Phase 1 and Phase 2.

For the entire trial (days 0–35), increasing the dietary inclusion of *juncea* cake resulted in curvilinear growth responses (Figure 2). It maximized pig daily feed intake at 12 per cent with a slightly decrease at greater cake inclusions most likely because of the bitter taste of gluconapin in cake. Daily weight gain was maximized at 18 per cent cake inclusion with no appreciable decline at 24 per cent inclusion. The increased daily weight gain was reflected in the final body weight of pigs being 24.4, 25.5, 25.9, 25.9 and 25.5 kg for pigs fed 0, 6, 12, 18 and 24 per cent cake, respectively. Our previous study showed that feeding increasing dietary inclusions of *juncea* canola meal linearly reduced feed intake and growth in weaned pigs. That was not the case this time feeding cake instead. Extrusion



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sion prior to pressing the yellow canola seed might have helped reduce the negative effects of the bitter-tasting glucopapin in *B. juncea* seed on feed intake.

Icing on the cake

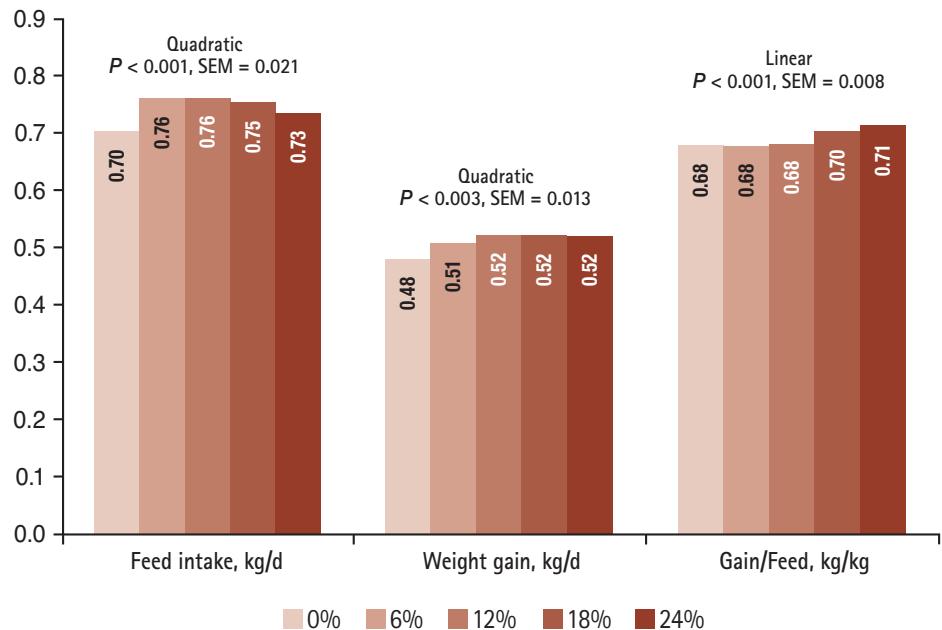
Increasing the dietary inclusion of canola cake drastically reduced the amount of liquid oil needed to balance the energy value of the diets. Based on assumed market prices (\$/tonne) of wheat 250, soybean meal 510, *juncea* cake 330, canola oil 1,100, and L-lysine-HCl 2200, the dietary inclusion of 6, 12, 18, and 24 per cent cake in substitution of SBM reduced feed cost by \$10.72, 23.52, 34.33, and 46.04 per tonne, respectively for both growth phases. That implied feed cost savings of 0.59, 3.66, 6.38, and 8.68 cents per kg of body weight gain, or 0.1, 0.65, 1.16, and 1.59 dollars per pig, respectively in weaned pigs for the 35-day trial. You could call that icing on the cake!

Conclusions

We produced ~20 million tonnes of canola and ~7 million tonnes of soybean seed in Canada (2019-2020). #1 and #2 seed are rightfully directed for human food oil consumption and most of the meal (~95%) is exported. The more tonnage we produce, the more lower-grade canola and soybean seed would be available for local production of cakes for animal feeding. Cakes not only provide protein but also have remaining oil that boosts feed energy complementing that from cereal starch in pig diets.

