

Western Hog Journal

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BANFF PORK SEMINAR 2010

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PREFACE

What a difference a year makes! At the 2009 Banff Pork Seminar, the industry was looking forward to a more prosperous year after two years of extreme hardship. No one could have predicted the H1N1 catastrophe that seriously affected pork demand and ravaged pork prices during 2009. With that disaster now out of the way, delegates at this year's seminar focused on industry renewal, with the theme "New Process, New Product, New Policy".

Popular double act Kevin Grier and Steve Meyer not only provided some humour, but also a huge amount of industry data that gave an excellent perspective of where the industry stands and prospects for 2010. Chenjun Pan, based in Beijing, gave a fascinating perspective on the Chinese pork industry and the implications for the world, while Douglas Porter from BMO Capital Markets, presented an outstanding perspective on the world economic situation.

In addition to the "big picture" presentations, a wide range of technical topics were covered, including two breakout sessions on reducing feed costs, which must be one of the key objectives for producers in future. Other themes included genetics, herd management, production of antibiotic free pork, animal welfare issues and risk management.

The summaries of papers given at Banff presented in this special issue of Western Hog Journal are intended to bring you as much of the information as possible. However, the original papers are available in the proceedings, *Advances in Pork Production*, Volume 20. To order a copy, call the Banff Seminar office on 780-492-3651, fax 780-492-9130 or e-mail info@banffpork.ca.

I would like to acknowledge and thank those people that have helped me with summarizing the presentations for this issue: Bruce Winkler and Charlotte Shipp of Alberta Pork and Marvin Salomons. Also, thanks to Terry Hockaday and his team at Meristem Land and Science for assistance with editorial and photographs.

COVER PHOTO

The iconic Banff Springs Hotel, which was home to the Banff Pork Seminar up until 1995.

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Chairman's Message



The 39th Banff Pork Seminar again showed the importance of coming together as an industry to share experiences and look to the future. Even with severe industry challenges, 600 delegates gathered in Banff clearly demonstrating the profile and respect developed over the years for the seminar.

My review of the conference must come from the observations of

others as I came down with a nasty stomach flu on the way to Banff. I want to thank Vice Chair Jim Haggins and others who capably filled in for me on very short notice. I was fortunate that my wife, Sharon, agreed to come to Red Deer on a rescue mission and even more fortunate that she didn't leave me there once she saw the shape I was in.

With the industry reeling from an extended downturn accentuated by "The Flu", delegates appeared ready for any potential signs of hope and came away with at least modest optimism from many of the presentations.

The Friday morning plenary apparently capped the three days off in fine form challenging delegates to think globally and bringing more understanding of the world's economic situation.

Perhaps the most telling review I received of the seminar was the following Monday at an ALMA Pork Value Chain meeting I attended by telephone. An ALMA official who deals with the various livestock sectors identified the Banff Pork Seminar as a unique opportunity for our industry to help provide direction and meet challenges in a way not available to other sectors.

The thanks of our organizing committee must go to Ron and Ruth Ball who assured delegates expectations were met, to sponsors who stepped up in spite of industry woes, and to the 600 delegates who again showed confidence in the Banff Pork Seminar.

May we have some better times in 2010 that we can celebrate as we gather in Banff January 18-21, 2011 for the 40th Banff Pork Seminar.

Regards,

Bryan Perkins
Chairman,
BPS organizing committee



Industry leaders honoured by Alberta's pork producers

Alberta pork producers attending their annual general meeting held in Edmonton mid-December, have honoured two Alberta industry leaders with the organization's Spectra Awards.

The Spectra Awards were set up as a way for our industry to honour leadership, says Herman Simons, chair of Alberta Pork, the organization representing pork producers in the province. The "Lifetime Achievement Award" is awarded to people with 25 or more years of service in the industry, either as a producer or in some other capacity. The "Friend of the Industry Award" is presented to a non-producer who has had a positive effect on the industry.

This year's winner of the Lifetime Achievement Award is veteran pork producer, Bryan Perkins, of Perkins Farms, Wainright, Alta. An innovator at all levels of the production chain through to marketing in his own operation, he is chair of four different community based farms, all part of the Sunhaven Farms Group. He is also chair of Sunhaven Farms Milling.

Perkins has served in many leadership capacities in industry. He is currently chair of the Banff Pork Seminar and he has served as chair of the Prairie Swine Centre, chair of Fletchers Fine Foods, is a past delegate of Alberta Pork and a past president of the Western Hog Growers Association. He has been vice-president of United Grain Growers, a director of United Oilseeds Products and board member of the Alberta Agricultural Research Institute. He is active in many local community efforts as well.

