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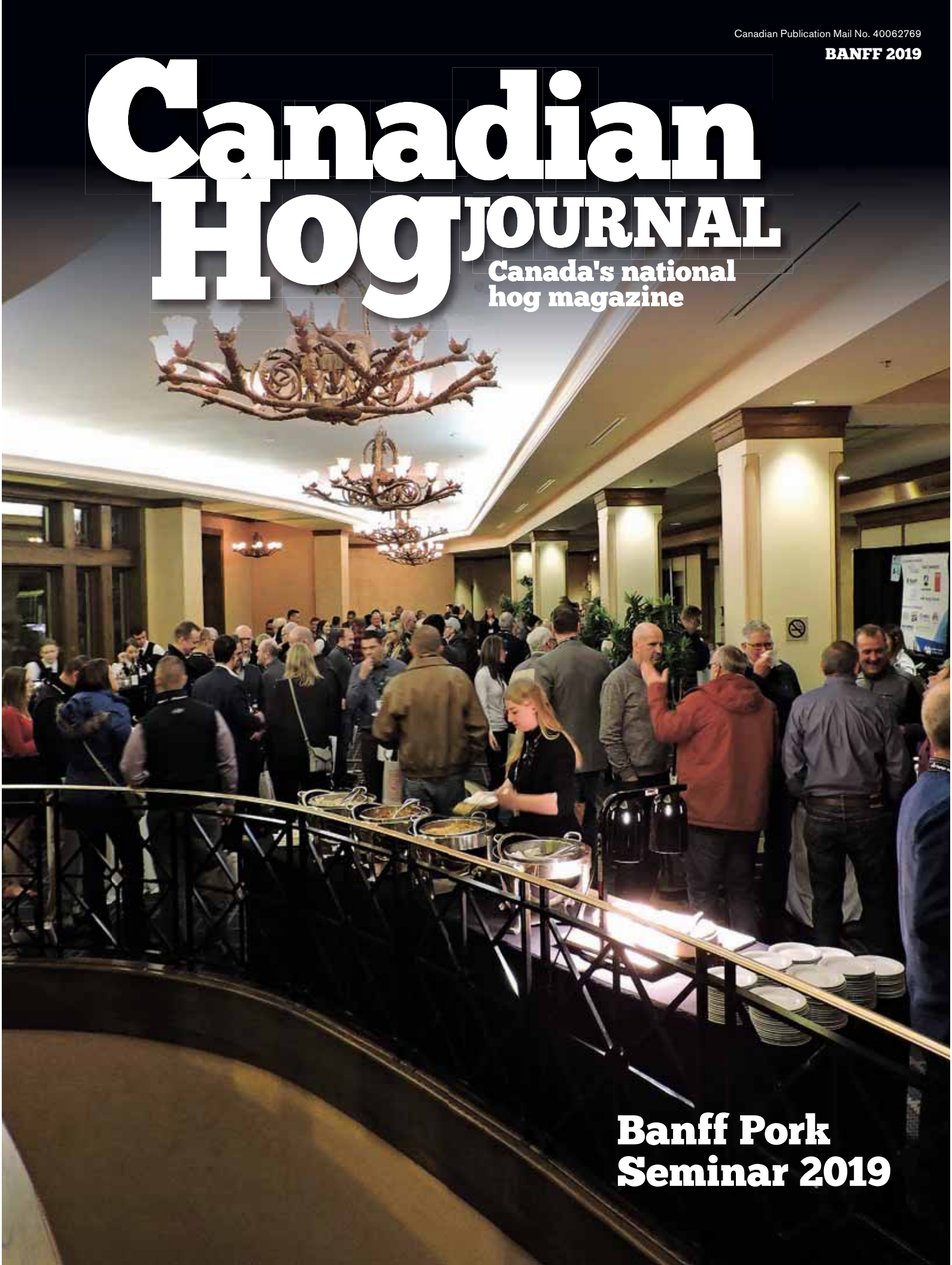
Canadian Hog JOURNAL

Canada's national hog magazine



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Phone: 403-627-9108
Email: sherimonk@gmail.com

Publisher
Darcy Fitzgerald, Alberta Pork

Business Manager & Editorial Director
Sheri Monk
403-904-5100 (o) 403-627-9108 (m)
sherimonk@gmail.com

Cover Photo
Banff Pork Seminar attendees take advantage of networking opportunities in the grand space of the historic hotel.
Photo by Alyssa Monk

Canadian Hog Journal Message from the editor

Welcome to our coverage of the 2019 Banff Pork Seminar!

It was an action-packed whirlwind of networking, information and opportunity, and I hope you had the chance to be there for it. But if you couldn't be, this issue is hands-down the next best thing.

However, no matter how thorough a job we do of covering each topic, (special thanks to Terry Hockaday at Meristem for his exceptional coverage!) we can't recreate the ambience of Banff in the New Year, before the holiday glow has worn off. The scenery is breathtaking, and the atmosphere is electric. It beats whatever Iowa offers any month of the year, and I would encourage you to make the effort to be there at least once.

One encouraging aspect of agriculture conferences in general, and Banff Pork Seminar specifically, that I have noticed is the trend to acknowledge climate change and our industry's responsibility to produce more with less. I think it really shows our commitment to build a better world, to embrace science, and to allow realism to shape our ideology. It speaks to our character, and I think it's a message we can be proud of – and I think we are getting better at sharing it, too.

Congratulations to the BPS organizers for another fantastic year – thank you for your dedication and hard work. It shows, and we appreciate you. Thank you to all of the sponsors who tirelessly travel to these industry events, using their time and dollars to ensure we all have the opportunity to learn and grow. Thank you to all the attendees who took time away from their personal and professional lives to be a part of it all. Lastly, thank you to our advertisers who make this special edition a reality so we can bring Banff to our readers who just couldn't make it this year. ■

sherimonk@gmail.com

S Monk.

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Editor, business manager

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Plenary Session 1, Part 1

How trends are re-shaping worldwide food production

Dr. David Hughes, Emeritus Professor of Food Marketing at Imperial College London, UK

By: Bryan Passifiume

Dr. David Hughes, Emeritus Professor of Food Marketing at Imperial College London, UK

The world, particularly among developed nations, is seeing a marked change in how we eat.

Gone are the days of weekly shopping trips for food ingredients to cook – from scratch no less – three meals a day to be eaten around a kitchen table with the family.

Today's eating tends are leaning more towards meals-to-go or prepared ingredients, and take place more sporadically throughout the day, says Dr. David Hughes, Emeritus Professor of food marketing at Imperial College London in the United Kingdom — and that presents both challenges and opportunities for the world's food producers.

Agriculture will be transformed over the next few decades and food supply will expand to meet burgeoning demand," he said, during his plenary address at this year's Banff Pork Seminar.

"The critical issue will be whether, in expanding global food production, we shall do irreversible damage to the environment or learn to produce more from less with a much lighter global food footprint."

As world population numbers increase, so too do the dire predictions on how our food supply could possibly keep up with demand – especially in the wake of an international catastrophe.

But are the pundits spinning portents about worldwide food shortages always correct?

The implication of production versus population will have a profound impact on the meat industry, he said, pointing to population spikes occurring in emerging countries.

While the so-called developed nations of Europe are struggling to maintain their current population numbers and China, Russia, Japan and South Korea are seeing noticeable declines, explosions in Nigeria, the Democratic Republic of Congo, Ethiopia and Egypt will contribute to a two-fold increase in population, from one billion to two.

India, Pakistan and Bangladesh will add close to 500,000,000 new souls to the Indian subcontinent, and populations in Canada, the United States and Mexico will likewise increase by 100,000,000.

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"The good news for meat is that emerging countries, if they experience household income growth, transform their diets and increase meat consumption significantly," Hughes said.

"But which meats?

Well, more than half of the two billion people added to the world's population by 2050 will be either Muslim or Hindu, whose dietary restrictions imposed by their faith prevent the consumption of pork or beef respectively.

This trend is good news for both the chicken and fish industries, he explained – both are readily consumed by both Muslims and Hindis alike, easy to raise and are affordable when raised under intensive conditions, and are seen by many as healthier alternatives than beef or pork.

"During the period 2018 to 2030, global demand for poultry is expected to increase by 50 per cent, eggs and pork by 35 per cent, and 20 per cent for fish/seafood and beef," Hughes said, adding that India and Pakistan will see the largest capita increases from a very low base.

While emerging nations will see the biggest future demand for meat, consumption per capita will remain static in developed nations, he said.

For these higher-income, developed nations, Hughes described these societies at being close or even achieving 'peak meat' in terms of both supply and demand – presenting both a challenge and opportunity for producers and marketers.

"Many consumers are signaling that they wish to eat less meat, but eat better meat when they do," he explained.

There are many reasons for this – health and weight management, concerns over animal welfare, the perceived environmental impact of modern agriculture, and saving money.

As well, the traditional 'three squares a day' model of eating is being replaced with smaller meals throughout the day.

Consumers in developed nations are also becoming more conscious of where their meat is coming from, demanding transparency and traceability in not only their food supplies, but even the source of the feed used to sustain the livestock.

Those most likely to cut back on meat consumption are 'flexitarians' – younger high-income earners, usually female and live in urban areas.

"Flexitarianism is a *bona fide* trend and is, also, associated with the primacy of meat slipping as 'the centre of the plate,'" Hughes said.

A response to this has been the recent popularity of non-meat 'meats' made from plant-based ingredients, including the Beyond Meat burgers available at Whole Foods and A&W and –although a few years away from commercial availability – products available from biotechnology firm Memphis Meats, boasting a 'clean meat' grown *in vitro* using stem cells to create what's called 'cultured meat.'

Even insects are being eyed as potential 'alternative' sources of protein – although it should be noted that insect populations appear to be crashing around the globe.

