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Volume 38 | Number 4

Banff 2017

Date of Issue: March 2017

Published quarterly by Alberta Pork with cooperation from the British Columbia Hog Marketing Commission, Sask Pork and Manitoba Pork Council.

Circulation

This publication is distributed to qualified pork producers and industry stakeholders across Canada in the provinces of BC, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, and Atlantic Canada.

Subscriptions

For new subscriptions, change of address or other subscription queries, please contact Sheri Monk.
Phone: 403-627-9108
Email: sherimonk@gmail.com

Publications Mail Agreement
No. 40062769
Return Undeliverable
Canadian Addresses to:
Circulation Department
4828 - 89 Street NW
Edmonton, Alberta T6E 5K1

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Cover Photo

The business portion of the Fairmont Banff Springs Hotel where the Banff Pork Seminar was held.

Photo by Sheri Monk



Plenary Session 1, Part 2

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Message from the editor

Well done! The Banff Pork Seminar this year was excellent! I've been to a few now, and I really think 2017 is my favourite so far.

What I really loved was the versatility of the plenary sessions. They had mass appeal, and anyone who walked into the room would have been captivated by the speakers. At the first plenary session, I really enjoyed Sandra Vijn of the World Wildlife Fund. Well, "enjoyed" may not be the correct word. It was a sobering presentation, and the idea that we have to produce more food in the next 40 years than we have in the past 8,000 is pretty scary.

When Sandra was done speaking, someone in the audience asked about the World Wildlife Fund's position on GMOs, or another similarly contentious food production issue in Europe. She all but rolled her eyes when she answered, making it clear that the science doesn't support the EU's position (and therefore WWF's) on some issues, but because they are a global organization, they have to make some political concessions. It's amazing to me that political issues can still be such an issue when the science is clear... but one look at what has been going on lately south of the border is a closer-to-home example of partisan populism trumping science.

Speaking of science, McGill's Dr. Joe Schwarcz was a wonderful ambassador for Canada, science and agriculture. At times, his frustration with anti-science sentiment that is becoming more and more mainstream was palpable. You could almost hear the audience reverberate with empathy. Joe, we feel your pain! Science in agriculture has been ignored by the public for years. It's hard to pinpoint where it started, but the ridiculous concept of "factory farms" has certainly propelled the sentiment.

Terry O'Reilly was a great speaker at the second plenary session. I've listened to his marketing/advertising podcast, *Under the Influence* on CBC, for years. He's brilliant, and he has a unique way of framing stories to illustrate the cultural pervasiveness of marketing and branding in our society. His talk was on how we can rebrand the pork industry, and he was really insightful.

The plenary sessions bring everyone together at the start of the day, before the seminar registrants filter into the many different workshops being held. The workshops are focused and precise, and very entrenched in the specifics of the industry – just being there makes your brain work. It's wonderful to have such entertaining and informative general sessions to really engage and inspire us as the coffee is kicking in.

Congratulations to the planning committee – you did a wonderful job. Thank you from all of us who attended. And for those that didn't – I hope this issue helps capture the spirit of BPS 2017. Most of all, I hope to see you next year. ■

sherimonk@gmail.com

A handwritten signature in black ink that reads "S Monk".

Sheri Monk, editor

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Mark Chambers: New talent key to a progressive pork industry

Content provided by Meristem

Banff Pork Seminar (BPS) 2017 chair, Mark Chambers, opened this year's event with some personal memories and a personal challenge for the delegates attending to do more to sell their industry to attract new talent.

"The first Banff Pork Seminar I attended was 20 years ago," Chambers reminisced. "The reception was in the foyer of the Banff Center. They fit because there were about 240 delegates that year.

"Fast forward to today and look around you. There are nearly 650 delegates signed up to attend this year in this beautiful

facility for what has become a premiere event for networking, knowledge gathering and teambuilding."

Thinking back to 1997 the industry has changed significantly, says Chambers. Costs to produce a pig have gone up dramatically, but revenue has not kept pace.



Mark Chambers

"The way we continually move forward is with research, innovation, genetic progress, improved management and above all, resilience. Our industry players, which include all of you in this room, are very innovative, resilient folks. It is events like this that bring the different components of our industry together to share knowledge throughout this Seminar week."

New talent critical

Chambers says as he looks around the room he sees a lot of familiar faces and some new ones.

"To me one striking concern is the lack of new ones," he says.

The production side of our industry is challenged to attract new talent, says Chambers, who has been an active player in industry personnel policy, training and recruitment. "We have the stigma of modern farming and a lot of new activist groups putting pressure on farming so there is a growing lack of trust on farming practices. All of us in this room need to ensure we are focused and paying attention to attract new talent. Making sure we spin the positives of our industry to all possible new recruits.

"We should not sell ourselves short and make sure each time we travel or meet someone we are blowing our industry's trumpet and our own on what we do for the public today to ensure they are fed safe, affordable and nutritious food.

"I'm sure everyone in this room who employs labour will relate to this. And we do have a breakout session focused on labour

CONTINUED ON PAGE 8

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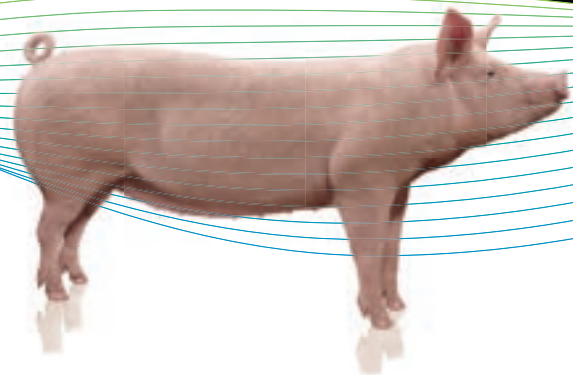
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so if you are attending this make sure you interact and have good discussions around this topic.”

Issues of the day

The theme for this year’s 46th seminar is “Innovative and sustainable solutions for an evolving industry.” It’s a very

fitting theme, says Chambers. The industry has been recovering from serious threats from foreign animal disease such as PED. There is continual pressure from activist groups and growing pressure for increased meat consumption while maintaining natural resources. And there is growing recognition ag-

riculture needs to change the conversation to connect with consumers’ emotion as they make food purchases, not battle with scientific data.

On the market side, the past three years have seen strong profitability but the question is will that continue? What will be the impact of increased packing capacity coming on stream in the US?

“We have top speakers to address all those issues and offer a wide range of practical advice that producers can take home and make improvements in their operations,” says Chambers.

Thanks for support

Chambers introduced and thanked his organizing committee for their efforts noting especially their employers who allow them to spend this time. He made a special effort to thank BPS sponsors, whose strong support means all BPS delegates are able to attend at a significant discount.

And he encouraged all delegates to provide feedback, without which a prestigious seminar is not possible. “The committee is always looking for new topics, speakers and innovative ways to attract people to the seminar,” he says, “so we depend on your feedback, good or bad, to accomplish that.” ■



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PLENARY SESSION 1, PART 1

Sustainable intensification - growth without depleting natural resources

Content provided by Meristem



Dr. Frank Mitloehner

They were promising and welcome words for a pork industry at times under siege.

The University of California, Davis' Dr. Frank Mitloehner told the 2017 Banff Pork Seminar the world can reach targets of feeding the expected nine billion people by 2050. It will happen in part, he says, through intensification of livestock production.

"Indeed intensification provides large opportunities for climate change mitigation and can reduce associated

land use changes such as deforestation. Production efficiencies will reduce environmental pollution per unit of product," he says.

To do that requires separating fact from fiction in the greenhouse gas emission world, and it requires an understanding of real progress in livestock production efficiency, he says. Production success needs to be put in a global context, and it requires a fair way to assess emissions.

Fact and fiction in GHG

The 2015 Global Climate Change Conference resulted in 196 countries signing on to reduce fossil fuel use. While there is strong scientific consensus regarding the relative importance of fossil fuel use, anti-animal agriculture advocates portray livestock as to blame for the lion's share of greenhouse gas (GHG) emissions, says Mitloehner.

One common argument is that U.S. livestock GHG emissions from cows, pigs, sheep and chickens are comparable to all transportation sectors such as cars, trucks, planes and trains. That argument suggests that limiting meat consumption, starting with "Meatless Mondays" will have a significant impact on total emissions.

The reality is leading scientists have quantified the impacts of livestock production in the U.S., which accounts for 4.2 per cent all GHG emissions, very far from the 18 to 51 per cent range that advocates often cite. Comparing the 4.2 per cent GHG contribution from livestock to the 27 per cent from the transportation sector, or 31 per cent from the energy sector brings all contributions to GHG into perspective.

Breaking down the 4.2 per cent EPA figure for livestock by animal species, shows the following contributors: beef cattle 2.2 per cent, dairy cattle 1.37 per cent, swine 0.47 per cent, poultry 0.08 per cent, sheep 0.03 per cent, goats 0.01 per cent and other (horses, etc.) 0.04 per cent.

CONTINUED ON PAGE 10

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“If all Americans practiced Meatless Mondays, we would reduce the U.S. national GHG emissions by 0.6 per cent,” says Mitloehner. “A beefless Monday per week would cut total emissions by 0.3 per cent annually. One certainly cannot neglect emissions from the livestock sector, but to compare them to the main emission sources would put us on a wrong path to solutions, namely to significantly reduce our anthropogenic carbon footprint to reduce climate change.”

Livestock’s real progress

Fewer inputs, fewer impacts.

That’s the bottom line for U.S. livestock production when all things are considered, says Mitloehner.

U.S. pork production per breeding animal is around 4,000 lbs. about double what it was in the late eighties. In 1970, the U.S. had 140 million head of beef; today there are 90 million. In both 1970 and 2010, 24 million tons of beef were produced.

Today, there are nine million dairy cows in the U.S., 16 million fewer than 1950. Yet comparing 1950 to 2013, milk production nationally has increased 60 per cent. The carbon footprint of a glass of milk is two thirds what it was 70 years ago.

Globally, the U.S. is the country with the relatively lowest carbon footprint per unit of livestock product produced (i.e. meat, milk, or egg). The reason for this achievement largely lies in the production efficiencies of these commodities, where fewer animals are needed to produce a given quantity of animal protein.

The average dairy cow in the U.S. produces 22,248 lbs. milk/cow/year. In comparison, the average dairy cow in Mexico produces 10,500 lbs. milk/cow/year, thus it requires 2-plus cows in Mexico to produce the same amount of milk as one cow in the U.S.