"Anyone who has been around our industry has had the opportunity to witness Bryan's wisdom and commitment," says Simons. "When he speaks, his point of view is always well thought out and his perspective valued by his peers."

The winner of the Friend of the Industry Award is NewCap Radio. Leo Pilon and Dean Thorpe of NewCap accepted the

award. The NewCap network has 31 stations across Alberta and 13 of those have daily noon hour agricultural programming on them.

"NewCap volunteered tremendous assistance this past year when our industry faced the H1N1 flu crisis," says Simons. The network donated \$96,000 in air time on its stations, and designated August as 'Pork Month' on its CFCW station. It also provided \$25,000 in promotional efforts including featuring pork recipes on its programming, and contests which encouraged listeners to send in their pork purchase receipts to win prizes.

As well NewCap was a major sponsor of the 'World's Largest Pork Cookout' in Camrose, broadcasting live from the event. The network also was a media leader in eliminating the use of the term 'swine flu' across its broadcast network.

"As our industry refocuses on its revitalization, leadership has never been more important," says Simons. "The people honored with the 2009 Spectra Awards are examples of the kind of attitude that has built our industry foundation in the past and will anchor our success in the future."

Assiniboine College streamlines its Swine Production Management program

By Myron Love

Brandon's Assiniboine Community College has streamlined and upgraded its Swine Production Management program. Speaking to producers attending the annual Manitoba Hog Days seminars on December 2 and 3 at Brandon's Keystone Centre, Mary Petersen, the college's Agriculture Program Coordinator, pointed out that the program used to consist of 34 courses.

"We have combined some of the courses and eliminated some others," she said. "The program now comprises six courses with new material added." She noted that the program is intended largely for barn managers but will also benefit others with experience in the industry. The courses include Swine Health & Nutrition, Swine Production & Breeding, Swine Production Management, Swine Production Analysis, Swine Barn Management and Swine Industry Current Issues. The first course, Swine Health and Nutrition, begins on January 25.

"Maintaining healthy animals is the most effective means of maintaining a viable production unit," Petersen said. "Disease prevention rather than treatment is the key to enhanced levels of production in all facets of the industry. Swine workers, managers, and owners need to be well-versed in the normal appearance and functions in swine in order to recognize problems early to minimize disease impacts."

Knowledge of principles of biosecurity and their application in swine units is a key component of disease prevention, she added. It is imperative that all levels of staff have a basic understanding of nutrition, the classes of nutrients, ingredients and the fundamentals of diet formulation, and the importance of providing feed appropriate to the life cycle phases of the pig.

Swine Production and Breeding provides the students with fundamental knowledge of the industry they have become involved in, the basics of handling and caring for animals, the

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basis of reproduction, the process of artificial insemination, and key concepts in genetics. Swine Production Management focuses on providing students with an understanding of all classes of pigs and how they fit into the stages of production.

Swine Production Analysis examines swine selection and breeding. Swine Barn Management considers human resources and performance management which includes safety practices in accordance with Workplace Safety and Health Act and Regulations. Students will learn to adopt proper maintenance practices in the barn facility, establish emergency management and develop a thorough understanding of ventilation and heating.

The Current Events seminar will cover current issues in the industry, provide networking opportunities, reinforce course content and give students the opportunity to interact with industry leaders. Petersen noted that the courses are all available via video conferencing. For further information, contact Mary Peterson on 1.800.862.6307 ext 6683.

New software provides precision stock solution formulations

From Farmscape.ca

A newly-released software package will help swine and poultry producers optimize the use of soluble nutritional and antibiotic supplements. Vétoquinol Precision, developed by Quebec based Vétoquinol was demonstrated during the 2010 Banff Pork Seminar.

Vétoquinol technical services manager Dr. Claude Thibault says the new software provides users with precise formulas for the preparation of stock solutions, resulting in optimal levels of medication for the treatment of animals.

The company started to work on Vétoquinol Precision about a year and a half ago because it realized that with many different soluble powders it was not always obvious for producers to determine how much powder to use and how much stock solution it made.

“Sometimes we have medicators that are the metric system instead of the US one ounce per gallon so if they wanted to work with metric medicators they would not find the appropriate recipe on the label so the Vétoquinol Precision software takes into account whatever is the type of medicator they work with,” explains Dr. Thibeault.

“If they have a different setup they can use it and every time they will end up with a very precise recipe for the preparation of the stock solution.”

Dr. Thibault says the software helps eliminate over or under medication and also identifies the correct withdrawal periods. Additional information can be obtained at solublepowders.com.