"Meat has much more competition than in the past as a protein source," Hughes said.

"Vegetable-based food products have improved substantially over the dire nut roasts and gritty soyburgers of yore –millennial start-up companies are quick on their feet, in-tune with younger consumers' food wishes and quick to spot commercial opportunities."

He points to Quorn 'chickenless chicken' produced by the Filipino

food company Monde Nissin – created from single-celled, fungus-derived mycoprotein – that's expected to become the world's first billion-dollar faux-meat brand within the next five years.

Pressure from anti-meat activists such as PETA and environmentalists, as well as national health authorities preaching a gospel of reduced meat consumption in the name of improved health and nutrition continue to take a toll as well.

All of these factors will cause strain for the meat industry, in particular beef, lamb and pork producers.

"In many countries, we are in a period of massive disruption in how consumers feed themselves," Hughes said. "At the beginning of this century, major supermarket chains were in their ascendancy and punditry talk was all about how dominate could Walmart, Carrefour and Tesco become."

Online retailers like Amazon have shaken up this once-insurmountable status quo, he said, in addition to small-store hard discounter chains.

"Consumers are increasingly impatient, when they want an item, they want it now – not later, not tomorrow, but now," Hughes said.

"Those selling food must ensure that it is available whenever and wherever the consumer requires it and, thus, successful vendors will be represented in small convenience stores, kiosks, metro stores in the middle of big cities, supermarkets, hypermarkets, and online."

Changes in how people prepare meals also plays a role, he said, describing the trend away from purchasing ingredients to entire meal components, such as bagged salad or marinated chicken pieces.

Some are even eschewing cooking altogether and just purchasing ready-made 'meals-to-go' from supermarkets.

"The chicken, beef and pork sections of the meat department look dated and, now, meat species ¬ including fish are presented together in value-added form in one section under the label of 'meal solutions centre.'

The good news in all of this, Hughes explains, are the increased opportunities for meat and egg producers to get their goods to market.

The supermarket's traditional monopoly is being supplanted by online meat vendors, artisan butchers, urban fresh food and meal outlets in urban areas, and direct-to-your-door meal preparation firms.

"In the United Kingdom, the 'food-to-go' sector is growing much faster than the traditional food retail sector," he said, describing a dominance in that industry of specialist companies more oriented to food service rather than straight retail.

Food-to-go is still lacking in the United States, he said, describing many hot food offerings in American supermarkets as being closer to school cafeteria lunches compared to overseas, particularly in Asia, where the 7-Eleven chain of convenience stores have long been market leaders in the area, and consumers have grown accustomed to more innovative ways to purchase prepared food, including vending machines.

"Chicken and egg producers would do well to look at the global salmon industry as a good practice example of how to take advantage of food-to-go trends," he said.

"Sushi is pervasively available around the cities of our world, yet managing the supply chain for chilled salmon is challenging."

Hughes described sushi as a food that fits into many current food trends – it's tasty, healthy, easy to buy and eat, and like much of the cuisine of Japan, it's fashionable.

"At a more economical price point, chicken and egg snacks and mini-meals should similarly be successful."

Expectations by consumers are on the rise – and not only for premium meats.

"They assume the integrity of the product is a minimum requirement when they purchase your product," he said, adding the increasing channels of communications available for suppliers presents new and exciting ways to open meaningful dialogs with the consumer.

"The closer a business can get to the final consumer, the more attractive is the margin." ■

Plenary Session 1, Part 2

Disruptive Technologies, Public Perceptions and Implications for Pork

Ellen Goddard, University of Alberta

By: Bryan Passifiume

Disruption — and disruptive technologies, aren't analogous terms, says Ellen Goddard of the Resource Economics and Environmental Sociology Department at the University of Alberta in Edmonton.

"We have a tendency to confuse surprising things in our work environment with disruption and although we may feel 'disrupted' it isn't always the result of someone or something disrupting our markets," she explained during her plenary address at this year's Banff Pork Seminar. "Sometimes we are disrupting theirs."

Having become what she described as a ubiquitous term, Goddard defines it as the "process of disruptive innovation" – a process whereby a small company with fewer resources is able to successfully challenge established incumbent businesses."

"Specifically, as incumbents focus on improving their products and services for their most demanding – and usually most profitable – customers, they exceed the needs of some segments and ignore the needs of others," she said, citing an article from the December 2015 issue of the Harvard Business Review.

"When mainstream customers start adopting the entrants' offerings in volume, disruption has occurred."

Applied to pork production, Goddard refers to a December 2016 LinkedIn post by Aidan Connolly discussing eight such technologies that could have a profound impact on agriculture – namely 3D printing, robotics, drones, blockchain and artificial intelligence, among others.

"When we move beyond actual information technology to other innovations, we have the various uses of genetic technologies – including newer gene drives and gene editing," she explained.

"However, we can also include other developments – such as cellular meat, refined plant based meats and insect meat products, all of which can and are impacting traditional livestock markets."

Is this, she asks, classic disruptive innovations or normal competition faced by livestock producers?

The answer, she claims, lies with consumers.

"Consumers may not only be looking for low cost alternatives, they are also looking for product quality attributes, ethical attributes (animals, environment, labour), health and convenience in their purchasing," she said.

"Some of the innovations are aimed squarely at these perceived undersupplied attributes requested by today's consumers."

A national study undertaken in 2017 that looked at non-consumers and consumers of pork products who've reduced their consumption over the past few years.

Ellen Goddard, University of Alberta

Aside from those who eschew pork for religious reasons, the results were telling.

"Although it is worth noting that the group that had reduced consumption represents only about 25 per cent of the sample of more than 1,800 Canadians, their reasons are interesting," she said.

"The largest reducers, which includes people who have reduced by 100 per cent, are less concerned about cost and more concerned about health – but not fat noticeably – than those who have reduced their consumption at lower levels."

Another large driver of reduced pork consumption were perceptions of animal welfare, Goddard added.

"The message of no-additional-hormones used in pork production is clearly not getting across to the entire population, given the relatively high level of concern about hormones as a reason for reducing consumption at any level," she added.

An innovator looking at disrupting Canada's pork markets may recognize that

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these 25 per cent of all Canadian pork consumers are being overlooked, and focus their efforts on them, Goddard said.

"Clarification around health, especially given recent analysis of the sodium content of some meat substitute products, and animal welfare aspects of pig production in Canada, are clearly worth a further look," she said, pointing to consumer-outreach initiatives such as the Verified Canadian Pork program.

She says the issue of 'substitute meats' is an interesting one, given the acquisition of such production by firms traditionally known for meat like Tyson's and Maple Leaf – who she says now describe themselves as 'protein companies.'

"The debates about what substitute products can be called – does a plant-based product have the right to call itself 'plant-based meat' – is often raised by traditional livestock producers, but not by the blended-protein processing companies," she explained, saying the battle could very well be an unwinnable one if everything is just re-designated as 'protein.'

"Are there benefits to being part of a 'protein spectrum' rather than fighting some disruptive innovations such as substitute plant-based products, which are called 'meat'?" she asked.

How these technologies will impact pork producers will vary, she says.

Technologies that demonstrate or facilitate positive impressions of animal welfare or environmental stewardship will be readily accepted by the consumer, Goddard said.

Issues surrounding technologies surrounding genetics, however, will often be controversial – a universal concern.

"What is particularly interesting is the explosion of new genetic technologies, such as gene drives and gene editing, which may or may not be viewed in the same way as genetic modification by regulators, the public and consumers," she explained.

Right now much of the utilization of genetics in pork production is genomic selective breeding, a rather benign and non-intrusive use of genetic science, rather than hands-on genetic editing or engineering, she said. However, its future potential in reducing disease is becoming increasingly apparent in today's age.

"In unpacking the public's interest in the use of genetic technologies – as distinct from genetic modification technologies – we focused on a couple of different things," Goddard explained. "First, how important reducing disease incident in pig production is to the public, and second, how important the technology used to reduce disease incidence is to the public – technologies can only be disruptive or productive if they somehow move out of the lab and into the marketplace."

As to popular resistance to genetic technologies, it isn't yet clear if that should pose a make-or-break decision when it comes to implementing them.

"The use of genetic technologies do not appear to be disruptive innovations in the pig production sector," she said.

"Canadian consumers are not like European consumers who seem much less accepting of genetic technologies, therefore, the use of production technologies needs to be assessed in the context of where exports might be directed. Pig producers and the public both would like to see more judicious use of antibiotics, so if the use of genetic technologies can reduce antibiotic use then the public would likely accept that use."

While keeping up with new advances available today's pork production can be difficult, Goddard says taking advantage of many of these new and emerging takes serious investments of time, money and knowledge.

"Somewhat more disruptive to the pig production sector could be the development of substitute products in the protein space," she said. "Cost is not the core attribute of these products to date and so their disruptive abilities are likely limited."

Focusing on consumers whose ignorance of current industry practices may prove beneficial, she said – as convincing people to return to Canadian pork could be as simple as changing their minds. ■

Breakout Session 1: Meat Quality

By Bryan Passifiume

It's somewhat of a poetic irony that the final product of any pork production operation –the meat – is ultimately judged on the most subjective criteria of all: taste.

Regardless of how the consumer chooses to prepare the end result of your labour – be it fried, broiled, barbecued or pulled, the palatability if the meat boils down to the one final factor still within the control of the producer: quality.

Part one – Confidence in quality

Michael Young, Canada Pork International, BC, Canada

Producing a quality meat can be impacted by almost every point in a farmer's operation, from feed through to finish. Defining quality, says Canada Pork International's Michael Young, is a little more nebulous.

"Meat quality is a moving target that can and does mean different things to different people," he said.

"Understanding the sensory, culinary, processing and emotional properties of meat is important for producing, processing, selecting and marketing consistent product quality."