India’s average milk production per cow is 2,500 lbs. milk/cow/year, increasing the methane and manure production by a factor of nine times compared to the U.S. cow. As a result, the GHG production for that same amount of milk is much lower for the U.S. versus the Mexican or Indian. Production efficiency is a critical factor in sustainable animal protein production and it varies drastically by region.

Improvements in livestock production efficiencies are directly related to reductions of environmental impact. Production efficiencies and GHG emissions are inversely related—when the one rises, the other falls.

Fairly assessing livestock emissions

In its quest to identify a sustainable, scientific path toward fulfilling the future global food demand, the Food and Agriculture Organization of the United Nations (FAO) has formed an international partnership project to develop and adopt a “gold standard” life cycle assessment (LCA) methodology for each livestock species and the feed sector.

The ‘Livestock Environmental Assessment and Performance Partnership’ (LEAP), engaged with more than 300 scientists from the world’s most prestigious academic institutions in an unprecedented effort in developing a global benchmarking methodology. The

first three-year project was finalized in December 2015 with six publically available LCA guidelines. This globally harmonized quantification methodology will not only allow the accurate measurement by livestock species and production regions across the globe today, but will also identify opportunities for improvement and the ability to measure that progress in each region going forward.

The 2050 challenge

Our natural resources of land, water and minerals (fertilizer) necessary for agricultural production, have not grown but in fact decreased, says Mitloehner. As a result, agriculture will have to become much more efficient worldwide and engage in an efficient path similar to the one it has traveled down in U.S. livestock production in recent decades.

China’s five year plan which focuses on making farms larger and more efficient is an example. Half of the world’s pigs live in China. That’s 50 million sows with 20 piglets born alive, or an annual production of 1 billion pigs. Pre-weaning mortality causes 400 million pigs to never make it to the market. Only one more pig per sow would mean 1 million tons of feed saved.

The five cornerstones of sustainable intensification

Here are the five fundamentals of sustainable livestock systems, says University of California, Davis professor Dr. Frank Mitloehner.

1. Financial
2. Animal welfare
3. Food safety
4. Workers availability and well-being
5. Environmental

People tend to think environment when they think sustainability but all five are needed for sustainable systems, he says. ■

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PLENARY SESSION 1, PART 2

Animal protein's challenging role in feeding a hungry planet

Content provided by Meristem



Sandra Vijn

Canada's pork industry got a hard lesson from an industry outsider in the reality of feeding a hungry world and suggestions on how they can do it better.

"We'll need to produce more food in the next 40 years than we have in the last 8,000 years," Sandra Vijn, director, sustainable food for the World Wildlife Fund told the crowd at the 2017 Banff Pork Seminar.

Animal agriculture will need to bring its use of resources and impacts in line with the earth's finite capacity and to demonstrate to consumers how

their products can be part of sustainable diets. The pressure to do things differently will increase, she says.

The harsh numbers

Of all human activity, producing food has the single largest impact on our planet, says Vijn. Food production accounts for about 40 per cent of the habitable land, 70 per cent of water consumption and 30 per cent of the greenhouse gas emissions globally. It's a leading contributor to climate change, soil erosion and the loss of biodiversity in vital ecosystems.

Livestock is the world's largest user of land resources, with pasture and land dedicated to production of feed representing almost 80 per cent of the total agricultural land. Taking feed into account, it takes hundreds of gallons of water to yield a pound of meat, and livestock contribute about 14 per cent of human-induced global greenhouse gas emissions.

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Within the next four decades we must double net food availability, but we cannot double the amount of land in production. We must produce more with less.

Regeneration warning

Ecosystems can regenerate natural resources to produce food, fiber and fuel, but Vijn outlines how resources are being consumed at rates that cannot be replenished.

By 2050, global demand for meat is forecast to increase by 70 per cent, and about 50 per cent for pork. That will increase livestock's demand and competition for land, water, and feed crops.

Globally, many of today's most important crop-producing areas might not be as productive in the future. Several important

aquifers on which grain agriculture depends are shrinking and precipitation patterns are changing. Soils are eroding.

"We need to intensify food production and produce more with less, not just on a per capita basis, but in absolute terms—less land, water and other resources overall than we do today if we are to live within the limitations of the planet," says Vijn. "But, we need to produce more nutrition in sustainable ways."

Ways to improve

There is no silver bullet, she says and no single strategy will solve the problem. By combining strategies we can achieve the results both we and the planet need.

"Sustainability is a precompetitive issue. We can work together to find solutions, share information and learn more quickly than ever before. Actions at speed and scale are needed to reduce the absolute impacts of the livestock industries globally."

Vijn offered three key ways to reach that goal.

Engaging platforms and multi-stakeholder initiatives

Consumer demand can influence food supply chains. Companies research hotspots to identify where sustainability impacts occur and are engaging their supply chains to identify opportunities to reduce impacts.

Platforms and roundtables such as the Global Roundtable for Sustainable Beef, a similar one for eggs, and numerous certification programs bring supply chain stakeholders such as retailers, brands, input suppliers, traders, institutions and producers together to identify how to measure, track and share information as well as to identify opportunities for improvement.

To ensure their efforts drive the consumption of natural resources below the earth's finite limits, companies and platforms today are agreeing on key metrics and establishing

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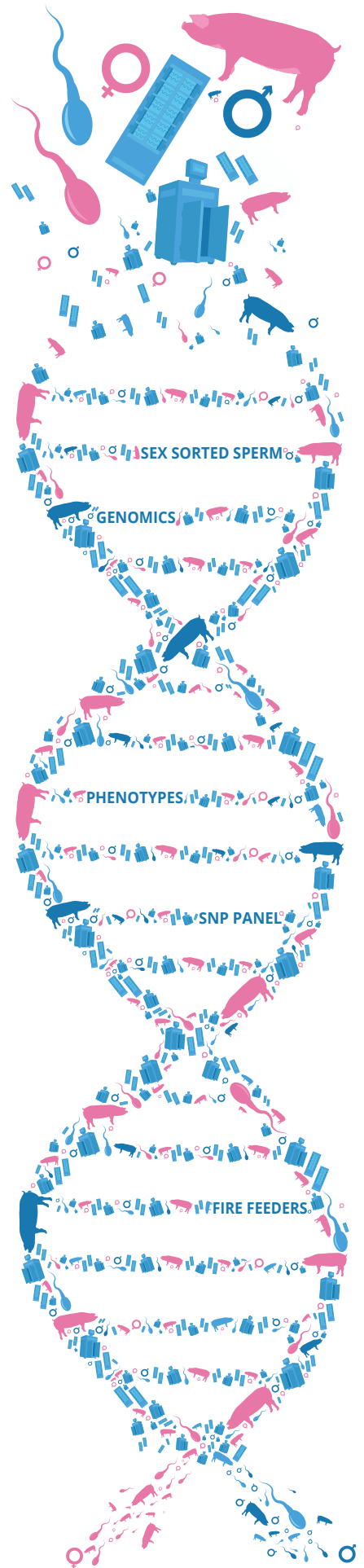
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global systems to assess improvement opportunities for those involved in food production and to monitor the key impacts of food production globally.

This helps producers identify where conservation benefits can be made that make the most business sense. In this digital era, data can flow into databases for cost benefit analysis that can be shared with other stakeholders, while protecting the privacy of the data owners.

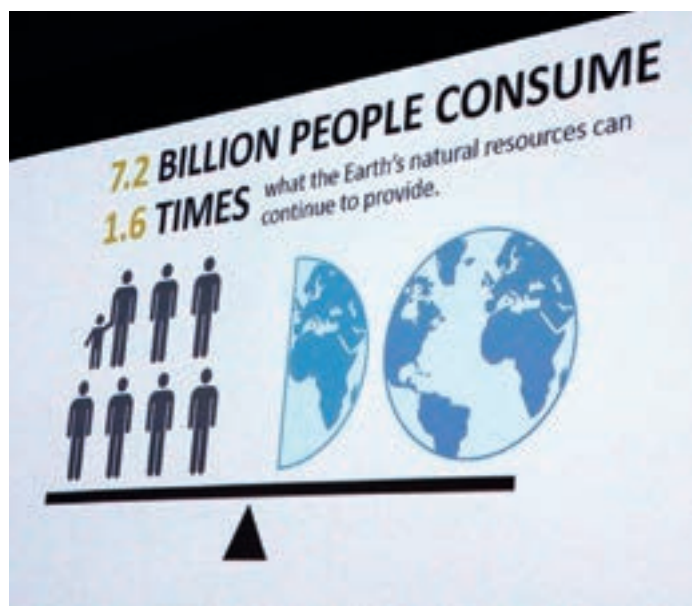
Improved production efficiency

Producers can document which practices are more efficient by measuring what matters and make the information available through information platforms to help other producers and buyers improve efficiency and productivity.

Producers can work with researchers, input providers, customers and others to share technologies and practices that can lead to more efficiency, while considering how to optimize public health and nutrition, animal welfare, and economic and environmental benefits.

Engaging consumers

Dealing with consumers is not clear cut, says Vijn. Consumers often blend environmental sustainability with other personal and public health issues that are not directly related and con-



sumer concern about additives, chemicals and preservatives may overshadow other concerns such as the environment.

That's why it is critical that animal agriculture and environmental NGOs work together to communicate clearly about the importance of improving the environmental sustainability of food, mainly by being more transparent about how meat, poultry and dairy products are produced.

"Reaching out through social media channels, sharing stories, and engaging the public to explain how food is being produced, what is being done to improve environmental performance, and what measurable results the sector is achieving are needed to build support for targeted solutions to the most pressing environmental challenges facing food production systems." ■

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BREAKOUT SESSION 1: Swine Health

By Geoff Geddes

Part one - Preparedness for a foreign animal disease: Is the swine industry ready?

If you thought putting your foot in your mouth was awkward, try dealing with Foot-and-Mouth disease (FMD). As part of his work, Dr. Chris Byra of Byra Consulting has encountered the latter (and maybe the former). In the process, Dr. Byra has seen first-hand the need to prevent a foreign animal disease (FAD) from affecting the swine industry and, in case we can't, the importance of preparation for dealing with it if it does arrive.







The 2001 FMD epidemic in the U.K. cost industry between \$5-8 billion, and the damage stemming from a similar outbreak in Canada is pegged at up to \$58 billion. With Canada exporting 70 per cent of our swine production, we are especially vulnerable to an FAD. Since FMD represents a worst-case scenario in that regard, Byra used it as a basis for this discussion.