Results from this trial showed that feeding increasing inclusions of yellow-seeded *B. juncea* canola cake up to 24 per cent in substitution for soybean meal in diets for weaned pigs

Figure 2. Growth performance of weaned pigs fed increasing inclusions of yellow-seeded *Brassica juncea* cake in substitution for soybean meal in nursery diets.



maximized feed intake at 12 per cent inclusion and weight gain at 18 per cent inclusion. Given that the remaining oil in cake costs about one-third of liquid oil added to pig diets, cost per kg gain was nearly nine cents lower at 24 per cent cake inclusion than feeding soybean meal-only nursery diets with equal energy value. The feeding value of oilseed cake is greatest for weaned pigs given that they have reduced gut capacity compared with finishing pigs and sows. Concentrating feed energy in every bite results in more growth when young pigs can only eat so much.

Acknowledgements

We appreciate the funding from Agriculture and Agri-Food Canada and the Canola Council of Canada. We thank Calvin Boese and the staff at Apex Nutri-Solutions Inc. for extruding and expeller-pressing the yellow-seeded *juncea* canola. ■

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YOUR DAILY BACON

BY BUDDY SIMMONS

Hello there again, bacon connoisseurs! We're back with another edition of Your Daily Bacon. We are hitting the newswires for material again like we did for our last rendition. That's mainly because the trough was not dry, to our surprise. During a scan of the internet, we learned there were a few amusing – and somewhat unsettling – stories. While not late-breaking headline news, these are fairly recent, all things considered.

Pigs are reputed to be pretty intelligent animals. This first pig tale leaves us wondering just how clever they really are...

In Champaign, Illinois, a tractor trailer carrying a load of pigs overturned on Interstate I-57 north, resulting in pigs on the interstate on the lam. Law enforcement was called, of course, who in turn brought in the University of Illinois Vet-med to assist and the pigs were herded into the median. The driver and another car that got involved in the crash were unharmed, but the story did not mention any pig casualties.

What gives us pause is this. Did the pigs engineer this mishap? Did somebody slip up and mention the final destination within earshot of the pigs? Pigs are clever, but perhaps they're even smarter than we gave them credit for.

You can probably figure out what happened next. It didn't work entirely as planned and they were recaptured without incident. To paraphrase the poet Robert Burns, "The best laid plans of pigs and men go often askew."

Next, this one is from a year ago, but simply too rich to pas up reporting.

A police dispatcher in North Ridgeville, Ohio received a rather unusual call from a man in the early morning. It seems that... hey, you know what? We'll just copy a transcript of the call – it will do this story more justice.

Dispatcher: North Ridgeville police.

Caller: Uh, hi, I'm walking from the Elyria train station to my house in North Ridgeville and a random pig just came up and started following me.

Dispatcher: A pig, you said?

Caller: Yes. Short pause. "It seems very keen to stay with me, so... Naturally, the cops were a bit skeptical and figured they were dealing with a very inebriated individual, to say the least. What would anybody think, really?"



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But police officers are duty-bound, so went to the location to see what was up. Upon arriving they discovered that a pig was, in fact, following the man who had placed the call. The man was not intoxicated, and the pig was not imaginary, but he was apparently lonely. The surprised police took the pig into custody.

"We will acknowledge the irony of the pig in a police car so that anyone that thinks they're funny is actually unoriginal and trying too hard," the department said in a statement.

The pig was placed into the custody of the local dog kennel and the owner was tracked down eventually. How this was accomplished was not detailed, but it turns out the pig's name was "Zoe" and she was returned to her home. All's well that ends well!

Now, we are blurring the Daily Bacon lines a little to report a scientific breakthrough, if it can be called that. Given the normal tone of Your Daily Bacon, naturally it will be a bit flip-pant. This is such a major thing that it probably will not be news by the time you read this, but just in case, here it is.

**Bacon is red
Bacon is rough
One strip of bacon
Is never enough**



Not bad, but we'd change it to "Bacon is red, bacon is nifty. One strip is never enough, and neither is fifty."

Scientists have managed to reanimate deceased pig brain cells! Yup. They did. Now, this does not mean that they were able to create a fully functional pig by resurrecting its brain, but it is definitely a breakthrough that could have a lasting impact on medicine and the world. Mind you, reviving some cells and reviving a brain are two very different situations. But still, the implications could be staggering.