Harmoniously mastering what Young describes as a "perceptive orchestra of attributes," producers are better prepared to reap the rewards of a quality product.

Meat quality, he explains, is subjective in the mind of the consumer, but traditionally was based on factors of palatability ¬such as appearance, colour, flavour, tenderness, juiciness and odour.

Today, marketing by retailers, restaurants and the media are telling consumers what to expect in terms of a premium product, usually by tapping into the emotions of the customer.

Rather than clearing the confusion for the customer, it often has the opposite effect – giving complicated and even sometimes contradictory information of what constitutes a premium product.

"It wasn't that long ago that buying meat was as simple as pork, beef, chicken or fish, and the rest was left up to Mom's kitchen skills," Young said.

Traditional palatability factors are influenced by carcass quality and workmanship, he said. Attributes such as muscle conformation, lean-to-fat ratios, marbling and quality of fat, portion yield, firmness and texture all play a part.

Production achievements aside, Young explains that emotional attributes through careful and purposeful marketing can be just as important in determining quality in the eyes and heart of the consumer.

Today's main marketing drivers can be split into four categories, according to Young, farming methods, genetics and animal nutrition, trust in the meat delivery sector, and nutrition in health.

Farming methods educate the consumer about where their meat was raised. Safety and trust play large roles in this, particularly when it comes to the divide between family and factory farms. Food traceability – being able to track all production stages from growth, production and distribution – is also a factor here, as is animal welfare and sustainability.

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In terms of genetics, consumers are becoming more aware of and actively seeking meat from certain breeds and lineage of pigs. They're also concerned about the type of feed sustaining your operations, and if the animals dined on commercial livestock feed or were pasture-fed.

Consumers also put a lot of weight in their trust of the meat delivery sector, country or region of origin, certification and inspection along the line, and the ability to trace their meat back to the source.

Nutrition is also important – is the meat they're eating low in fat? Is it heart healthy? What about exposure to GMOs? All of that is meaningful information to a growing number of consumers, Young explained.

Part two – Chewing the fat: Pork is more than the sum of its protein

Brian Sullivan, Canadian Centre for Swine Improvement, ON, Canada

While protein is a staple in any healthy and balanced diet, where it comes from makes a huge difference.

Brian Sullivan of the Canadian Centre for Swine Improvement at Ottawa's Central Experimental Farm, explains that while meat is naturally an excellent source of protein, there's so much more to it than just simply a carrier for important nutrients.

"When we consider meat quality, we therefore need to think beyond protein," he explains.

"We should also be thinking of meat within the context of the larger question of human nutrition."

Determining quality isn't a simple task, and both macro and micronutrients play a role, not only in nutrition, but also consumer satisfaction and ultimately economic value.

How exactly does meat fit into a healthy human diet? It pays to take a broad approach, Sullivan explains.

"If we think about it from a whole-diet perspective, we might see meat quality differently than if we look at meat in isolation, or simply as a good source of protein," he said.

Balance is everything when it comes to a healthy diet – and that includes protein.

Brian Sullivan, Canadian Centre for Swine Improvement, ON, Canada

While serious health impacts can occur when protein is lacking, a diet with too much protein is at the very least wasteful – and can even be detrimental.

Optimal dietary intake of fats and carbohydrates is less apparent, one only needs to read wildly varying reports over the past half-century about the risks levels put on dietary fats.

Fears of cardiovascular disease prompted industry to concentrate on low fat foods, which included the pork industry's successful efforts to producing leaner meats.

"However, an unintended consequence of lower fat intake has been a shift to increase consumption of carbohydrates," Sullivan explained.

"Although this may not have been the intention, it is a mathematical certainty that if we eat less fat, keep protein intake at about the same and take in the same amount of food energy, then we must eat more carbohydrates."

Current research highlights the dangers of this dietary trend, and shows the dangers of throwing a narrow lens on nutrition.

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"This seems to be a tragic example of what can happen if we look at something in isolation, in this case, taking fat out of the diet," he said.

"A current research question is, therefore, what happens if we put more fat back into our diets so that we don't need to eat so much carbohydrates. We may find that this is a good thing and we may soon find that consumers want products with more fat, including pork products."

Pork, Sullivan explains, could play an important role in this new high-fat, low-carb reality.

"Pigs are very good at turning carbohydrates into fat," he said. "Despite the remarkable increase in the leanness of pork, there remains lots of fat on a pork carcass. Some questions to consider are how to make better use of the fat."

That, he says, could include changing the distribution of the fat – such as enriching loin marbling – or altering the composition of the fat.

Where producers market their product is also important. Pork is currently the lowest-cost meat in the Canada, but that's not the case overseas.

Japan, for example, is the largest export market for Canadian pork outside of the United States by weight, and well on its way to becoming the most valuable.

"Important to this success is meeting pork quality requirements for the Japanese markets," Sullivan said.

"Not all Canadian pork can meet these requirements."

Developing methods to increase marbling in the loin, for example, are traits highly valued in the Japanese market.

Optimizing the quality and fat-to-lean ratio in the belly is also important, Sullivan said.

Technology, such as established methods like ultrasound imaging and computed tomography (CT) scanning and emerging tech like 3D imaging, near-infrared spectroscopy and genomics all contribute to the development and standardization of these desirable traits during the pig's development.

Another growing overseas market is China, which a large portion of exports there consist of parts of the carcass that don't garner much interest in North America – and they command a high enough premium to make the long shipping distance a worthy venture.

"Understand markets today, especially the higher-value markets, could help us to get more value out of the carcasses that are available today," Sullivan said.

"It can also guide us on what we might change to make carcasses more valuable in the future."

While learning the lessons of the past's myopic view of nutrition is important, it's equally vital to see which way the wind is blowing.

Current dietary trends of higher fat and lower carbs will naturally bump up demand for high-quality sources of fat. In short, as consumers rediscover the nutritional importance of fat, they'll also rediscover how delicious it is.

"Although it's important not to look at anything in isolation, fat may be the most important component of pork that we should be considering for improvement in meat quality," Sullivan explains.

"The money is following the fat if you consider our current markets for pork, and if you consider which parts of the hog are most valuable today." ■

Breakout Session 2: Animal Transport and Welfare

By Bryan Passifiume

Getting animals from point to point safely and securely is not only one of the most important links in Canada's livestock production chain, it's also the most visible.

Ensuring that gets done with the interests all involved — both producer and animal — is up to everybody.

Part one – Canada's success in self-policed industry standards

Stéphane Beaudoin, GestBEAu Inc., QC, Canada

Animal welfare best practices are in place to ensure animals under transport get to where they're going in a safe and humane manner.

Stephane Beaudoin (left) speaks with audience members after his presentation at the 2019 Banff Pork Seminar.

Getting that done, says Stéphane Beaudoin of Quebec's GestBEAu Inc., is the responsibility of everybody involved, from producers, handlers and auction staff, right down to the truck drivers and plant loading crews.

"Animal welfare has evolved into a high-profile issue for every segment of the livestock industry," he said. "All stakeholders, including consumers and the public, are asking more questions and closely examining industry practices."

The best way to satisfy this public need, he explained, is to demonstrate that all involved are aware of the right ways to do things, and make sure they're putting them into practice.

While other jurisdictions around the world have imposed regulations to mandate training and best practices, Canadian livestock producers have taken action from within – hence the development of the Canadian Livestock Transport Certification Program.

Livestock transporters in this country face many challenges, Beaudoin explains.

"Careful handing of animals during loading, unloading and during transport minimizes losses and contributes to the health and well-being of animals in transit," he said.

These challenges include determining appropriate stocking densities by age and weight class, balancing travel distance with feed, water and rest intervals, how much and what type of bedding is most appropriate, design of the transport trailer, loading and unloading conditions, and driver experience in hauling animals.

"The benefits of training and certification include improved knowledge, increased professionalism, improved safety and

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reduced livestock stress and injury during transport," Beaudoin said, stating this all leads to a decrease in economic loss while gaining public trust.

The result of this self-regulation within the industry is the Canadian Livestock Transport (CLT) certification program – a standard recognized across North America.

"While CLT is not mandatory through government regulation, increasing numbers of processing facilities across Canada and the United States are demanding proof of competence and certification in livestock and poultry farming," Beaudoin explains.

"This issue is taken so seriously that uncertified drivers are not permitted to deliver animals to facilities that require certification, creating a mandatory system at these facilities."

Originally developed on behalf of Alberta's livestock industry through the Alberta Farm Animal Care Association, the program owes its existence to the combined efforts and experience of all segments of the livestock and poultry sectors, as well as researchers and both provincial and federal regulatory advisors.

While baseline rules regarding animal health, welfare behaviour, laws and regulations are standard curriculum, the program also includes modules specific to all major species transported in Canada, such as beef and dairy, swine, sheep, poultry and horses.

The program continues to evolve, Beaudoin explains.

Starting this year, the CLT program will include training on new national biosecurity standards for livestock, poultry and deadstock transport.

"CLT content is 100 per cent based on Canadian laws and regulations, codes of practices and standards," Beaudoin said.

"It is the most complete tool to help understand and meet expectations of livestock transport regulations in Canada."

Animal welfare, he said, should be ingrained into the culture of all industries involved, and be promoted as a key to business success.

That all comes down to employee training, qualification and education from the top down.

CLT training, Beaudoin explains, isn't limited to drivers.

Handlers, dispatchers and other workers — even senior facility management — are increasingly given the training.

In some facilities CLT certification is mandatory as part of their employment, if anything to create a greater awareness of the importance of maintaining industry-wide standards for proper animal handling.

Part two – International lessons in productivity

Niels-Peder Nielsen,SEGES,Denmark

In world swine production, Denmark is widely recognized as an international leader in efficiency and breeding.