Components of FAD Preparedness

1. Prevention: Whether it's a head cold or a deadly pig disease, the best way to deal with an unwanted illness is by preventing it in the first place. To that end, Byra recommended the following for the pork industry:

- Encourage government to increase border control measures regarding illegal importation of meat/products to a level applied to illegal drugs, guns, money or other trafficking, especially from high-risk areas.
- Ensure that the risk of bioterrorism is being addressed (sage advice for protecting human health as well!).
- Continue to ensure compliance with established biosecurity measures. In particular, visits to high-risk sources such as assembly yards and auctions where commercial agriculture and non-commercial farmers mix should be minimized and followed by appropriate sanitation measures. As with PED, fomites such as vehicles and equipment are the primary carriers of FMD.
- Identify and manage the risks by monitoring potential international sources of FADs and controlling the risk from animals, feed and other product sources.

2. Early Detection: If you can't prevent disease, at least detect it as soon as possible to limit the

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CONTINUED ON PAGE 16

damage. It sounds simple enough, but reducing the time between finding infection on farm and reporting it to the Canadian Food Inspection Agency (CFIA) requires a number of elements:

- Diagnostic capability and capacity to quickly diagnose suspect cases; Canada has this.
- Further training of producers to recognize abnormal symptoms that may be caused by a FAD. Fact sheets regarding Seneca Valley Virus are a recent example of success in this area.
- Further training of meat inspectors to recognize the signs of FADs.
- More familiarity among veterinarians with the clinical picture of known FADs.
- Industry understanding of the need for immediate reporting of suspicious clinical disease signs.
- Continued support and improvement of regional/national swine health surveillance networks.
- Ongoing communication with national government disease surveillance programs.

3. Response to a Positive FAD Case: So in spite of your best efforts, FAD has been detected on farm; now what? Now is the time to address that, because if you wait until disease is at your door, the window of opportunity to nip it in the bud has come and gone. Here are some critical areas to focus on in mounting a response:

Movement Control

Movement of animals made recent FMD outbreaks bigger and badder. The UK outbreak would have been half the size with the imposition of movement controls two days earlier. The lesson for Canada is clear: Since the minister of agriculture de-

termines the size of the movement control zone based on tracing of the potential spread, industry should implement voluntary movement control until the control zone is established, thereby reducing the size of the outbreak and time to recovery.

Livestock Market Interruption Strategy (LMIS)

This is a national strategy to enhance industry and governments' preparedness to deal with the fallout from an FAD and the impact of key decisions during market interruptions. It focuses primarily on impacts to healthy animals from border closures.

In the swine industry, the depopulation of isowean pigs that are normally exported would have to be implemented almost immediately. There must be effective coordination and cooperation of all parties in determining which animals enter the domestic market and which are surplus and thus, candidates for depopulation. This will involve some tough decisions for all concerned parties:

1. Producers: How much to produce and what to do with surplus animals for which there may be no market.
2. Processors: How much product the Canadian market can absorb; where and how best to source the product; how to continue competing with imported products and how to deal with the surplus product returning to Canada.
3. Governments: Whether intervention is required and, if so, where, when and how to initiate intervention measures to facilitate industry response to the change in markets.

Through it all, parties must find ways to effectively coordinate consistent messaging within and between stakeholder groups, as well as with the general public. LMIS can help prepare key stakeholders to act and provide them with key tools, information and approaches to guide decision-making and actions, as well as the development of individual stakeholder plans, during an actual response.



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Emergency Response Plans

Industry and governments must have developed emergency response plans, roles and governance for an outbreak.

4. Recovery to Resume Trade: Once the danger has passed, we will need to support government efforts to develop policy changes that would shorten the recovery period. These include allowing containment zones within a country, using emergency vaccinations and allowing vaccination by producers, and improving stockpiles of vaccine through sharing agreements.

Reducing the number of pigs that need to be depopulated is also crucial in maintaining a social license to produce.

While industry and government have already initiated many of the recommendations in this article, others have yet to be widely considered. One way or another, the swine industry must do all it can to prevent an FAD from entering Canada and prepare for a worst case scenario should prevention fail. Otherwise, the next FAD could render the industry DOA.

Part two: Modeling the transboundary survival of foreign animal disease pathogens in contaminated feed ingredients

Another expert who fears the impact of FADs is Scott Dee, Director - Pipestone Applied Research with Pipestone Veterinary Services. That impact could include crippling our export markets, inducing significant animal suffering and initiating a major domestic economic crisis. Based on the widely held belief that PEDV originated in China before spreading to North America, Dee and his colleagues studied one possible source of the disease: Importation of high volume ingredients used in swine feeding from China.

This study began by developing a model to study whether PEDV harbored in imported ingredients could remain viable during a trans-Pacific shipment from Asia to the United States, especially given the time and environmental conditions involved. The model employed ingredients imported to the United States from China including organic and conventional soybeans and meal, lysine hydrochloride, D-L methionine, tryptophan, Vitamins A, D & E, choline, carriers (rice hulls, corn cobs) and feed grade tetracycline, all of which were inoculated with PEDV.

To mimic conditions on land and sea, historical temperature

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and percent relative humidity (% RH) data were programmed into an environmental chamber which stored all containers. To evaluate PEDV viability over time, ingredients were organized into 1 of 4 batches of samples, each batch representing a specific segment of transport.

At the conclusion of the simulated 37-day shipment, viable PEDV was detected in soybean meal (organic and conventional), Vitamin D, lysine hydrochloride and choline chloride. In contrast, viable PEDV was not detected in any samples treated with one of two chemical mitigants. These results demonstrated the ability of PEDV to survive in a subset of feed ingredients using a model simulating shipment from China to the U.S. This suggested to researchers that contaminated feed ingredients could serve as transboundary risk factors for PEDV and also identified effective mitigation options.

Based on the success of the model, researchers used it to evaluate the survival of FAD viruses in ingredients using viral surrogates to represent the actual pathogens. In doing so, they had two objectives:

1. To model if foreign animal diseases could survive in feed ingredients shipped from Asia to the United States.
2. To evaluate whether two chemical mitigants could reduce the risk of disease survival.

The study was based on the hypothesis that pathogen survival will be influenced by ingredient and treatment.

Materials and Methods

Researchers identified 10 FAD viral pathogens as significant risks to the U.S. swine industry and used surrogate viruses for the study which were structurally similar to the actual pathogens. Using a model previously validated to study the risk of contaminated feed ingredients for the transboundary spread of PEDV, they selected feed ingredients known to be imported from China to the United States. These included organic & conventional soybean meal, soy oil cake, DDGS, lysine, choline, vitamin D, pork sausage casings and several pet foods (dry & moist). Ingredients were inoculated with representative surrogate viruses and some were treated with two mitigants.

Results

Preliminary data indicate the survival of two surrogate viruses at all points during the simulated 37-day shipping period: FMDV (Seneca Virus A) and PRV (Bovine HerpesVirus-1). Under the conditions of this study, these results suggest that contaminated feed could serve as vehicles for FAD introduction to the United States, which supports the previous findings regarding PEDV. Results from follow-up phases of this study are expected soon. ■

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BREAKOUT SESSION 2: Animal Transport Issues

Content provided by Meristem

Part one: Minimizing challenges caused by animal rights groups

At one time the chance of farmers engaging with activists was relatively remote. That's not the case today. Media and social media show constant interaction with activists in a way that has potential to threaten the individual and their industry.



Geraldine Auston, Ag and Food Exchange

Geraldine Auston of the Ag and Food Exchange gave pork industry players attending the 2017 Banff Pork Seminar some solid background in the difference between animal welfare and animal rights. And she had some tips on how to manage on-farm or during transport and when dealing with activists.

Do the right thing, always

A lot has been learned on how producers and transporters can manage their affairs to be better prepared for questions about their operation. Here are some specifics about good management techniques and transparency.

Have a code of conduct

Outline your farm's or company's expectations for animal welfare. Every person in contact with livestock should sign off on this document.

Hire the right people, for the right reasons

Skills and strength are important in certain jobs, but go beyond that. Consider a person's temperament, and do not allow individuals with challenges such as anger management issues to work in close contact with animals.

Train and retrain

Ensure every person understands the law, regulations, code of practice and expected procedures and policies. If an individual has trouble initiating a task such as euthanasia, retrain that individual or reassign him or her.

Establish a reporting system

Within your business establish how employees can raise animal welfare concerns. Ensure all concerns raised receive appropriate recognition and follow-through.

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Document problems

When something goes wrong, document it. Outline what happened, and what you will commit to doing to ensure it does not happen again.

Focus on transport

Over the past few years, animal rights activists have been holding protests outside of processing facilities. Most activists attending these events are committed to quietly observing trucks entering slaughter facilities.

Recently, a growing number of activists, particularly in Ontario, have attempted to block trucks, or attempt to feed and water animals, climb onto trailers to take images or make contact with livestock and sometimes argue with transport drivers.

What you can do

Here's what Auston recommends:

1. Establish communication and expectations with the plant.
2. Assume you are being filmed, and act accordingly. Activists frequently post videos of their encounters to social media pages.
3. If activists are blocking your truck, or if they are too close to safely move forward, stay inside your truck and contact plant security or police for assistance.
4. Do not engage in conversation beyond asking activists to move out of the way.
5. Avoid using truck horns. It causes distress for the animals and inhibits your ability to communicate with plant security and police.
6. Once protestors move away, verify it is safe to proceed and move the truck ahead.
7. If protestors approach the truck again, stop the truck, warn them again, and call police.
8. Do not engage in physical or intimidating contact with any protestor.
9. If you feel you or your property are threatened, contact police.

Social media

Farmers and transporters active on social media should not engage in arguments with animal rights activists. End online conversation with individuals who antagonize. Block them if you need to. Ensure your security settings such as photos, physical location and personal information are not available to public view. ■

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BREAKOUT SESSION 3: Sow Productivity

By Geoff Geddes

Part one: Farrowing room management

Farrowing room management is like supervising a 7-11 without the free Slurpees: a 24-7 job that requires constant attention. Two men who know this only too well are Dr. Egan Brockhoff, a swine veterinarian with Prairie Swine Health Services, and Alastair Bratton, production manager with Verus Animal Health. They will both tell you that focused management of the farrowing barn, room and crate support improved health, welfare, growth and production outcomes for piglets and weaned pigs.