There's innovation, and then there is sheer genius. This transcends both!

Now, whether that impact will be a cure for brain maladies, or the Earth being overrun with zombie pigs, remains to be seen. And while those brain cells were no doubt revived in a sterile laboratory and restricted to a petri dish, being "Your Daily Bacon", we cannot help but imagine a Victor Frankenstein-type character strapping a deceased pig to a table and raising it into a lightning storm and then shouting, "It's alive! It's alive!"

Also in that scenario, there could be two very different results. Result A would be success, a Frankenpig! Result B might be a really well-cooked, tender collection of bacon, pork loin, etc. In other words a win-win for Victor Frankenstein.

Here are a few short-takes of other newsworthy pigs.

In the Bahamas, a Venezuelan model was posing was posing for a swimsuit photo shoot when a group of four feral pigs wandered over to take a closer look. One decided to sample the model and gave her an unexpected nibble. Understandably, the model gave a squeal, probably not a good idea considering the nature of her assailants, and when another pig decided to give chase, the hapless lady fled to some rocks. The model was unharmed and took it in good humour after the initial shock wore off.



We do eat other meats, but wrapping them in bacon just makes them better! what doesn't bacon make better?

A pig in Franschoek, South Africa has entered the world of art. When it was discovered that the young pig liked to play with paintbrushes, the only toys she did not eat. The owners decided to provide some paint and a canvas to see what would happen... and what happened was the pig began to actually paint the canvas. Her preferred style is abstract, and the paintings reportedly sold on the Internet for thousands of dollars. Her name, if you have not guessed it already, is now "Pigcasso."

And that's it for this time around. Don't forget to send us any pertinent pig news you may come across! ■

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GRETA'S GRUBS

BY GRETA ROSE HANLEY

PINEAPPLE KIWI PORK LOINS

Pork is one of those versatile meats that you can do just about anything with. As an incorrigible kitchen experimenter, this makes me happy. Sweet and savory both work in beautiful harmony with the full-bodied flavor of pork. While I often serve pork chops or cutlets with a sweet side dish, I generally don't add fruit directly to the pork recipe, so this dish was a bit of a departure for me.

Not only did I dare to add fruit, I added two types of fruit. Since I was feeling brave, for one of the two, I even chose a super-sweet tropical fruit – pineapple. Now, I'm not a huge pineapple fan. I like it in moderation. It's definitely better fresh, but I've eaten it canned didn't dislike it. As an ingredient, though, I think it's scrumptious. There is really nothing like it.



Fruit? For supper?

In this dish, I found that combining pineapple with the tartness of kiwifruit and some umami and salty flavors in the soy and Worcestershire sauces proved to delight the palate and really bring out the wonderful flavors of the pork. Final verdict? This was easy to prepare and delicious. I'll make it again soon!

You will need:

- Six lean pork loins
- One quarter fresh pineapple (or half a can)
- One kiwifruit
- 2 tbsp soy sauce or soy sauce alternative.
- 1 tsp Worcestershire sauce
- Fresh ground pepper
- 1/4 cup water

Directions

Remove pork loins from package and place loins flat in glass or ceramic baking dish. Add soy sauce, distributing evenly. Let rest for 30 minutes, then flip. Refrigerate and marinate for approximately eight hours. Overnight or

all-day marinating is recommended for maximum flavour and tenderness. For quicker options, marinate 30 minutes on each side.

After marinating, heat water in skillet over medium heat. When water is warm, place pork loins and marinade in skillet. Cook for four to six minutes on each side, depending on cut thickness. Cooked pork will generally be light tan in color.

Cut fresh pineapple into small cubes. (Canned pineapple in water is a fine substitution.) Add pineapple cubes to skillet, distributing evenly.

Stir in Worcestershire sauce. Reduce heat to medium low.


Thinly slice kiwifruit and add to skillet. Gently distribute evenly with spatula. Continue to cook on medium low for one to two minutes.

Let rest for five minutes. Serve and enjoy! I served this over pan-seared (rainbow) Swiss chard and paired with couscous and grilled asparagus.