This, explains Niels-Peder Nielsen of the Danish Pig Research Centre, is due to communication.

"Besides strong breeding and well-educated pig farmers, this high-level of efficiency is attributed to the communication of know-how from the Pig Research Centre to the pig advisors and onto the pig producers," he said.

Denmark's pork industry last year consisted of 3,300 farmers producing one million sows and 32-million 30 kg. weaners, with an average 2018 herd size of 770 sows.

Annually, 18-million swine are slaughtered in Denmark, while 14-million weaners are exported.

National productivity averages for 2017 was 33.3 weaned pigs per sow, a progress of 1.1 weaned pig per year per sow.

Live-born pigs per litter in the same year was 16.9, with 14.6 pigs weaned per littler and 13.6 per cent mortality rate during lactation.

CONTINUED ON PAGE 20

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Average weight at weaning was 6.5 per cent, while farrowing weight in 2017 averaged out at 89.2 per cent.

2017 weaner period feed conversion ratios was 1.88 kilos per kilo gained, post weaning mortality was 3.1 per cent, and average daily gain for seven to 30 kilogram hogs was 452 grams per day.

For finishers, Danish swine saw an average of 971 grams of daily gains, a 2.79 feed conversion ratio, 86.8 kilogram average slaughter weight, and 60.6 per cent lean meat average with 3.1 per cent dead and culled.

Animal welfare is also something Danish farmers take seriously.

"Danish agriculture and food council pig production have been working tirelessly and purposefully in all areas, securing significant development," Nielsen explained. "The most essential areas include the introduction of 'The Heart Pig,' which is an animal welfare solution on several levels of animal welfare."

This, he explains, is a national labeling system that assigns one, two or three heart symbols indicating the type of environment the animal was raised in, including tail docking, availability of rooting and nesting straw, space requirements, free-range farrowing, a 28-day wean and access to outdoor areas.

Niels-Peder Nielsen: Denmark raises the bar on animal care standards

This, including industry-wide rules mandating local anesthesia during piglet castration that went into effect on Jan. 1, are part of a 2014 agreement with the Danish government, animal protection organizations, retailers and veterinarians to improve animal welfare by 2020.

Goals receiving the most attention are farrowing pens, loose nursing sows, keeping tails intact, ending castration and increasing piglet survival.

"In the long term, the aim is to obtain these goals as part of the production concept for the Danish standard pig," Nielsen said, explaining that the initiatives are meant to ensure the Danish standard quality pig to fetch premium prices in the world pork market.

"The expectation is also that the demands for animal welfare will increase, as well as for standard pig production. Additionally, it is expected that specialty production will become even more visible on the domestic market."

Part of these goals is a target of loosing at least 10 per cent of nursing sows by 2020, the subject of years of study, research and industry consultation.

Last year, Denmark hosted an international workshop on the topic, sharing experiences and knowledge with experts from Europe, Australia, Canada and the United States.

To eliminate tail docking, the Danish Pig Research Centre introduced a demonstration project to determine the success of intact-tail production.

Danish industry benchmarks over the past 20 years demonstrate a progressive and reactive pork production process.

In 1999, Denmark demanded showers for pregnant sows and gilts. 2003 saw strengthened legislation on tail docking, keeping them intact as much as possible and mandating docking could claim no more than half of the animal's tail. While EU regulations always mandated sick pens, in 2005 Danish legislators recommended that all producers reserve 2.5 per cent of pregnant sow pens for ill or damaged animals, and that farmers always maintain some reserve capacity. In 2009, voluntary pain relief for castrating weaners is established, and would later become law in 2011. ■

Breakout Session 3: Feed Efficiency

By Bryan Passifiume

Advancements in feed technology have contributed greatly to the vast improvements the pork industry has seen over the past half-century.

Part one – It's all in the genes

Graham Plastow, University of Alberta

Over the past 50 years, pig production has grown by leaps and bounds. Feed conversion ratios have fallen by nearly 32 per cent – all while maintaining the carcass quality demanded by the market.

Much is due to the greater understanding and application of pork genetics, says Graham Plastow of the University of Alberta.

"We are now at a point where new technologies in these areas offer the opportunity for even greater progress in these key traits," he said.

New tools, able to combine new methods of correlating carcass quality with feed intake, as well as applying the latest advances in artificial intelligence to crunch raw data from producers, not only serve well today's operations – but offer exciting glimpses into what's to come.

"New tools will include automated collection of individual pig identifications and behaviors, and characterization of the carcass of the live animal, as well as post-mortem," Plastow explained.

These tools include imaging technologies such as near-infrared spectroscopy and dual-energy x-ray absorptiometry – the latter similar to procedures currently used in human bone densitometry scans, instead adapted to non-invasively determine meat quality.

Until very recently, says Plastow, herd genetics was limited strictly to what's referred to as the 'infinitesimal model' – which means that quantitative traits are controlled by only a few genes showing a large effect, and many genes showing small effects.

"It was not necessary to identify variation in the genes themselves as, over time, selection based on phenotype increased the frequency of beneficial alleles of the genes influencing the trait," Plastow explained.

"In this way, on average the performance of the offspring of selected parents was greater than parents."

CONTINUED ON PAGE 22

These days, advances in the field of microbiology means genetic variations can be studied at the gene level, creating a reality of an extraordinarily precise examination of herd genetics.

The first practical application of this technique was identifying the genetic mutation responsible for porcine stress syndrome, followed by identifying genes responsible for influencing quantitative traits.

"Genomic tools provide the opportunity to make progress in traits that are difficult and expensive to measure for traditional genetic improvement, which include feed efficiency and carcass quality," Plastow said.

Marker-Assisted Selection, or MAS, uses DNA-based genetic markers to identify desirable traits, such as feed efficiency, appetite or carcass composition, that breeders want included in their herd's offspring.

Breeding animals with such traits can pay off dividends when balancing carcass value to feed costs.

"The importance of feed efficiency for profitability and the expense of recording feed intake makes genomic selection an attractive option, and there have been a number of whole genome association studies focused on different measures of feed efficiency," he explained.

"These studies provided insights into the genetic architecture of the train in different breeds and identified some of the reasons and candidate genes explaining variation in the trait."

Part two – Getting with the program

Joel DeRouchey, Kansas State University

Successfully getting finisher hogs to market hinges greatly on a thoughtful and deliberate feed program.

Establishing such programs, says Joel DeRouchey of Kansas State University, starts with determining the most economical energy level for the animals, after matching calcium, vitamin, trace mineral and salt contents to economic, genetic and environmental conditions, by determining the proper lysine to calorie ratios.

That, he explains, is followed by setting ratios for other amino acids relative to lysine, then standardized total tract digestible (STTD) or available P to calorie ratio.

"Finally, the last step is to set the level of calcium, vitamins, trace minerals, salt, and other ingredients including feed additives," he says.

Foremost on the mind, he explains, should be energy concentration.

"Even though energy is the most expensive component of the diet, the level used in formation is often based on the history, or impact, on diet cost rather than an in-depth analysis to determine the most economical level," he says.

Formulation begins with figuring out what energy level is the most economical, he explains.

Determining optional dietary energy level lies in the knowing how even small changes can impact cost, performance and carcass criteria such as dressing versus lean percentage.

"Additionally, the economic value of these incremental changes is dependent on the market price," DeRouchey added.

Determining how their herd's physiology will react to these changes, while ideal, isn't always possible for producers, often requiring consultation on how these changes have typically impacted animals previously.

DeRouchey points to regression equations developed by KSU's Dr. Sureemas Nitikanchana intended to predict the change in growth rate from incremental changes in net energy intake.

In these equations, Average Daily Gain (ADG) in grams is equal to 0.1135 × net energy (in calories/kg) + 8.8142 × average body weight in kilograms - 0.05068 × (average body weight in kilograms)2 + 275.99

Provided, of course, that amino acids such as lysine aren't limiting performance, he adds.

"Thus, for every 100 calorie per kilogram increase in net energy, average daily growth would increase by 11

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grams per day," DeRouchey says, assuming that efficiency is linearly related to the diet's net energy content.

"A one per cent change in net energy will result in a one percent change in feed efficiency."

Actually determining what ingredients will meet the desired energy value goals means understanding how variables such as cost, availability and handing.

"The energy values in different ingredients will vary considerably due to their diverse chemical composition, and that variability can be even higher in by-products," he said.

"Determining energy values is critical to account for potential changes in performance and optimize economic return."

Sources of energy in grow-finish diets are cereal grains like corn, wheat, sorghum and barley.

While methods to set energy levels can vary, he explained, consistency is important across all ingredients to ensure positive results.

Despite this, dietary energy isn't the only factor in determining a quality yield, DeRouchey warns.

"Changes in dietary net energy levels do not fully account for the negative impact of fiber on carcass weight," he said.

"Feeding diets with high levels of fiber increases digesta content in the colon and cecum at processing, and reduce dressing percentage."

Excess weight in the animal's digestive system at slaughter – be it from hogs not subject to pre-slaughter fasting or undigested fiber results in increased live weight but reduced carcass weight.

Feed consumed by the animal nine to 10 hours prior to slaughter will not be converted into carcass weight.

As well, increased gut fill can also result from the type of fiber present in the feed ingredients.

"Neutral detergent fiber (NDF) has been shown to result in the digestive contents to swell by absorbing water, thus increasing the fecal volume in the large intestine," he said. "High levels of NDF have a negative impact on carcass yield."

While cutting off pre-slaughter feed can reduce the negative effects, the contents of the animal's last meals can impact how long that impact lasts.

"This, the optimal energy density for the diets fed immediately before market must be determined on a carcass weight basis to include the dressing percentage component." ■

Breakout Session 4: Human Resources

By Bryan Passifiume

Behind every good pig, there's a team of humans devoted to its efficient, safe and humane journey from piglet to production. Inviting outside consultants into your operation is always a big step, so it's important to know how to do it properly.