Dr. Egan Brockhoff,
Prairie Swine Health

Farrowing room management requires a unique combination of individual animal care, environmental and population management, team dedication and steadfast attention to detail.

TEAM (Together Everyone Achieves More)

As with any business, your team will only be as successful as the training, mentorship and support that stands

behind them. Proper training is critical to success, and assumptions about level of skill and knowledge will only lead to frustration and disappointment from both the manager and employee (remember the old “how do you spell ‘assume’ rule?”). Having a farrowing management training program in place will support new employees in bringing value to the production unit and improving outcomes. This should be followed up with an auditing process that ensures training principles are being applied on a daily basis.

Before Farrowing

With the turnaround time between weaning and the next farrowing becoming ever shorter, sanitation is of increasing importance in maintaining a healthy farrowing environment.

Proper washing, disinfection and drying reduces the pathogen load in a farrowing room and within the crates themselves. An assessment of the biofilm present within a farrowing room will help you select an appropriate detergent and degreaser. While the different properties of alkaline and acidic detergents should inform your decision of which type to choose, understanding the endemic pathogens in your herd can guide selection of a disinfectant.

Finally, drying all surfaces is a critical component in the removal of pathogens. Disinfection alone, without proper drying with a dry heat source, will only reduce your pathogen load, whereas adding a proper drying regiment should eliminate the entire pathogen population from the local environment.

Once the farrowing room has been properly washed, disinfected and dried, final preparation must occur before or while the sows are being loaded. Check feeders to ensure they aren't full of wash water, disinfectant and old feed. Also assess waterers, heating pads/lamps, the crate and the room's environmental controls and ventilation.

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The Farrowing Room Management session packed the house at BPS 2017.

Farrowing, Fostering and Day 1 Critical Care

As natural as the birth process is, minimizing pre-weaning mortality in farrowing involves many challenges: Parturition, environmental, sow and colostrum management, as well as fostering programs, all impact outcomes. Consequently, Day 1 Critical Care programs have become an integral part of farrowing room management and a key strategy to minimize mortality during the highest risk period, which is the first four days during and following farrowing.

The environment of the farrowing room must address the differing needs of the sow and piglets, so close observation of the animals is critical to fully understand what they're experiencing. Temperature, humidity and air movement are all factors when establishing climate based protocols.

As colostrum quality and quantity both impact survival, this is another key area

Loading the sow should typically occur at 110 days of gestation, allowing her time to adapt to her environment while minimizing stress to both her and

the unborn piglets. As always, the goal is to positively impact health, welfare, growth and production outcomes for piglets and weaned pigs.



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to manage. In general, birth order impacts the quantity and quality of colostrum intake. Because time at nipple and colostrum quality decrease as birth order increases, being one of the first seven born greatly increases a piglet's chance of survival. Individual monitoring of colostrum intake through management of split suckling, stomach tubing and time based identification are the best tools for managing colostrum intake and survivability.

Keep in mind too that not all colostrum is equal. Colostrum from a piglet's own mother is always superior to that of another sow as it allows piglets to absorb more immune cells. This is an important consideration in planning cross-fostering protocols.

Day 1 Critical Care

This is as much about observation and stockmanship as anything else. Day 1 Critical Care starts with ensuring the piglet is born into a favorable environment. You must quickly identify piglets that are at risk of falling back and any factors with the farrowing room and crate that may negatively impact the piglets.

The sow should be observed to ensure she has enough teats and that they are of a size that will allow for ease of suckling.

When the piglets are born, warming and drying them is the first priority followed closely by minimizing the time to the first suckle. The warmer we can keep the piglets, the less energy they must expend to keep warm and the more they can use to suckle.

Time between piglet births is another important factor. The longer the interval, the more stress they have probably suffered and the more likely they are to be born weak and unable to suckle. More than 30 minutes should alert the team to

closely monitor the sow. Cross-fostering to balance litter size and ensure access to teats should occur after proper colostrum intake and within 24 hours of birth.

As part of the process, starve-out piglets who are suffering from malnourishment require immediate attention. They should be individually examined for sickness, anemia, and the state of their teeth, gums, navel, tail, injection sites and castration incision. Leaving one crate empty within a farrowing room is a common approach to starting foster litters within the first three or four days of life. These piglets need proper nutrition and treatment before being placed with a carefully selected nurse sow in a warm, dry environment. Note that starve-outs can occur anytime in the lactation period and regardless of age.

Nursing, Rapid Growth and Weaning Preparation

Success during lactation starts with the selection of a quality replacement gilt. Body confirmation and the number of functional teats are important qualities to pursue during gilt selection, with 14 as the minimal teat target. Increased weight gain of the gilts translates to increased litter weaning weight. In that regard, the 300 lb second heat rule is often cited as a minimum breeding target to ensure longevity and potentially higher milk yields. Increased weaning weight is also positively correlated to shorter days to market, while longer lactation periods are linked to increased weaning weights, producing a more robust pig that will gain better.

Creep feeding is a common intervention associated with increased litter size and increased lactation length. Although it does not affect pre-weaning performance, creep feeding can improve post-weaning outcomes by elevating the number of pigs classified as "eaters" at weaning.

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Successful farrowing room management requires expertise in individual animal care, proper environmental and population management and team dedication. Weaning the highest quality pigs greatly increases post-weaning success by minimizing factors that reduce health, growth and efficiency. It requires round-the-clock care and attention, but the payoff is much greater than free Slurpees.

Part two: Determinants of lactation success in primiparous sows

If you ever play ag trivia with your friends, the question is bound to arise as to what dictates the gilt remaining in the herd or being culled. Thanks to Nathalie Trottier, Associate Professor in Michigan State University's Department of Animal Science, you now have the answer: the outcome of the first lactation. Culling of gilts following a poor first lactation represents an economic drain for producers; conversely, preparing

the gilt for a successful first lactation will benefit lactation performance in subsequent parities and thus your bottom line.

According to Trottier, there are several determinants of a successful first lactation.

Maximizing feed intake during lactation

A number of factors impact the gilt's voluntary feed intake during lactation. For example, the over-conditioned gilt has a lower voluntary daily feed intake, especially during the first week of lactation. In many mammals, hyperphagia and building fat storage during the gestation period is an essential evolutionary mechanism associated with a reduction in appetite near parturition and several days postpartum that leads to prioritizing nursing over eating. In confinement systems, however, the over-conditioned gilt coupled with limited mobility during gestation is far more susceptible to dystocia (difficult and extended length of farrowing) associated with lower feed intake in lactation and higher rates of piglet mortality at birth and in early lactation.

Setting body condition goals for gilts entering the breeding herd and monitoring body condition during the gestation period will optimize feed intake for lactation. The most effective monitoring method is to weigh or tape them and to measure backfat thickness during gestation. Feed intake in gestation should be restricted to meet the amino acid and energy demand associated with products of conception and mammary tissue growth, and to maintain a body condition score. In production settings where gilts are housed in gestation stalls it is advisable to feed several times a day to encourage them to stand up.

Increase fiber intake during gestation

In addition to restricting caloric intake during gestation, a greater concentration of crude fiber in the diet offers several benefits. Apart from increasing gut fill and controlling satiety during gestation, increasing crude fiber from 3.8 per cent to 7 per cent decreases the rate of constipation by up to 75 per cent. Increasing bowel movement is important in gilts because long transit of fecal matter through the large intestine is associated with an increased risk for bacterial endotoxin production. It has been suggested that circulating endotoxins may interfere with the secretion of prolactin, the hormone needed to initiate and maintain lactation in swine.

Increase feeding frequency during lactation

Feeding gilts three to four times per day during lactation with smaller quantities of feed will stimulate feed intake and encourage gilts to stand up compared to feeding twice per day. Frequent feedings also decrease feed spoilage. If economics allow, replace hand-fed feeders with ad lib or self-feeders.

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Increase length of lactation period

As weaning age has increased, sows naturally have a longer lactation period which tends to optimize socialization and positive behavioral development. Extending the lactation period contributes to increasing stomach volume and helps restore body fat and protein lost during lactation.

Maximizing mammary gland use

Milk secretion pattern and the dam and progeny interaction is unique to the sow. Each mammary gland and teat cistern is relatively small, and glands must be emptied every 50-70 minutes by the piglets to optimize milk production. Fortunately, piglets are programmed to nurse every hour following transition from colostrum to milk. Nursing of all of the available functional glands is crucial to stimulate mammary growth during the first lactation.

Selecting for udder conformation

Dairy producers have long recognized the importance of udder conformation for milk yield. In pigs, the current thinking is that the sow udder should be equipped with 14 or 16 equidistant, well-defined, functional teats with no inverted nipples.

Preventing teat injury

Unlike other livestock species, for pigs each gland will eventually belong to a single piglet. Consequently, for each malfunctioning teat, one piglet is left out since they tend to nurse one particular gland. Within 72 hours of farrowing, un-suckled glands are noticeably reduced in size and by mid-lactation, glands involute completely.

Thus teat injury may prevent nursing of an otherwise well-developed, functional gland. These injuries can be reduced with proper flooring, hind hoof claw trimming and delayed teeth clipping.

Stimulating mammary cellular activity and growth

The mammary glands begin growing at an increasing rate around mid-gestation (approximately day 60). At the end of gestation, mammary tissue contains just over 600 grams of protein, nearly half as much as the protein content of a 12 piglet litter at birth.

Maximizing mammary gland use

Research suggests that glands which are suckled in a first lactation have enhanced productivity in the next lactation compared with glands that are not suckled. This suggests a sound biological reason for adding one or two piglets to an existing litter to maximize the use of functional glands by cross-fostering from another gilt or sow.

Dealing with contamination

One factor that impacts lactation in gilts more than in sows is ergot contamination of grains like barley, rye, wheat and oats used in lactation diets in some regions. There are different ergot alkaloid compounds depending on the grain, but they all inhibit prolactin secretion which depresses milk yield.

There may be a lot involved in producing a successful first lactation, but there's also much to be gained: happier hogs, a better bottom line and an edge in the next round of ag trivia. ■

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BREAKOUT SESSION 4: Labour Management

By Geoff Geddes

Changing Landscape of Agricultural Labour

If asked to name the largest employer in the world, you might guess hospitality, oil & gas or the people who make those tiny soap bars for hotels. In fact, the answer is agriculture with over a billion workers worldwide. Exploring the issues and influences that impact agricultural employment is the focus for Ken Linington, Human Resources Director/Policy Advisor for Flowers Canada (Ontario) Inc./Labour Issues Coordinating Committee.