The final product is colourful, and easy to dress up or down, depending on your wine and dessert choices.

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SALSA VERDE PORK TACOS

I love tacos. In fact, just about everyone I know likes tacos in one form or another. When I have gatherings, taco-themed nights are always a big hit, so much so that I will find almost any excuse to whip up a taco bar in my house. Hosting a scary movie viewing with friends? Terrifying Taco Night!

Dining both in and out, I've enjoyed taco variations ranging from vegan to fish tacos and just about everything in between. While in recent years, the street taco is a much-lauded trend (and deservedly so), it seems the hard shell taco is increasingly pushed to the side, ignored, and, dare I say...abandoned?

Not in this house, it isn't. I have great love for the hard shell taco in all its crispy, textured, complex glory. Taco nights here may include soft shells, both flour and corn, and street taco ingredients, but not in lieu of my beloved crunchy shells.

One of my all-time favorite taco meats is ground pork. Pork has an rich, succulent flavor that provides the perfect base for other tangy, spicy, flavorful filling. The recipe below is a version of ground pork tacos that has been a taco night staple of mine for over a decade. I'm telling you, it holds up.

You will need:

- One pound lean ground pork
- Shredded Colby Jack cheese

Pork Culture and Trends

- Taco seasoning packet (I make my own using this recipe: <https://www.budgetbytes.com/taco-seasoning/>)
- One ripe avocado
- Two small vine-ripened tomatoes
- 1/4 cup diced onions
- One bunch of cilantro (or your favorite leafy greens)
- 8-16 ounce bottle of Salsa Verde (I use Herdez: <https://www.herdeztraditions.com/products/traditional-salsa/herdez-salsa-verde/>)
- Hard taco shells (I use La Tiara White Corn Shells)

Optional ingredients

- 4 - 6 diced jalapeno slices
- One small lime

Directions

Preheat oven to 175°F (approximately 80°C).

Brown pork over medium heat. When fully cooked, ground pork has a much

CONTINUED ON PAGE 41

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Pork Culture and Trends

lighter brown or grey color than ground beef; avoid overcooking.

While pork is browning, sauté diced onions over medium-low heat; do not caramelize. Dice jalapenos.

Add Salsa Verde to browned pork and let simmer for 5 minutes. Add sautéed onions and diced jalapenos to mix, reduce heat to low.

Arrange taco shells on baking sheet. Place in oven for 6-8 minutes if shells are thin*, 10-12 minutes if shells are thicker. Allow to warm but do not brown shells; the warming simply releases the oils and brings out the best flavor and texture of the shells.

Author's note: La Tiara brand taco shells are rather delicate, which is what I like about them. The shells don't overwhelm the ingredients. They are small, however, and may require a lighter load of filling. If you like a larger, thicker shell or are using blue or yellow corn shells, they will require longer warming time.



Don't forget to share your greens with your rabbit (provided you have one handy and feel like sharing!)

Cut one tomato in half, dice one half, and mix into ground pork. This adds some extra complexity to the flavors.

Dice remaining tomatoes and avocado and place in separate bowls.

Coarsely chop cilantro and place in bowl. If you or your guests have the cilantro-hating gene, chopped spinach works well (or use shredded Iceberg lettuce, if you must).

Add taco seasoning to shredded cheese and place in bowl.

Efficiency tip: If you buy the bagged variety of shredded cheese, a quick way to mix the seasoning in is to add it directly into the cheese bag, reseal it, then shake gently until well distributed. Even if you don't use all of the cheese, the seasoned shreds are a fantastic addition to many other dishes.

Remove browned pork mix from heat.

Remove taco shells from oven.

Let rest for five minutes.

Assemble your tacos and devour!

Makes 10-15 tacos, depending on shell size.

Parting thoughts: If you have a house rabbit, be sure to share any extra cilantro! ■

Greta Rose Hanley is a professional writer and small business owner. Growing up in rural farmland in the magical 1970s, she learned to appreciate access to fresh produce, dairy, and meats. Through her mother, Greta also developed a love for cooking and gardening. She is now an enthusiastic culinary and horticulture hobbyist and enjoys experimenting with both. She likes to subject her friends to recipe-testing and please her house rabbits with garden goodies.

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