Part one – How strong is your consulting foundation?

Karen Kerns, Kerns & Associates

In today's environment, no production undertaking could possibly survive alone. As it's impossible to amass the whole of needed skills, abilities and job descriptions onto one's payroll, outside consultants are vital to navigate all variables in today's agricultural industry.

"Good business given opportunistic times means business beyond boundaries," says Karen Kerns, CEO of Kerns and Associates, an Ames, Iowa based agricultural management and consulting firm.

"Integrating consultants into your operation to translate the sea of available information into actionable execution can make the difference between simply performing or exceptionally perfecting."

While consultants should be an indispensible part of any production team, it's far too easy to permit the system to go awry without following a number of important guidelines, she explains.

Karen Kerns

"Common mistakes include introduction change into a system already challenges, imposing an artificial set of solutions or processes based on externally driven assumptions, or focusing on the agendas of individual stakeholders instead of the holistic wellbeing of the organization," Kerns said.

Ensuring a successful integration of consultants into your production, she explains, one must consider four important points.

Clarity avoids confusion

It's vital to be absolutely sure of what problem needs addressing before hiring a consultant, she said. "If you have a problem with employee performance, hone in on the source," Kerns states.

"Leadership consulting focused on employee motivation is entirely different from organizational development consulting that provides missing infrastructure and direction."

A consultant, she explains, is only as good as the capacity to use them effectively.

"If you have not defined operational goals and decision-making processing driving execution strategy, even the best risk management team will fail to protect your operation effectively," she said.

"The best consultants conduct an operational needs assessment and align needs with targeted outcomes before they charge you a penny."

The Cost of Free

"Nothing in this world is free," she said, warning to be wary of accepting consulting services for free or part of some sort of value-added vendor initiative. "'Free' consulting can cost your organization if it overwhelms your team with conflicting approaches to leadership, technical practices and product assessment."

She also warns against what she refers to as the "Wolf in Sheep's Clothing" approach, as some 'free' consultants are more interested in promoting products or services rather than improving your business.

They also, she says, will often teach or drive self-serving assumptions as part of their 'training' program.

"A primary and perfectly appropriate goal of these types of vendor-sponsored trainings is to build loyalty relationships, but many producers find themselves making decisions based on the 'freebies' without completely benchmarking the potential of using a more competitive product or service," Kerns said.

Nothing to lose

A great consultant, she explained, is one that drives ideas that benefit their client as a whole, rather than aligning with or advocating specific stakeholders.

"When money is received for services, you want to hire consultants who have a higher driving value than 'winning the sale'," she said.

CONTINUED ON PAGE 26

She suggests asking potential consultants about their operational values and associated practices, as well as previous situations where a client's values and behaviours differed from their own.

Kerns described a great consultant as one who are willing to challenge assumptions and offer clients a different perspective. They're also capable of turning the job down if they determine the client's assessments and goals are incompatible with their own and would serve to harm the sustainability of the operation.

Competitive vs. competing

Effective consultants, explains Kerns, are confident in both their craft and abilities, and avoid such things as speaking ill of competitors and other clients, both past and present.

"Beware the consultant that delivers ultimatums that limit your participation in opportunities that would benefit your operation," she said. "The benchmark of a great consultant is a sense of selflessness when it comes to the client's well-being."

That includes making decisions and giving advice to clients that encourages them to seek solace in competing products or services if the end-benefit to them is a positive one.

"It's the 'Miracle on 34th Street's' Gimbles-or-Macy's strategy," Kerns added, referring to Kris Kringle telling parents they'd get a better price on their child's Christmas present by visiting a competing store, much to the chagrin of his employer.

"His role in looking out for the customer first ultimately created unprecedented customer loyalty and patronage – you want to maintain relationships with consultants who direct you to and attract beneficial relationships and opportunities."

Great leaders value their integrity over net gain, she explained, and that applies equally to consultants.

"If you're inviting someone into your business family, choose someone you would welcome as an in-law, not someone whose reputation and practices would better character an outlaw."

Part two – Temporary Foreign Workers

Andrea De Groot, Ontario Pork Industry Council

While labour shortages trouble many Canadian industries, agriculture is among the hardest hit. With underemployment costing producers dearly, many producers turn to the Temporary Foreign Worker program to fill much-needed roles.

Andrea De Groot, managing director the Ontario Pork Industry Council, says that while navigating the multi-layered program is a challenge, the benefits far outweigh the hassles.

"The long-standing contribution that the TFW program has made in the agricultural community is wide-spread," she says. "Many facets of the agricultural industry have relied on the TFW program to provide consistent employees to their operations, and therefore help move the Canadian agricultural industry forward."

The program, she explains, is needs-based and requires employers to demonstrate they're unable to find Canadians to fill open positions.

That proof comes in the form of the Labour Market Impact Assessment (LMIA) – a process that outlines the measures employers have gone through to unsuccessfully fill jobs domestically.

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In order to address the needs of Canada's agriculture industry, the Temporary Foreign Worker program contains measures to directly assist through its Agriculture Stream program, which is meant for employers directly involved in areas such as the operation of agricultural machinery, boarding, animal care, handing and breeding, as well as the collection and preparation of crops, sod or plants for market.

"The agricultural stream of the TFW program allocates a 24-month contract, where employers provide flights, transpiration, and adequate housing depending on (whether it is) high-or-low skilled agricultural stream," De Groot said.

High skilled workers are defined as agricultural managers and farm supervisors, service contractors and specialized livestock workers.

Minimum wage for this category is $14.97 per hour, and workers cannot be charged more than 30 per cent of their monthly gross wages for housing.

Workers also typically possess high levels of fluency in either French or English, she added.

Low-skill workers, normally general labour farm workers, earn a minimum wage of $14 per hour cannot be charged more than $30 per week for housing, and require no minimum language fluency standards.

Employers must also provide adequate housing for their workers, the inspection of which is part of the initial LMIA assessment.

Worker housing arrangements, which can include a farm house, bunkhouse or off-site accommodations, that doesn't meet inspection standards can disqualify an employer from participating in the program, De Groot said.

A typical TFW contract, she explained, spells out all aspects of employment, including job description and duties, wages and housing.

The contract will also contain mechanisms to resolve any future disputes or disagreements, she said.

"Health insurance and workplace safety insurance are the requirement of the employer to provide," De Groot explained, adding that payment of both are the responsibility of the employer at no cost to the worker.

"Service Canada and Employment and Social Development Canada also have the right to conduct unannounced audits to ensure the integrity of the LMIA is being followed, and to ensure that all requirements and documentation are adhered to."

These temporary foreign workers, she says, have proven to be hard-working, dependable and reliable, making them a strong and vital option for Canadian agriculture.

"With further improvements to the TFW process, the hope is that the agricultural industry can continue to grow the relationships founded on the Temporary Foreign Worker Program," she said. ■

Tom Stein, Maximus Systems: 2019 Foxcroft Honorary Lectureship

Pork producers may have a difference of opinion on many things, but one thing they will agree on is that the impact of technology in their industry will continue to increase.

One place they could get a look at that future was at Breakout Session 6 at the 2019 Banff Pork Seminar (BPS). It brought together three speakers with compelling information on "Big data and technology."

One of those speakers was the George Foxcroft Lectureship for 2019, Tom Stein of Maximus Systems. That award is named after Dr. Foxcroft, the University of Alberta professor, research pioneer and industry icon.

"The George Foxcroft Lectureship in Swine Production has a special meaning," says Dr. Ben Willing of the University of Alberta, who presented Stein with the honor. "It allows 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.

"Each Foxcroft Lectureship recipient receives this award based on the quality of their research and the contributions made to the swine industry and there is little doubt of those qualities in the case of Tom Stein," says Willing.

Stein is senior strategic adviser for Maximus Systems, leading the design and development of next-generation pig and poultry production management software using machine learning to automate pattern recognition and analysis. He is the designer of the PigCHAMP software and co-founder of MetaFarms. He was named one of the top 50 men and women who truly have made a difference in the U.S. pork industry. The American Association of Swine Veterinarians recognized Stein for outstanding contributions to swine production and health.

Tom Stein left, Ben Willing, University of Alberta.

His BPS presentation was entitled "Smart systems in pig production." He was joined in Breakout Session 6 by Bram Visser of Hendrix Genetics who spoke on "Augmented intelligence for better swine breeding" and Ricardo Segundo Cochran, OPP Group who spoke on "Farm center data integration platform." ■

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2019 BPS student science winners announced

By Meristem

Two young scientists at the 2019 Banff Pork Seminar (BPS) Jan. 8 to 10, in Banff, Alta. were presented with the R. O. Ball Young Scientist Award.

First prize winner, Victoria Seip, University of Guelph with Ben Willing

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 Victoria Seip, University of Guelph. Her paper was "Impact of iron status on growth performance and antibody production in weaned pigs."

Second prize went to Mariia Tokareva, University of Saskatchewan for the paper "A comparison of motivation for exercise and stall-housed sows and gilts."

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

Second prize winner, Mariia Tokareva, University of Saskatchewan and Ben Willing, University of Alberta.

BPS 2019 Aherne Prize winners tell the story behind their inventions

By Meristem

Each year as the winners of the F. X. Aherne Prize for Innovative Pork Production are announced, there is real interest at the Seminar and across the industry. Again in 2019 the stories behind the winners are quite remarkable, says Dr. Ben Willing, of the University of Alberta, chair of the Aherne Prize committee who presented the awards.

Two winners shared the prize at the Banff Pork Seminar, Jan. 8 to 10, 2019 in Banff, Alta.