Agents of Change

Historical Shortages

The availability of reliable farm workers has been an issue for decades. The Canadian Agricultural Human Resources Council predicts farm worker shortages across the country to reach 114,000 by 2025.

Nature of the Business

Unlike other industries such as mining, construction, manufacturing and health care, farming involves the management of biological processes that are subject to environmental and climatic conditions, require constant care and have a family orientation. In many cases, the perishable nature of farm production has a direct impact on the workforce.

Global Migration

The migration of people around the world continues to grow, as demonstrated recently by news stories of migrants attempting to reach Italy by boat from Libya and the movement of people from Syria to Germany. Still, developments like the Brexit vote and election of Donald Trump suggest a fear among many of the growing migration trend.

Demographics

Europe was in a massive rebuilding phase after World War II while North America dominated food production and manufacturing. Then came the “baby boom” marked by job creation and the emergence of the middle income earner. Over time our birth rate fell below the 2% standard often quoted as being necessary to sustain our society. Meanwhile, our farmer population is aging and our industry continues to consolidate.

Trade Agreements

Following World War II, large industrial nations used a system of tariffs to protect their industries from products coming from other countries. During the 1980s an attempt was made to re-distribute the wealth in the world. Canada began entering free trade agreements focused on the movement of goods and services unfettered by prohibitive tariffs or regulations. This meant that the lowest cost provider would get the market and it felt like a race to the bottom. Against this backdrop, the farming population experienced massive change. For Canada, the elimination of the Crow Rate saw trade shift from east/west to north/south.

CONTINUED ON PAGE 30



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From a global perspective, food that was previously considered out of season for several months is now available year-round. Apple growers that are 50 km away from a large market must now compete with apples coming from New Zealand. This raises the question of whether all countries are playing by the same rules. Do other nations' export enhancement programs offer an advantage? Government wants our industries to be competitive, but is our government competitive with our global competition?

As mentioned earlier, the tide of popular opinion in the world seems to be changing with events like Brexit and the Trump election. It is too early to predict what will happen with various trade agreements, and with so many unknowns there may be no concerns in the short term; but for the long run, we must remain vigilant.

Fee-for-Service Contracts versus Employer-Employee Relationships

There are legislated costs associated with the traditional employer-employee relationship as society has developed a host of protections for the hired worker but few for the employer. Businesses have reacted by hiring fewer workers in favour of

the fee-for-service contract in which these legislated worker costs do not apply.

Urban Centric Society

Our governments have focused on large urban centers for our economic engines. Yet most farming happens in rural Canada and does not enjoy the influence it once had. Farm workers face a number of challenges including lack of public transit and the seasonal nature of their job which often excludes them from employment insurance.

Temporary Foreign Workers

While farmers can access Temporary Foreign Workers (TFW) through four different programs, the Seasonal Agricultural Workers Program (SAWP) is by far the most popular. Following a recent parliamentary consultation, 21 recommendations were made regarding changes to the program. To date, however, the federal government has not adopted any of them.

Immigration Policy

Canada has a regulatory structure that requires immigrants to achieve a certain number of points, many of them tied closely with education and financial resources. This often disadvantages an agriculture industry in need of long-term, full time employees.

Labour Policy

A trend towards raising health/safety and employment standards, eliminating employer based deductions, expanding pension plans and blurring the lines between minimum wage and a living wage are legislating more costs for the employer who functions in a global market. It appears as if labour policy is done in isolation of immigration and trade policy.

Elite versus Masses

The Brexit situation is one example of a growing challenge. Increasingly, there is a wide gulf between the openness of elites to migration and the desire of the masses for fewer migrants. So-called “cosmopolitan elites” often see immigration as a common good based on universal rights, while more nationalistic masses want to offer migration as a right to only certain outsiders deemed worthy of joining what they perceive as “their community”.

Next Steps: Where to from here?

- Anticipate more change.
- Focus on small direct retail niche market or go big through expansion or partnerships.
- Obtain training on managing a multicultural workforce. Understand your personal cultural biases and those of your workers.
- Obtain training on employee engagement techniques.
- Research the potential of Temporary Foreign Workers.
- Get involved in farm politics and ensure your issues are understood by those in power.
- Partner with other employer groups (eg. Chamber of Commerce).
- Use the many resources offered through the Canadian Agricultural Human Resource Council (CAHRC).

Agricultural employment has its challenges; but at the end of the day, if you have to choose between producing food for the world and making those tiny soap bars, the choice is clear. ■

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2017 Foxcroft Honorary Lectureship: Stephen Webel

Content provided by Meristem

Leadership comes in many forms. For the pork industry one of the most important types of leadership is research into innovations and management techniques that can make real improvement at the production level.

Those are the topics featured in the Banff Pork Seminar breakout sessions each year. And each year one of those presentations is dedicated to the George Foxcroft Honorary



Dr. Michael Dyck, University of Alberta (left), George Foxcroft Lectureship speaker Dr. Stephen Webel, (center), and Dr. George Foxcroft

Lectureship, named after the University of Alberta professor, research pioneer and industry icon.

“We established the George Foxcroft Lectureship in Swine Production to allow the Banff Pork Seminar, in conjunction with the University of Alberta, to host speakers who are conducting high profile research that is applicable to the pork production industry and will potentially improve production efficiency,” he says.

“In 2017 we are pleased to recognize Dr. Stephen Webel as the recipient of the Foxcroft Lectureship,” says Seminar co-program chair, Dr. Michael Dyck of the University of Alberta. “Each of these recipients receives this award based on the quality of their research and the contributions made to the swine industry.” Webel’s presentation, “The reproductive management of gilts and sows” is in breakout session five.

His credentials are impressive. He is the director of reproduction research and development for JBS United, Inc. He earned his B.S. from the University of Illinois, M.S. from Iowa State University and Ph.D. from the University of Illinois. His basic and applied research has led to development of estrous cycle and ovulation control products to permit fixed time insemination for swine, sheep, cattle and horses.

Webel is currently involved with developing and implementing programs for fixed time insemination in gilts and weaned sows. ■



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Student science winners at BPS 2017

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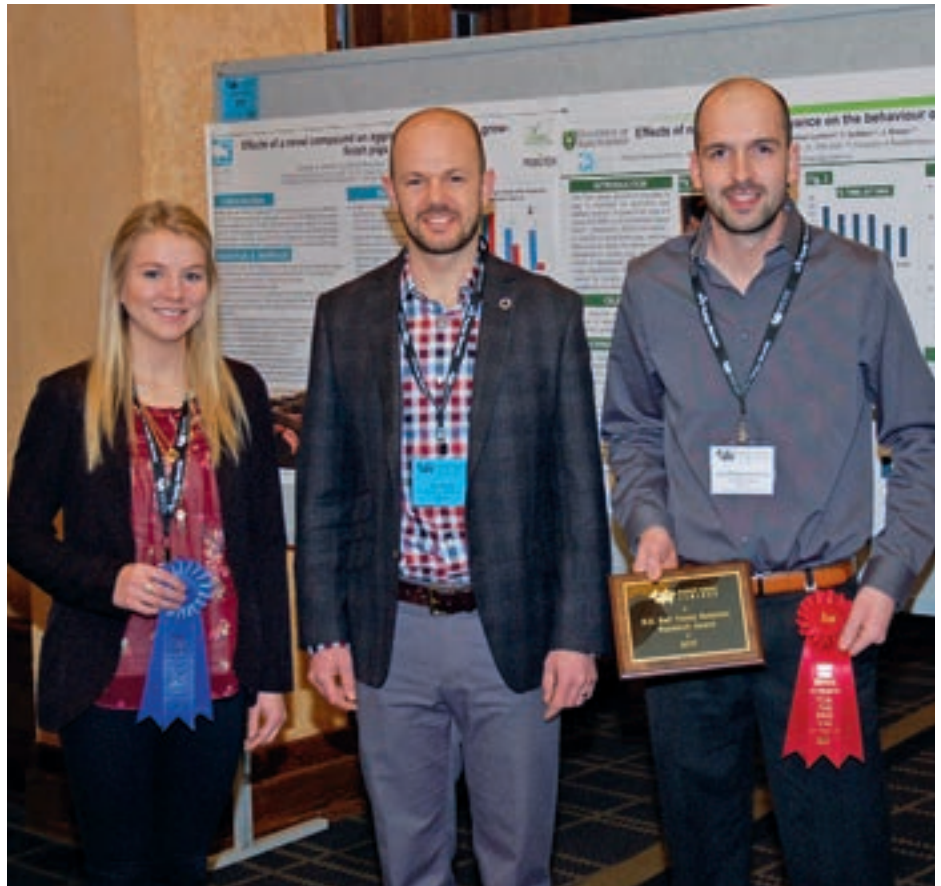
Two young scientists at the 2017 Banff Pork Seminar (BPS) were presented with the R. O. Ball Young Scientist Award.

The award is named after Dr. Ron Ball, a long-time researcher and former BPS program director. The award recognizes graduate students who provide a best overall combination of good and relevant science, well-written abstract and excellent presentation.

First prize was awarded to Jean-Philippe Martineau, Universite Laval for, "Partial substitution by organic trace minerals on gilt growth, production and longevity and progeny growth performance."

Second prize went to Stephanie Gartner, University of Alberta for, "The effects of administering amoxicillin early in life on inflammation and insulin secretion in the porcine pancreas."

First place winner receives a \$500 cheque and plaque and second price receives a \$250 cheque. ■



Stephanie Gartner, University of Alberta, (left) Dr. Ben Willing, University of Alberta (center), and Jean-Philippe Martineau, Universite Laval

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Transport wash innovation wins Aherne Prize Seminar

Content provided by Meristem

Disease control in livestock production just got a little better thanks to winners of the 2017 F. X. Aherne Prized for Innovative Pork Production. The prize was awarded to Blue Water Wash of Blumenort, Manitoba at the 2017 Banff Pork Seminar.

Bill Rempel of Blue Water Wash accepted the award for the company's innovative new heavy equipment undercarriage wash.

The prize has become a major event in the pork industry says Dr. Ben Willing, chair of the F. X. Aherne Prize committee. It is named after industry icon, the late Dr. Frank Aherne, a professor of swine nutrition and production at the University of Alberta and a major force for science-based progress in the western Canadian pork industry.