Winners for the piglet creep protection device for loose housing were Brett, Jamie and Carl Israel of Carl Israel Farms Ltd. in Mapleton Twp., Ont. Winners for the Tattoo Master, an automatic tattooing solution were Daniel and Justin Maendel of Rosebank Colony in Miami, Man.

Willing says again this year the quality and number of applicants was strong, a sign of the tremendous innovation occurring on farms every day.

"This prize recognizes individuals who have developed either original solutions to pork production challenges or creative uses of known technology," he says. "We are pleased at Banff Pork Seminar to acknowledge these grassroots innovations in the pork industry."

The prize 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.

Here, in their own words, are winners' descriptions of their innovations.

Piglet creep protection device designed for loose housing

As loose housing becomes standard practice across gestation facilities, it is only a matter of time until the market will demand loose housed farrowing sows with litters.

That's the opinion of Brett, Jamie and Carl Israel of Carl Israel Farms Ltd. in Mapleton Twp., Ont., one of two winners who shared the 2019 F.X. Aherne Prize for Innovative Pork Production at the Banff Pork Seminar. Their piglet creep protection invention may help that occur, as they explain in their own words the reason behind their winning entry.

On paper the transition to loose housed farrowing sows makes sense. However, a major issue facing producers transitioning farrowing operations to loose housing pens from traditional confinement crates is the issue of inadvertent crushings.

In some instances, piglet crushing rates can be as high as 50 percent. Piglets born in these settings have a very difficult

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time finding the safe creep areas, as in most cases the total loose housed farrowing pen is significantly larger than conventional farrowing crates.

Having recently transitioned to organic pork production, our operation faced this very issue.

Our farrowing pens are 9 ft. x 9 ft. in size, with the sow being able to freely move around then pen. Upon our first organic sows farrowing we immediately identified that our mortality rates were impacting our bottom line and piglet well-being.

Out of pure desperation we took left over building materials from our recent barn construction, and fastened together a triangular plastic divider that slides over our pen creep dividers. The divider establishes a defined safe creep area under the heat lamp away from the reach of the sow.

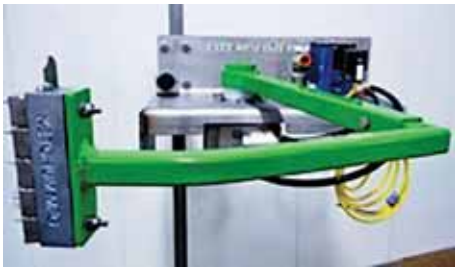
Upon farrowing, we collect all piglets and place them in the protected creep area. We wait until the sow is settled and calls for the pigs, then we release the piglets to nurse. We repeat this process over the litter's first 48 hours, ensuring that every time we enter the farrowing rooms we immediately secure the litter before the sow becomes unsettled.

By utilizing our creep protection device we have developed a process for training piglets to find the creep area, significantly improving our weaning rates. We have effectively increased our weaning rate by one piglet per sow per litter. Additionally, our divider wall provides a handy means of securing piglets for castration saving considerable amounts of time.

Ensuring that producers meet the changing demands of consumers requires on farm innovation. We are proud of our tool, and are confident that it's easy to make recycled nature could be adopted by producers across the industry.

Tattoo Master automates tattooing, streamlines workload

Here's an idea that puts less stress on animals and the people handling them. And it automates tattooing, a job that normally requires hard work for people.



The Tattoo Master designed by Daniel and Justin Maendel of Rosebank Colony in Miami, Man. is a shared winner of the 2019 F.X. Aherne Prize for Innovative Pork Production at the Banff Pork Seminar. Here's an overview of their story in their own words.

Tattoo Master is an automatic tattooing solution designed to ease the burden of everyday hog tattooing while keeping animal welfare and legibility of tattoo as top priorities. It can be mounted on most automatic hog sorters with very little to no modifications, or custom fitted to most others. The simplified solution means the only thing that needs to be done is add ink every 400 hogs. The stainless steel unit can be easily washed with a power washer when required.

CONTINUED ON PAGE 34

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- Front gate opens and market hog gently trots out of the scale to designated holding area.

To all of us in hog production it is a well-known fact that tattooing hogs can be a demanding and time consuming job. We all realize the importance of a legible tattoo at the processing plant because it is the only way for the packing plant to identify our hogs and pay us according to our grades.

Tattoo Master was developed in conjunction with a hog processing plant to ensure a legible tattoo. Another advantage is labor saving and worker safety. Tattoo Master applies the tattoo automatically versus a person swinging a manual tattoo slapper. Swinging a manual tattoo slapper can be a demanding job and sometimes lead to long term shoulder injury or other bodily harm.

Some other improvements were also noted. The Tattoo Master hits every pig with the same amount of force required to make a legible tattoo. Sometimes barn staff doing the job manually will use a little too much force or not enough to make a legible tattoo. There is also less stress on market hogs at loading time because of the stress-free tattoo application from the previous day.

Start thinking for next year

"The Aherne Prize popularity continues to grow and is one that will be continued in future years," says Ben Willing. "Innovation comes from energy and ideas and as delegates head home from BPS 2019, we hope they will be encouraged to enter their innovations in upcoming years." ■

Plenary Session 2, Part 2

Tariffs, trade and trepidation – implications for the Pork sector now and into the future

Joseph Kerns, Kerns and Associates

By Meristem

The "Trade, Tariffs and Trepidation" session by Joseph Kerns of Kerns and Associates at the 2019 Banff Pork Seminar was a fast-paced run through soybean and corn production, foreign market imports and exports, and the implication of these to the pork sector.

Kerns outlined the winners and losers in some critical areas:

- Recent ratification of international trade agreements such as CPTPP and CETA: Canada is a partner in these agreements and a winner in this category as the United States is currently without these agreements and is in the midst of a government shutdown.
- Win: Consumers are seeing price benefits when purchasing protein due to a strong supply, especially for chicken. Lose: But China is struggling with a fading GDP, a stock market under considerable duress, auto sales are down and the country is feeling the impact.
- Win: Producers who are winning right now are strong balance sheet managers, and there is some significant restructuring in the industry. Lose: But Kerns said "We are refinancing some entities right now. There is a huge chasm of winners and losers inside our industry, and this includes leveraged land-based operations."

Kerns highlighted what appears to be a continuing upward trend of global GDP numbers well into 2030. He brought those numbers together and forecasts that $38 trillion more in GDP could translate into an increase of a 140 million metric tonnes in meat and poultry consumption between 2017 and 2030, which is an increase of 46 per cent.

Joseph Kerns

This is an unprecedented increase over a relatively short amount of time and as Kerns explained, "This is a rising tide that will float all ships. The sandbox (meat demand) is getting bigger and pork is the dominant protein in the world."

Much of that demand for protein is being driven by emerging economies in the Middle East and Asia but there continues to be small increases in western economies such as the United States and the U.K. While many focus on the increase in the global population, Kerns says this is a food story.

"More food will be consumed in the next 50 years than was consumed in the last 7,000 years," Kerns said.

When looking at changes in consumer demand, Kerns sees another opportunity.

"The pork industry is in a fantastic position to enter some of the niche markets and provide specialty products. We can compete in a low-cost environment very well." ■

Breakout Session 5: Managing the Robust Pig

By Bryan Passifiume

Part one – Batch Farrowing basics

Blaine Tulley, DVM, Swine Health Professionals, Steinbach, MB

Whether it's for disease control or efficient use of manpower, the decision to implement batch farrowing on one's operation tends to elicit strong opinions.

Blaine Tulley of Steinbach, Manitoba's Swine Health Professionals, says a careful and thoughtful implementation of batch farrowing can be a viable option for both optimizing pig flow and managing animal health.

"The industry trend over the past few decades has been to try to fill and empty farrowing, nursery and finisher rooms all at once," he said ,referring to the practice as 'all-in-all-out' (AIAO) production – primarily as a means of reducing the impact of disease transmission from one age group of pigs to another.

"We also know that a narrower range of ages and weights within a group of pigs allows us to manage health, medications and diets optimally."

Using AIAO production as a management strategy, he says, isn't a one-size-fits-all solution.

Rather, it's up to the producer to decide which approach would work best for their operation based on the size of the farm, number of animals, available space, personnel, and so on.

Typically, farms will choose to implement four-week, five-week and six-week batch farrowing, each with their advantages and disadvantages.

Some advantages, Tulley explained, can include minimizing age ranges in groups, better utilization of space, reducing delivery and transportation costs, easier disease eradication, concentration of work, and better opportunities for capturing herd data.

In contrast, batching can amplify certain management mistakes such as poor conception, a slower rate of farrowing pen turnover, an increase reliance in hormonal intervention to ensure animals reach estrus at the same time, and less flexibility for workers involved in the production, as it tends to concentrate busy times into short, hectic time periods.

Four-week batching

In common use in many North American farms, this system involves a farm combining four weekly breed groups into a single large batch that breeds at the same time.

This, Tulley explains, is accomplished by not mating sows in heat the first week of conversion until their subsequent heat, strategic use of hormones (extra-label use of altrenogest under the guidance and prescription of a veterinarian) the following two weeks, and permitting normal mating during the fourth week.

"In fact, all four weeks of weaned sows will experience estrus at the same time, and can be bred as one large batch," he says.

This system, he explains, often permits operations to keep achieving 20-day weaning age.

"A four-week batch system will allow the farm to continue weaning approximately the same number of pigs in a year, because one could potentially achieve 2.6 litters per sow per year, so could a weekly farrowing farm," he said.

A downside to most batch farrowing programs, he says, are non-productive days.

"Repeat sows are typically not in the correct week to be synchronized with the subsequent batch," he explained. "This requires the farm to either run a larger gilt pool to replace repeat sows in breed groups – and cull repeat sows – or skip heat and use altrenogest to delay estrus and push sows into other batches."

When comparing weekly farrowing with a four-week system, Tulley warns that one needs to consider the fact repeat sows face an extra 35 days of non-productive time, as well as the potential for an extra 16 days of hormone treatment.

"Some farms will breed repeat sows and utilize a 'slush' farrowing room to accommodate these non-synchronized sows," he said. "However, there can be health implications to this practice."

Five-week batching

As minimum wean ages are regulated in Europe, five-week batches are a common production strategy there.

Converting to a five-week batching methodology is somewhat similar to the four-week model, with some differences.

"As pigs are weaned older, an average of 27 days, the farm will experience a potential 4.8 per cent drop in the numbers of litters per sow per year, and therefore must capitalize on an older weaned pig being more cost-effective to feed through to finish, in addition to gaining other efficiencies."

When compare to weekly farrowing, non-productive days, he explained, will also increase – typically to 49 days per regular repeat, as well as 10 days of altrenogest treatment.

This system also requires a lot more from both farm manpower and farm real estate, Tulley explained, and may not be suitable for those facing challenges of space or labour – not to mention the logistics of weaning a large five-week batch of sows.

"Facility use efficiency can become an issue, with the potential for larger pools of non-productive sows taking up valuable space in the breeding barn," he said.

"Each farm chore is five-times bigger with this system, and farm staffing needs to be considered carefully."

Six-week batching

This system, Tulley explained, actually involves farrowing sows tandem-staggered by three weeks, putting a new sow into a single farrowing crate every six weeks.

This system offers a bit more flexibility in terms of lactation management and fall-back piglets, as at any given time the operation has two groups of lactating sows.

"This is also a pitfall, as it tends to mean there are always suckling piglets on site, and potential for disease shedding and transmission between groups of pigs is more likely than in other batch systems," he warns.

Nevertheless, the system allows producers to maintain non-productive days at rates similar to weekly farrowing for regular repeat sows, as well as the aforementioned lactation management.

Regardless of the method chosen, producers needs to put careful thought into the decision to integrate batching into their management program.

"A 1,000 sow farm may want to move to a five-week batch system – for example around 3,000 weaned piglets every five weeks – but only has nursery capacity for 1,800 pigs, there may be a need to renovate nursery space or sell excess pigs," Tulley said.

A move to a five-week system also presents a significant impact to staff, he explained.

"In the words of a client of mine who recent converted to five-week batching, 'those crappy jobs that nobody likes only come around every five weeks, but are five times crappier!"

Part two – What to expect from a conversion to batch farrowing

Derald Holtcamp, Jyga Technologies

Pig farmers in Quebec, says Sylven Blouin, animal welfare director at St. Lambert-based Jyga Technologies, have utilized batch farrowing in their operations since at least the mid 1990s – typically on 200 to 250 sow farrow-to-finish farms.

This, he explained, was due to high incidents of diseases such as Porcine Reproductive and Respiratory Syndrome (PRRS,) leading to the specialization of pig barns.

"Since then, we've seen the emergence of the three-site production system with the early-weaning concept," Blouin explained.

While the concept appearing promising, the solution was far from a simple one.

"Although it seemed like a good idea on paper, the system didn't fulfill promises of producing PRRS-free piglets for different reasons, and with farms as small as 150 sows, health challenges have actually increased and we've had to mix many sources of piglets in the same nursery."

Batch farrowing, he says, allows a farmer to receiving large numbers of piglets from a single source – certainly an ideal situation for any finisher, he explains – as well as impacting herd productivity in terms of piglets per sow.

"This system may penalize the sow barn for the benefit of the nursery and finishing part of production," Blouin explains.

"Most of the time, the regular return of estrus will occur between regular batches, which is problematic since you don't want to manage what we may call mid-batch farrowing."

As explained in the previous section by Blaine Tulley, these out-of-cycle sows are either culled or made to conform to group estrus by either natural or artificial means via hormonal treatments.

For those wanting to implement batching, planning is key – either by implementing the system into an existing facility or building a new one from the ground-up.

"Whether for an existing building in operation or a new construction, this type of production will have an impact on the barn, especially on the layout for sows in group housing," Blouin said.

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With that out of the way, attention can turn to building the batches.

For existing herds, hormones are necessary to synchronize the sows into a single breeding group.

For farmers wishing to implement the program on a new herd, Blouin warns that a gilt pool of at least double the number of animals required for a single breeding group.

Regardless of the type of breeding used, conversion to a batch system has an impact on boars, as well.

In operations that rely on nature taking its course, four times as many boars are required for a four-week batch – and their services are only required for one week.

"It creates a problem," Blouin says. "What to do with them for the next three weeks?"

Another issue producers face, once batch farrowing has begun, is one of gilt introduction.

"The last thing you want to see is an empty farrowing crate," he explains.

"Many producers will serve more sows and gilts than they really need and cull over sows after pregnancy tests, but this has a price, and the gilt pool is then important."

Workers in larger operations, Blouin explains, can easier detect the natural estrus of gilts and introduce them to specific batches.

Part three – How nutrition impacts survivability

Marcio Goncalves, Jefo Nutrition

For any swine producer, survivability is a top concern.

Marcio Goncalves, global technical manager for swine with Jefo Nutrition, says improving survivability is important not only for continued animal welfare, but also a 0.6 per cent increase in wean-to-finish mortality, which equates to roughly a $10 USD increase in profitability per sow per year.

"Multiple aspects of pig production affect survivability," he said, pointing to factors like heath status, management practices, the quality and age of the facility itself, and – Goncalves emphasized – genetics.

"Breeding stock companies have been focusing on the survivability trait as part of their overall index, and producers have been able to observe that improvement over the past several years."

In terms of health, producers strive to eliminate disease from their production chains as a matter of course — spending increasing amounts of capital on biosecurity, truck washing and a sterile feed mill.

Among the most important factors, he says, is the safe and sound management of individual animals.

"The labour force in pig production is evolving, and stockmanship skills and training seem to be an area of focus in successful production systems," he explained.

"Additionally, early pig care after birth and during the first week after weaning continues to be key for maximizing birth-to-market survivability."

Nutrition is the common factor in many survivability scenarios, Gonvalves stressed, from breeding herd to market pig.

To maintain sow productivity, producers much pay close attention to the management of the animal's body condition.

"Litter size went up in the last few decades, and thus, birth weight went down," he said. "Many farms tried to fix the birth weight problem by giving more feed during late gestation and that, unfortunately, did not fix it."

Overweight sows can cause many issues, including longer farrowing, an increase in stillborn piglets, increased mortality and movement/locomotion problems.

As for gestational nutrition, studies from the early 1980s sug-

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gest feeing 1,000 grams of fat prior to farrowing has a positive impact on piglet survival.

"It would be interesting to re-evaluate this area with today's litter sizes," Goncalves remarked.

More recent studies found a one per cent increase in survivability in later-term sows and gilts fed diets with higher starch-derived energy – but also with a 2.1 per cent increase in stillbirths.

"With the exception of thin sows, it's not recommended to provide increased levels of feed in late gestation," Goncalves said.

Improvement in stillborn rates have been observed with diets higher in amino acids and yucca extracts, but 24 studies suggest no benefit to piglet survivability when levels of dietary fibre are increased.

Another well-established benefit to overall piglet survivability, Goncalves says, is colostrum.

"A pig that has a colostrum intake below 370 grams reduces its probably of survival from above 90 per cent to 30 per cent before weaning, and from 95 to 83 per cent during the nursery period."

Post-wean, the strategy of herd managers should be survival, rather than growth.

"With the increase in feed intake in the first few weeks after weaning, the digesta flow will reduce bacterial proliferation in the gut and reduce diarrhea," Goncalves said.

"Pigs that eat less than 200 grams of feed per day in the first week after weaning are 18-to-34 times more likely to have diarrhea compared to pigs that eat above 200 grams per day."

In terms of individual nutrients, Goncalves points to documented cases of behavioural problems in swine lacking sufficient amino acids in their diets.

One 1991 study showed that amino acid deficient pigs were more likely to be attracted to blood compared to properly-fed animals.

Organic acids used as feed additives show as much as 55 per cent mortality reductions in some studies, he said, with xylanase demonstrating improved survivability in finishers. ■

Breakout Session 6: Sow longevity

By Bryan Passifiume

Getting the best bang from your buck from sows begins – and ends – with sound and proven herd management techniques.

Thoughtful gilt management and introduction can reap rewards both in terms of production and economics, so long as producers are willing to do the legwork beforehand to ensure the benefits outweigh the costs.

Part one – Gilt management for improved sow lifetime productivity

Jennifer Patterson, University of Alberta

It all starts at the bottom.

Getting a herd off on the right hoof begins at the very earliest stages, which is why proper gilt management is so important to ensuring sow longevity.

"Gilts are the foundation of good production and drive farm success," says Jennifer Patterson of the University of Alberta.

"Gilts with the greatest potential lifetime productivity can be identified through the implementation of successful gilt management programs."

This, she says, starts at birth and continues until she's ready for breeding.

"Measuring and managing the key components of a successful gilt replacement campaign program will substantially reduce reproductive issues reported in the sow herd."

The key to ensuring success, she states, relies on recognizing two key factors: **litter of origin**, and **gilt selection**.

"As a consequence of genetic selection for increased litter size, the industry has seen an associated increase in within-litter variation in birth weight, and an increase in the proportion of piglets with low birth weight," Patterson explained.

Low birth weight, she says, impacts heavily on all stages of production. Gilts weighing less than a kilogram at birth have little chance of surviving until weaning, and those that do face similar challenges in both health and performance.

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Those animals also face reproductive issues, she said, pointing to a 2015 study that suggests gilts with birth weights below 1.1 kilograms, regardless of how well they're cared for, simply lack the reproductive capability for efficient production due to retardation of their uterine and ovarian development.