"This prize recognizes individuals who have developed either original solutions to pork production challenges or creative uses of known technology," says Willing. "The quality and number of applicants is strong each year and keeps this award popular. And these grass roots innovations help anchor a promising future for livestock production to feed a growing world."

There has never been a way to wash all organic material from underneath livestock trailers according to Blue Water Wash. Organic material has the potential to carry and spread diseases which is a threat to the industry.

The company has researched and developed an undercarriage wash which is operational in their new state-of-the-art drive-through wash bays in their Blumenort, Manitoba facility.

The system uses 24 high pressure spinning nozzles along with 90 gallons per minute of water to thoroughly clean the underside of any livestock trailer that runs through it. To finish off the undercarriage wash, disinfectant is then applied to the underside of the trailer as it exits the wash bay. ■



Bill Rempel of Blue Water Wash, Blumenort, Manitoba, (left) and Dr. Ben Willing, University of Alberta, chair of the Aherne Prize Committee

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PLENARY SESSION 2, PART 1

Terry O'Reilly - changing the conversation

Content provided by Meristem

Ad man, CBC radio personality and marketing guru Terry O'Reilly spoke to a packed room at the 2017 Banff Pork Seminar, and shared his belief that any negative perception of a brand can be changed.

How do you change a negative perception in the marketplace? "A negative perception can be changed if you have a great insight, a really smart leverage point and if you are absolutely consistent with your messaging from that point on," says O'Reilly.

Brand

O'Reilly defines brand as what an organization stands for, and possibly more

importantly, what it stands against. For example Nike says "Just Do It" - and is against being a couch potato. "In another words it is a crystal clear vision of what makes you unique, and what you stand against usually says more about your organization."

Using Einstein as an example, O'Reilly explained why the perception of a brand is so important. Einstein was one of many important scientists in the 20th century but likely the only one most people can name. He is perceived to be the greatest scientist of his time because his brand has become so well known. And perceptions are sticky.



Terry O'Reilly: Perceptions can be changed, but not easily



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Perceptions: burrs on a sweater

“Perceptions are sticky little things. They are like burrs on a wool sweater, they are tough to remove,” says O’Reilly. Advertising’s goal is to build perceptions for a product or organization. A positive perception makes price less important, and banks goodwill.

“If your brand is unique, compelling and well defined, and people feel positively about it, they will listen to your messages, respect your industry and buy your product,” says O’Reilly.

If the perception of a brand is unclear, it fogs up the messaging and identity and impacts perception. “In this time-starved world the perception of a brand acts like shorthand. It is an impression we carry with us,” says O’Reilly. If the perception of a brand is working against its identity, then it is time to change the perception.

Marlboro Country

“Changing a perception is the most difficult task you can give to marketing because people treat them like possessions. They don’t part with them easily,” says O’Reilly.

Using the example of Marlboro cigarettes, he explained how

the cigarettes were considered a ladies’ product, and were failing in the marketplace. The ad agency decided to try to change the conversation about the product to attract male consumers and the Marlboro man was born.

It was around this time that marketers realized the consumers quite often “drink the label and smoke the advertising. The image of the brand hinges on the perception of the product, not the actual product qualities themselves. The perception of a brand is an idea, and because it is an idea it could be influenced,” says O’Reilly.

The Marlboro campaign, what O’Reilly describes as perhaps advertising’s darkest success story, was nevertheless a useful marketing success case study because it influenced how people perceived the product and changed the conversation completely.

“Changing the conversation is never easy. It takes insights, strategic planning and patience. But it can be done,” he says.

I love New York

In order to change the conversation a leverage point is also needed. “A leverage point is something already in the consum-

CONTINUED ON PAGE 38

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PROGRESS IN PIGS

ers' minds that is so persuasive it cannot be denied" he says. A great example of this was the campaign in the 1980's to try and revive the image of New York City to attract tourists, despite its reputation as dirty and unsafe.

After consulting focus groups, it became clear that Broadway was the one thing people loved about NYC and that became the leverage point of the campaign. It overrode all the other perceptions people had about the city. "This is a great example of how finding the greatest area of opportunity when you are fighting a perception problem can change the conversation. The 'I love NYC' campaign wasn't about the city. It was about Broadway."

"When you uncover a leverage point, it's like rocket fuel."

Leave your bias at the door

Finding that rocket fuel isn't easy says O'Reilly An organization must be Switzerland, completely neutral when doing research and looking for the leverage point. "You must let the research reveal itself. Do not stickhandle the results or let your biases impress the results." In his experience, he has usually been surprised at how wrong his assumptions were.

The key is asking the right questions and listening closely to the answers. Quite often it goes back to what the perception of the product is and asking the right question can reveal the insight.



Frank Novak, (left) session chair hosts questions for Terry O'Reilly

Process, not event

Patience is needed. "You can change a perception but it is a delicate process. You have to be absolutely consistent in your messaging. You need patience because changing a perception is not an event. It's a process. It takes time." And lastly O'Reilly says, "If you want people to think about you in new ways, you need to talk to them in new ways."

The first step in changing a percep-

tion is to dig for the insight. To look for meaning not just facts.

"Your brand in the pork industry is so important and so powerful and it is one of your most valuable assets. And like anything of value it needs care and nurturing and it needs to be protected," says O'Reilly. He adds that when changing the perception or conversation around the pork industry seems insurmountable, remember New York City. ■

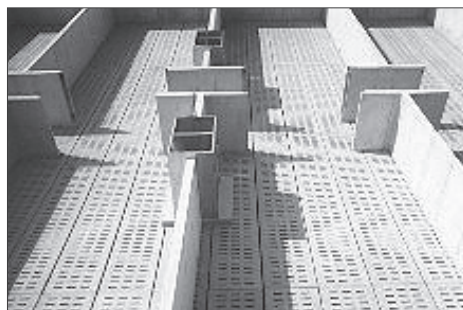


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PLENARY SESSION 2, PART 2

Winning the battle of public misconception about food

Content provided by Meristem



Dr. Joe Schwarcz

McGill University Professor Dr. Joe Schwarcz has spent a long career working to correct public misconceptions about science. He hasn't been short of work.

These days the field of food and agriculture provides rich fodder for that discussion. Schwarcz weighed in on the issues of the day at the 2017 Banff Pork Seminar. His goal was to talk to the pork industry about what he has learned about winning the battle of public misconception about food.

Not surprisingly, genetic modification was a key part of the discussion. The herbicide glyphosate is at the center of a large body of criticism, says Schwarcz in a paper provided to dele-

gates in conference proceedings. It is an example of how misguided science is creating wild misconceptions about food.

“Half of All Children Will Be Autistic by 2025, Warns Research Scientist at MIT.”

That headline has triggered both fear among the public and scathing attacks about irresponsible fear-mongering by scientists, he says. So, why are we destined for such a tragedy, and just who is this prophet of doom at MIT?

The story is really about glyphosate, a non-selective herbicide that proved effective at weed control, but really didn't get any traction as a villain in the public eye until Monsanto introduced crops genetically altered to be resistant to the herbicide.

History repeating

Historically the introduction of any new technology, be it pasteurization, vaccination, microwave ovens or cell phones, has raised concern, and so it was with genetically modified organ-

CONTINUED ON PAGE 40



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isms (GMOs), says Schwarcz. There were allegations that the effects of GMOs on people’s health had not been adequately tested and we were all “guinea pigs.”

But scientific organizations and regulatory agencies around the world dismissed the concern that genetic modification alters the composition of the edible portions of these plants in any significant way.

Recently, worries about safety have expanded to include the supposed toxicity of glyphosate itself and its residues in food. French researchers stirred up a dust storm with the claim that eating corn genetically modified to resist glyphosate can cause tumors as well as kidney and liver problems.

The study precipitated an outpouring of anti-GMO feelings around the world with activists saying, “I told you so”. They clamored for genetically modified foods to be immediately taken off the market, they slung piles of verbal fecal matter at Monsanto, and called GMOs the “new thalidomide.”

But there were issues. That science was ultimately rejected and the published paper retracted by the science journal that ran it.

MIT example

Stephanie Seneff, a research scientist at MIT has published articles linking the chemical to gastrointestinal disorders, obesity, diabetes, heart disease, depression, Alzheimer’s disease and infertility.

Her main thesis is that glyphosate disrupts gut bacteria and interferes with cytochrome enzymes. She presents no relevant human evidence, Schwarcz said.

There are also flagrant attempts to snow people with a mass of irrelevant data to make a case for glyphosate being the curse of our lives. Seneff’s most spurious argument is the correlation between increased use of glyphosate and increasing rates of autism and celiac disease.

What we have here, according to Schwarcz, is the classic fallacy of confusing association with cause and effect. Instead of glyphosate, one could just as

well link an increase in these conditions, which is itself contentious, with an increase in coffee consumption, cell phone use, flat screen TVs, Chinese imports or sales of organic produce.

The fact that the Seneff paper is scientifically poor has not been an impediment to activists promoting it as gospel. A widely circulating article claims to reveal, “The real reason wheat is toxic,” and “You’re going to want to sit down for this one,” warns the writer of the article who calls herself the ‘Healthy Home Economist’.

In any case, even if glyphosate is an evil chemical, it cannot do its mischief without exposure. Studies show the actual secreted amount in the general population is 1-3 micrograms/L. This corresponds to 1/5000th of the ADI, which actually has a 100-fold safety factor already built into it. Essentially then, our exposure to glyphosate as a residue in food is insignificant.

“So, if we are looking for causes of our ailments, we need to look elsewhere. I’ll also gladly wager Dr. Seneff that half of our children will not be autistic by 2025,” says Schwarcz.

The future of GM crops

A real question is to ask what the state of genetically modified crops will be by 2025? So far, the importance is proof of concept: we now know that it is possible to alter traits in plants in a scientific way that is more specific than the haphazard process of cross breeding. The future may yield crops with improved nutritional value, crops that can grow in salty soil, and who knows what else?

“Given that by 2050 some 9-10 billion people will be coming to dinner, we have to consider every technology that will help feed them. No, genetic engineering will not solve all the world’s problems. It is just one of the tools that can help. It would be irresponsible to turn our backs on this technology, especially given that there isn’t a single credible study that demonstrates any ill effect in people despite more than twenty years of wide-

spread consumption of foods with components derived from GM canola, soy and corn,” Schwarcz said.