A second study a year later concluded such animals produced fewer piglets and spent less time in the herd than their heartier counterparts.

Low birth weight, studies suggest, is an inheritable trait passed from parent to offspring.

"Results indicate that sows that exhibit the low birth weight phenotype at the nucleus/multiplication level produce progeny with limited survivability after birth, poor retention, and overall will have low efficiency of replacement gilt production," she explains.

"Furthermore, if gilts from these sows do end up in the breeding program, they will in turn pass on this low birth weight trait to their commercial progeny."

While birth weight phenotype significantly impacts future growth, studies suggest it has little impact on the onset of puberty.

Being able to predict a litter's birth weight phenotype is vital to overall herd efficiency, Patterson says, as identifying sows that consistently produce underweight offspring allows the producer to intervene.

"Post-farrowing management, which includes drying piglets immediately after birth and ensuring adequate colostrum intake is essential to better-manage low birth weight pigs," Patterson explains.

"Strategic cross-fostering, involving a reduction of the litter size in which replacement females are raised, will improve gilt retention and increase the efficiency of replacement gilt production."

Another factor in ensuring long sow lifetimes is identifying early-maturing gilts.

"Successful gilt introduction and retention through the early parities drives lifetime performance of the breeding herd," she says, calling this an 'underappreciated' opportunity to improve and enhance overall production.

Identifying these productive gilts, she says, all boils down to how they react to stimulation from boars, especially when that exposure is limited to a preset period of time.

She suggests that determining 'premium select gilts' should be gauged on those who are naturally cyclic within a month of boar exposure.

All others, she says, should be deemed as 'opportunity' gilts and should only be introduced into a breeding herd as backups to the premium select animals.

Beginning to breed gilts should take place at the animal's optimal reproductive maturity rather than strictly by chronological age.

Early stimulation of gilts, Patterson explained, allows producers to take advantage of increased productivity when bred during their second or third estrus.

"From a very practical perspective, breeding at second estrus is normally an essential component of a good breeding program, because it allows time for gilt acclimation to the sow herd and to housing in gestation stalls, all of which will ensure a positive metabolic state at breeding," she explained.

"After the first estrus has been recorded, gilts should be acclimated to stalls or breeding and gestation housing at least 16 days prior to breeding."

Introducing the animal to stall right before breeding, she said, disrupts normal feed intake and causes physiological changes that can negatively impact her ability to carry her piglets to term.

Keeping your sows in tip-top shape is also vital, and that involves keeping careful track of the animal's weight.

"It is recommended that gilts be bred at a target weight of 135 to 150 kilograms," says Patterson.

Gilts weighing in less than that produce less piglets, she said, while gilts bred at weights over 170 kilograms risk low retention and mobility issues, not to mention a greater strain on resources during farrowing.

Overweight gilts also suffered from inefficient feed utilization during gestation and lactation – and ultimately diminished lifetime productivity and were candidates for early culling.

Part two – Modeling the economics of sow longevity

Derald Holtcamp, Iowa State University

Even the most ambitious production plan comes down to dollars and cents.

Will the money one wishes to spend on their herd produce and acceptable return on their investment?

Derald Holtcamp of Iowa State University says producers need to pay close at-

tention to the economic intricacies of ensuring the longevity of their sow populations.

"The most important input in the breed-to-wean phase of production is the replacement gilt," he said.

"However, decisions about how much to invest in gilt development to improve sow longevity and productivity are still subject to the laws of economics if producers desire to maximize profits."

At its most fundamental level, producers need to figure out if the benefits outweigh the costs, he explains.

"A cost-benefit analysis is an old, well-established tool for assessing input decisions," he said.

"It is a process of weighing all costs and benefits of an input for making an informed input decision."

To find this out, Holtcamp described a 2,400 sow study farm with group-housed gestation, and gilts isolated off-site for six weeks before introduction into the herd.

At the farm, gilts were exposed to vasectomized boars when they reached 145 days old and then isolated for six weeks.

They were then introduced into the herd, in pens and finally stalls up to a week before beginning a 14-day altrenogest (brand name Matrix, manufactured by Merck Animal Health) administration program, with boar exposure continuing throughout.

"At the end of that 14-day period, the girls were returned to pens with fence-line boar exposure," Holtcamp explained.

Gilts in heat were bred, while those yet to achieve estrus after 10 days were subjected to hormone treatments — in this case Merck P.G. 600, a combination of equine serum gonadotrophin (PMSG) and chorionic gonadotrophin (Human Chorionic Gonadotrophin or HCG) meant to induce fertile estrus in swine.

Data from the study was collected 30 months both before and after the start of the gilt management program.

In both scenarios, costs were the same. Average gestation and wean-to-finish diet costs were $186 per ton, while lactation diets ran $222 per ton.

Replacement gilt costs were $200 per animal, and the market hog price was $0.65 per pound carcass weight.

All values are in U.S. dollars, and included the cost of both purchasing and administering the hormone treatments, as well as labour for boar exposure.

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Farm records show 100 per cent of the gilts that entered the program were given Matrix hormone treatments, while only 18.2 per cent were given P.G. 600.

Net benefit was gauged by measuring the increase in profitability in the 'after' cohort compared to 'before.'

All sows involved in the program were automatically culled after the 11th parity.

What the study showed was, after the program began, the cull percentage of female animals dropped from 26.7 per cent to 18.9 per cent.

As well, the annual female replacement rate dropped 10 per cent, from 62 to 52 per cent.

Average parity for the herd also went up, from 3.08 to 3.20, while the number of pigs weaned per female per year increased by 0.37 – an increase of 881 weaned piglets per year.

"The program resulted in 829 more pigs marketed, and 222,310 more lbs. of pork produced per year," Holtkamp said.

"The total net benefit of the improved sow longevity, because of the gilt management program, was $66,208 per year for this 2,400 sow herd – the economic benefit of the program was divided into that due to the cost of replacement less the salvage value of the culled females, breeding herd productivity and growing pig productivity."

While all three of those factors contributed significantly, he explained, the largest economic benefit was directly related to a marked increase in breeding herd productivity.

The total cost of the gilt management program was $35,781 – including both product and labour.

"Given the benefit of the gilt management program was $66,208 per year, the benefit-to-cost ratio was 2.41 to 1, and the return on investment was 141 per cent."

Investments in gilt development, Holtkamp explained, may be a prudent decision to both improve sow longevity as well as productivity.

Part three – The causes and consequences of sow mortality

Jerry Torrison, University of Minnesota

With losses from sow deaths currently averaging above 10 per cent across North America's swine industry, it's a worry every producer needs to address in their own operations.

Sow mortality rates, says Jerry Torrison of the University of Minnesota's College of Veterinary Medicine, have been on the rise for decades.

In 1984, he says, mortality rates were only three per cent in herds of 150 sows or less, increasing to five per cent for herds over 200 sows.

"The consequences of sow mortality are severe for the sow, of course, and the welfare aspects of sow mortality have drawn scrutiny and warrant effective interventions," he said.

"The economic impact can also be severe for the producer, since cascades of effects occur on top of the lost revenue, resulting from the inability to market a sow for cull value."

The reasons for mortality have shifted over the years, while today's experts and producers are arming themselves to keep the losses at a minimum.

Mortality statistics are usually collected from either farm records or by post-mortem examinations of the animal – and the causes can be varied and diverse.

"In the case of arm records, there are well-noted inaccuracies in reason for death or culls when relying on farm-reported causes," Torrison explained. "However, more objective measures can provide meaningful associations."

He points to factors like the weather – especially summer heatwaves – and the impact it can have on annual mortality numbers.

Specific causes of death can shift over the years, he explains.

Referring to a 1991 study, Torrison described the deaths of 426 sows that year – 22.1 per cent attributed to cardiac fail-

ure, 18.3 per cent to torsion of abdominal organs, and 7.5 per cent to cystitis or pyelonephritis – similar to other published reports of that era.

Cysitits and nephritis, he explained, are seldom seen as mortality factors these days due to the increased use of artificial insemination.

While some conditions are noted to have decreased over the years, some saw concerning increases.

A perceived increase in sow prolapses, Torrison said, was first noted in 2013.

"As awareness grew, a group was convened to study the extent of the problem," he said, describing how herd records from seven separate production systems were analyzed between 2012 and 2016, including data from over 4.3 million farrowings from 153 farms in 2012, as well as 167 farms from the subsequent three years.

"The results indicated an increase in the relative proportion of sow deaths related to prolapses – out of total sow deaths – starting at 10.9 per cent in 2012 and increasing to 19.5 per cent in 2016."

The data suggested such risk factors were total number of piglets born, use of a toxin binder, assisted farrowing and Porcine Epidemic Diarrhea health status, he explained.

On a larger scale, the National Pork Board's ongoing Sow Mortality project collects data from 95 farms, with weekly updates handed over voluntarily by participants.

Of the 25,654 sow deaths reported over the study's first 32 weeks, "other/unknown" was the number one cause of mortality at 39 per cent, followed by issues concerning lameness (30 per cent) and prolapse-related deaths at 20 per cent.

Causes of these increasing prolapse deaths is the subject of current study.

Deaths relating to lameness, Torrison says, should be a big concern to producers.

"It is primarily a problem of the younger breeding females in the herd, so mortality or culling at that career stage results in a reduced return on investment for the replacement female," he explains.

Another herd impact to early mortality is the unplanned nature of the death – dragging down overall performance due to missed targets in breeding and farrowing, as well as the forced retention of subpar breeders.

"The optimal timing for sow 'retirements' is at a planned culling after weaning when an adequate replacement is available with higher productivity potential," he said. "Mortality and lameness are key drivers for disrupting this objective." ■

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