Can unforeseen circumstances arise? Possibly. There is a risk with pursuing any novel scientific venture. But the biggest risk is taking no risk at all – that is guaranteed to stagnate progress.



Dr. Joe Schwarcz uses magic tricks to explain science

A sampling of Schwarcz logic

A powerful presentation from Joe Schwarcz at the Banff Pork Seminar 2017 had many nuggets of knowledge. Here is a condensed version of some of his comments:

- *The task of separating sense from nonsense is more difficult than ever. There is so much information today, much of it not useful. So you can cherry pick results. And you can publish anything; all you have to do is pay the page rate.*
- *Biggest thing I face is that something that is natural is safe. Much of our life is spent dealing with the ravages of nature.*
- *Number of pesticides does mean risk. There may be 36 pesticides registered to be used with apples, but in reality only two or three would be used.*
- *It always comes down to risk and rewards.*
- *One thing that really ticks me off is the battle between organic and conventional agriculture. There is room for both. But organic will be a niche market because we cannot feed the world that way.*
- *Hazard and risk are different. Hazard is the potential to do harm. Risk is hazard multiplied by exposure. A grizzly bear has a high hazard for harm in the wild, but in a zoo the risk is managed. Sunshine is a hazard but you can manage the risk.*
- *We have to keep an eye on genetic modification. But life is full of risks; it's a matter of benefits.*
- *Chemicals are not to be feared or worshipped. They are to be understood.*
- *The dose makes the poison. ■*

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BREAKOUT SESSION 5: Breeding Technologies

By Geoff Geddes

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Part one: Current strategies and technologies for reproductive management of gilts and sows

Though not all aspects of pig production are universal, reproduction is kind of a given. Still, technologies to increase the precision of pig reproduction are becoming more widely available and vital to the economic viability of producers. Drawing on his expertise as Director of Reproduction Research and Development for JBS United Inc, Stephen Webel took a closer look at these technologies and what they mean for the industry.

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and mares. Therefore, the predominant approach to estrus synchronization in the gilt is to administer a synthetic progestin (altrenogest), which suppresses pituitary secretion of the gonadotropins, follicle stimulating hormone (FSH) and luteinizing hormone (LH) for 14 to 20 days. During this time the corpus luteum (CL) degenerates while the growth of new follicles and ovulation is suppressed. Upon withdrawal of altrenogest, pituitary gland secretion of FSH and LH resumes simultaneously.

Altrenogest is generally available worldwide and is marketed as Matrix or Regumate as well as several generic formulations. Altrenogest is also used to synchronize estrus in sows to facilitate batch scheduling. Accurate daily dosing of altrenogest is extremely important, with gilts receiving at least 15 mg/day and sows 20 mg/per day for 14 to 18 days. Insufficient dose levels, failure to deliver the dose each day and at the same time each day or failure of animals to ingest the entire dose leads to increased incidence of cystic follicles and failure of animals to return to estrus. Inaccurate administration of altrenogest is a consistent problem that reduces the precision of estrus synchronization.

Stimulating or Controlling Follicular Development

Precise stimulation of follicle growth requires treatment with a correct ratio of FSH to LH. However, frequent injection or continuous infusions of these purified hormones are required. Likewise, gonadotropin releasing hormones (GnRH) for follicle stimulation have failed to produce consistent results. Pregnant mare serum gonadotropin (PMSG or eCG) contains the appropriate ratio of FSH and LH-like activities to stimulate follicle growth. Doses ranging from 500 to 1000 IU are generally effective.

Although PMSG is widely available in many countries, the only commercially available preparation for inducing estrus and ovulation in pigs in the United States is P.G. 600.

Induction of Puberty in Gilts

PMSG or P.G. 600 induces estrus and ovulation in 50–90% of prepubertal and peripubertal gilts within five days. The maximum response occurs when gilts are within 20–30 days of natural puberty. However, up to 30% of treated gilts do not display estrus, but many of these ovulate. As well, up to

CONTINUED ON PAGE 44



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30% of those exhibiting estrus have an irregular return to a subsequent estrus.

Development of improved methods of inducing estrus in pre-pubertal and peripubertal gilts would increase the precision of breeding this group of gilts.

Follicle Stimulation after Estrus Synchronization with Altrenogest in Gilts

Inevitably in commercial swine operations, groups of gilts will include cycling and prepubertal animals, or the sexual maturity of a group of gilts may be unknown. A regime of altrenogest for 14 days followed by a follicle stimulator, such as PMSG or P.G. 600 24 hours after the last feeding of altrenogest, synchronizes estrus in these gilts.

Follicle Stimulation in Weaned Sows

Weaning a group of sows typically results in wean-to-estrus intervals of 3–6 days. Yet greater variation occurs in parity one and two sows and in the hot summer months. Variation in the weaning-to-estrus and ovulation intervals in sows is due to variation in stages of follicular development at weaning. Simultaneously triggering follicle growth with PMSG or P.G. 600 at weaning results in a more uniform population of follicles and increases the percentage of sows in estrus within five days.

Seasonal Anestrus

Puberty is frequently delayed in summer months. Weaning-to-estrus interval is longer and ovulation rate, conception rate and litter size are lower among both primiparous and multiparous sows weaned during summer and early fall. Parity one sows are more susceptible than older sows. An injection of 500 to 1,000 IU of PMSG, or treatment with P.G. 600 promotes a synchronized estrus in gilts following altrenogest and in weaned sows injected the day of weaning or 24 hours later during late summer and autumn.

Induction of Ovulation

Ovulation induction is an important tool to more precisely synchronize the time of ovulation. Mature follicles are simultaneously induced to ovulate with a gonadotropin of predominately LH activity, such as porcine LH (pLH) or hCG. A GnRH analogue can also synchronize ovulation by inducing an endogenous preovulatory LH surge from the pituitary gland.

CONTINUED ON PAGE 46



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Control of Farrowing

Generally, farrowing within a group of sows is spread over several days. Due to an increased focus on biosecurity and piglet health, there is renewed interest in batch farrowing and all-in-all-out production. Properly timed induction of farrowing increases the proportion of sows farrowing during normal working hours. It's important to note that successful induction requires treatment within two days of the expected normal farrowing date.

Available technologies for precise control of reproduction have been implemented in part or in whole by early adopters. These technologies are not therapies for reproductive problems the way antibiotics are for disease, but are designed to enhance production efficiency.

At present, the primary impediment to more universal application of these technologies is critical training of all personnel regarding the importance of proper and precise implementation. Careful timing of treatments and correct dosing of products are primary issues that limit the precision of these technologies. These are issues worth addressing, as pig reproduction is like proposing to your future spouse: There's no way around it, so you might as well do it right.

Part two: Application of sexed sperm in pig production

The use of sexed sperm has been primarily synonymous with cattle, but why should they have all the fun?

Significant investment in research and development has made this technology available to other commodity groups including pigs. Commercial application of sexed sperm is expected to increase as the level of fertility approaches that of conventional AI and as the sorting capacity improves. So the timing was right for Kilby Willenburg of Fast Genetics to explain the processes of flow cytometric sperm sorting and how this technology can be applied to the swine industry.

Flow Sorting of X and Y Bearing Sperm

The effects of sorting, particularly on the sperm membrane, are well characterized and include several stressors and potential dangers to the gamete resulting in reduced viability, stor-



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age capacity and fertilization. Sperm are exposed to Hoechst staining, high dilution rates, laser exposure, high pressure, electrical charging, changes in media composition and centrifugation, which are collectively thought to reduce the lifespan of the sorted sperm.

Interestingly, inter and intra-boar variation exists for sperm to withstand flow cytometric sorting as it was reported that 15 per cent of boars did not exhibit a well-defined distinction between the X- and Y-bearing

peaks in a histogram plot. Hence there is value in determining which boars can withstand the sorting process to ensure sufficient post-sort motility and viability to accommodate a greater distance between the sows and sorting lab.

Fertility of Sexed Sorted Sperm

The application of sexed sorted sperm in the swine industry must overcome some challenges before this technology can be used commercially. Flow cytometric sperm sorting speeds are a limitation, especially for an industry that inseminates 2.5-3.0 billion sperm in 75-100 mL of extender. Although sorting speeds have improved to around 20 million cells per hour, one A.I. dose would require about 100 hours of sorting time. To overcome this obstacle, new insemination techniques have been used to reduce the number of sperm and deposit the sperm closer to the site of fertilization.

One such technique is Laparoscopic insemination (LAI), which appears a plausible alternative to inseminate pigs from a sorting perspective. It could be a realistic model for sexed

sperm on nucleus or multiplier herds since one gender is generally preferred and fertility could be reduced if additional animals from the desired gender are produced. This technique is still relatively new in terms of use with sexed sperm but has shown promising results.

Deep uterine insemination (DUI) is another option for inseminating reduced numbers of sexed sperm, particularly on a commercial farm. A DUI catheter longer than 1.5 m has to bypass the cervical folds and manipulate the length and coiled nature of the uterine horn prior to depositing cells in one of the horns.

Collectively, LAI and DUI enable the swine industry to reduce the number of sperm inseminated and further leverage a particular boar across multiple females, which is not realistic for inseminations that require billions of sperm per female.

For example, a boar that is used for cervical inseminations at 3 billion cells can produce almost 8,000 pigs a year, while that same boar can produce almost 8 million pigs when used in a laparoscopic model, assuming all sperm cells are used for insemination (and you thought you were overworked). A more realistic model for commercial farms would be an insemination dose of 500 million cells and 45,000 slaughter pigs produced per year.

At present it's unclear when sexed sperm will be ready for commercialization. Sorting speeds are a popular area of concern, especially for an industry that relies on billions of sperm for one insemination dose. Speeds have increased from 200-600 cells/second in the earlier years to 8,000-10,000 cells/second from improved digital technology and partial automation. For an industry that relies on 6-9 billion cells per breeding female, however, inseminating 50-500 million sperm might be a difficult transition. Sorting speeds will continue to improve but a reduction in sperm cells is needed for inseminations similar to what the dairy industry experienced in the earlier years of the implementation of sexed sperm.

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Whether industry is willing and able to make the adjustment remains to be seen. Clearly, it will require farms to be more efficient, but if the dairy industry is any indication, sexed sperm is a technology that pork producers should milk for all its worth.

Part three: Editing the genome for PRRSV resistance - where can we go from here?

As visitors go, Porcine Reproductive and Respiratory Syndrome Virus (PRRSV) is akin to a mother-in-law at a stag party: unwelcome and potentially fatal. With vaccines largely ineffective, losses from the disease continue to mount. In exploring alternative countermeasures, Dr. Randall Prather with the Division of Animal Science at the University of Missouri described the use of a simple genetic editing technology to delete a protein from the pig that is responsible for infection. These gene edited pigs are completely resistant to challenges from PRRSV and represent one example of a genetic change that has a profound effect on the health and wellbeing of pigs.

Fortunately, vaccines provide control for many swine pathogens. Unfortunately, it has been more difficult to develop an effective vaccine for PRRSV, resulting in costs to producers of over \$660 million in North America and over €1.5 billion in Europe. And the financial damage is only part of the picture. There is also a price to be paid in terms of animal welfare, sustainability, food security and psychological and emotional costs.

The starting point for a genetic editing approach to PRRSV prevention was a belief by some that the virus gained entry into, and infected, the white blood cells in the lungs. Two can-

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didate molecules on the surface of the white blood cell were implicated: sialoadhesin and CD163.

To test which molecule is really important for infection, it was necessary to remove the sialoadhesin or CD163, or both sialoadhesin and CD163, and then determine if the animals could still become infected. Researchers began by testing sialoadhesin. By using some rather complicated genetic engineering technology, they were able to delete the DNA sequence that prompts the production of sialoadhesin. Removing these sequences resulted in “knocking out” the gene and in making pigs that didn’t produce the protein.

PRRSV Resistance

Unfortunately, the animals that did not make sialoadhesin still contracted PRRSV, but experiments with CD163 clearly identified it as a gatekeeper for infection. Moreover, the pigs with CD163 removed appeared to grow at usual rates, reproduce normally and be no more susceptible to other infections than regular pigs.

Since these CD163 edited pigs have been raised and maintained in a research setting, it remains to be seen if they perform well in a production environment. Additionally, the same or similar edits need to be introduced into pigs with elite genetics to determine if there is any effect on production characteristics.

Other Genetic Editing Opportunities

Editing CD163 to knock it out is just one example of what might be done. Other possibilities include replacing individual amino acids in a protein, replacing domains and adding transgenes. These approaches could support introducing resistance to other diseases, addressing other animal welfare issues, improving productivity and altering the carcass composition.

Genetic engineering, whether it’s gene editing or transgenesis, offers an incredible opportunity to address basic questions of biology. In addition to producing a pig that is

Canadian Hog Journal - Banff 2017
Scenes from the Seminar



resistant to PRRSV infection, a better understanding of the mechanisms of biology in the case of how a virus infects the cell by using CD163 may also lead to better treatments to prevent PRRSV infection.

The types of genetic engineering available are limited only by biology and our imagination. Applications that benefit production agriculture by improving animal welfare, boosting productivity and creating safer, healthier food will continue to be developed. Now if we can just find a gene to keep your mother-in-law in check, our work will be done. ■

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PLENARY SESSION 3

Is the re-tooling over, or just beginning?

Content provided by Meristem

Two of North America's best known pork market analysts told delegates at the Banff Pork Seminar that they believe the re-tooling in the Canadian and U.S. pork industry is neither over or about to increase. It is just continuing.

Steve Meyer of EMI Analytics, and Kevin Grier of Kevin Grier Marketing and Consulting are comfortable and entertaining speakers on pork market analysis and their tandem discussion on the retooling question closed out the 2017 Seminar in Banff, Alta.

Meyer cited five drivers that have driven the biggest changes in the U.S. pork industry and says all will continue to shape that industry in years ahead.

One is contract production. Born in the poultry business it changed how the industry viewed facility construction, labor, capital, economies of scale and geographic dispersion, says Meyer. Second is technology, "The term I use loosely to describe how we do things." That includes things like the application of statistical analysis to control swine production.



Steve Meyer (left) and Kevin Grier

Driver three is superior genetics; four is federal grain price supports. Driver five is the specialization of everything, the biggest driver recently.

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“Size allows people, vehicles, buildings, records, virtually everything to be optimized,” says Meyer. “Labor and management specialization has been a key part of that and size allows specialized marketing, logistics, public relations and government relations, all with big advantages.”

Canada can compete

One common question in Canada, says Grier, is whether the Canadian industry can compete. While Grier often hears that this industry is not competitive, he says the data does not support that. Trade balance figures show we can compete and Canada is clearly a global presence. Canadian production from 2012 to 2016 increased seven per cent, while the world increased one per cent and the EU four per cent.

Canada increased exports the past four years while the U.S. decreased theirs. Canada’s share of the Chia market increased. “We lost a bit globally due in part to the fact we lost Russia. International cost of production figures show Canada can compete. We aren’t Iowa but then nobody is Iowa,” says Grier.

Packer developments

There is some work to be done on the competitiveness side in the packing industry in Canada. “They know that,” he says.

Grier expects strong demand for Canadian weaners and feeders thanks to the growing U.S. hog industry and the weak Canadian dollar. He sees plant closures likely in the Quebec market, perhaps expansion in other areas. Expect the move to fewer, larger, more integrated operations to continue, he says.

On the trade front, while the Comprehensive Economic and Trade Agreement (CETA) is coming, he does not expect it to be a big deal for the Canadian hog industry.

Positive demand

One of the most important developments in the North American industry is the improvement in pork demand. In fact, it is not just an improvement in pork demand but in meat and



poultry demand in general. It has been an unfortunate factor of the red meat industry, and pork in particular, that demand has been in decline for 20 or more years.

In 2014-2016 the erosion appears to have stopped. Not only have Canadians eaten more pork but given how high prices

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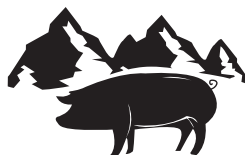
were, Canadian consumption was very robust. The U.S. demand behavior is almost exactly the same.

Demand is important because an industry with declining demand is an industry in decline. Conversely an industry with increasing demand is not necessarily growing, but at least it has the opportunity to grow.

Grier explains that demand is the combination of price and consumption. Just because consumption is rising or falling, does not mean demand is rising or falling. The price must be combined with the consumption to get a true picture of demand.

Demand is important to the health and growth of the pork industry. People readily look at supplies and slaughter as indicators of the potential for pricing and profit gains or losses. Part of the reason the industry looks so closely at supply and slaughter is because it is easy to grasp.

“We can all appreciate what it means to hog prices when we have short or long supplies,” says Grier. “Obviously supplies and slaughter are critical but they only tell half the story. Demand on the other hand is more nebulous and we typically cannot get a statistical feel or gauge on demand until after the fact. Demand can make or break a market just as supplies can make or break a market.” ■



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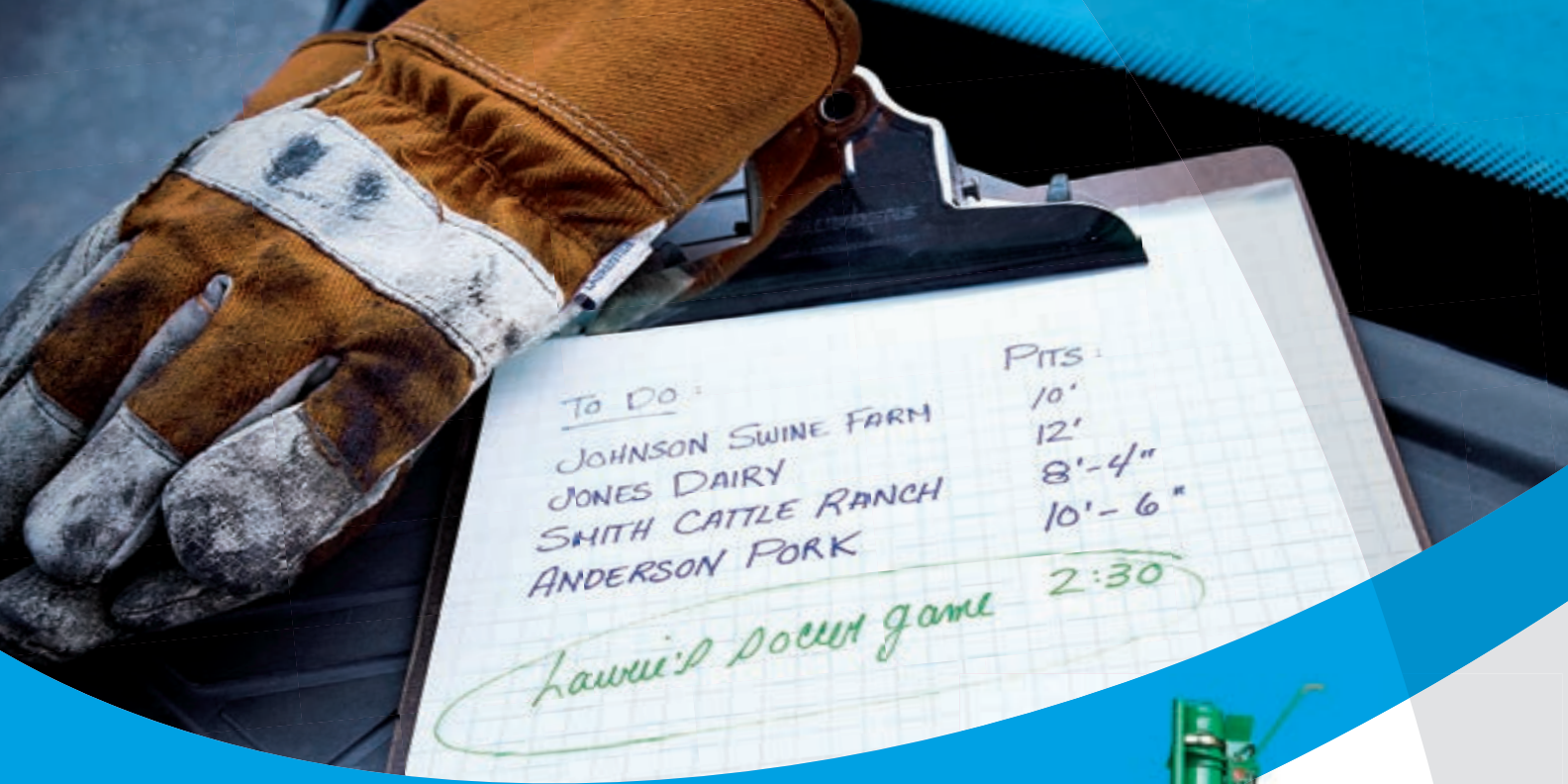
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