Alberta pork producers moving closer to industry revitalization decisions

The blueprint to revitalize Alberta’s pork industry is moving closer to the point where producers will have to make decisions on whether to move ahead with the plan in its entirety or parts thereof, say three industry experts hired to build the strategy. They presented background on their analysis to the Alberta Pork annual meeting held in Edmonton mid-December.

Gene Leman, a revitalization strategist from South Dakota, with extensive North America meat industry experience, says the strategy rests on three pillars. One is to build an Alberta Quality Platform as a baseline production standard. Second is to create a brand domestically and internationally that creates demand at the consumer level and “pulls” product through the supply chain. Third is producer involvement and possible investment in the processing side throughout the value chain.

The quality platform is an essential tool in product differentiation already used by major competitors, says Leman. Genesis Quality Assurance, a British company with a successful international production verification program has been hired to *continued on page 10*

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evaluate the Alberta industry. The market research and brand pull effort is being handled by J. C. Williams, an international brand development firm.

Industry integration is really about getting a bigger piece of the pie for producers and that requires integration up the value chain, says Leman. Producers can do this at a basic level by building risk sharing programs with processors. A second option is by having a verified production program and combining that with brand ownership for their product and an agreed custom slaughter with a processor. A third option is by building a more complete program that combines production verification and brand ownership with processing plant ownership.

Leman says return on investment is not strong at either the producer or the processing level. Processors need hogs and they may be more willing to listen to value relationships that will help keep hogs coming.

Mark Brooking, Director of Genesis Quality Assurance, hired to evaluate Alberta's industry, says that on the production front, the Alberta industry is doing many things right already and it is more a matter of doing a better job of telling the product story than it is about requiring a major shift in approach.

"Based on our initial findings Alberta has excellent facilities, good basic production protocols such as Canadian Quality Assurance, and excellent management. You compare favourably with the rest of the world. Don't keep it a secret. You need to sell your strengths."

Producers concerned with what assurance will cost, should keep in mind that the most compliant farms usually also have the best herd performance, says Brooking. Assurance is more about common sense and attention to detail, and in fact in some countries, assurance has led to lower insurance costs because of that. "It can set the stage for you to sell your product rather than giving it away."

John Torella of JC Williams says producers will recognize many successful food brands such as Wisconsin cheese or Ontario wines. The challenge is to build a brand for Alberta pork that will warrant a price premium from certain consumers, build long term profitable growth and customers for life.

The branding effort is following a four step process. The first stage, where information was gathered from consumers, chefs and

industry executives, and case studies examined, is complete.

Next stage is to build the brand positioning and strategy options. The first draft of this is complete. Stages three and four will be to develop the branding process and to build a business plan for implementation.

"Alberta pork has some important consumer purchasing and usage strengths to build on," says Torella. "It is an excellent time for pork to grow. However, there are challenges in the value chain that have been identified and need to be dealt with."

"We are very pleased with the work that has been done so far and are confident producers will have good information to make these critical decisions about their future," says Herman Simons, chair of Alberta Pork.

Canada invests \$2.3 million in Conestoga Meat Packers

The Canadian government is helping to open new markets for Ontario pork by investing C\$2.3 million in Conestoga Meat Packers. MP Harold Albrecht announced the investment from Canada's Economic Action Plan's Slaughter Improvement Program.

The investment will help Conestoga Meat Packers renovate its facility, allowing it to process value-added products, capture new markets and generate new revenue. In the past eight years, Conestoga Meat Packers, which is owned by 150 hog farmers in southwestern Ontario, has increased its capacity from 3,000 to 14,000 head per week, resulting in an increase in employment from 35 to 350 staff. This investment will further boost its productivity, job creation and the bottom line of local producers.

"Investing in a stronger meat-packing and processing sector in Canada benefits the entire value chain," Mr. Albrecht said. "If packers are profitable and competitive, our farmers will benefit through stronger markets, and our economy will benefit through new jobs."

2010 Swine Breeding Management Workshop

The 2010 Swine Breeding Management Workshop will be held on Thursday, April 29 and Friday, April 30, 2010 in the JG O'Donoghue Building in Edmonton. Entitled "Making Pigs

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Make Money: More Product at Less Cost”, the workshop covers a wide range of topics including understanding and managing litter phenotypes, increasing the genetic impact of elite boars through breeding management and feeding for profitable outcomes. In addition, a series of technical sessions, both barn and laboratory based, will include topics such as lactating/weaned sow management, fixed-time AI technology, assessing relative boar fertility, measurement of grow-finish performance at the farm level as well as many other topics.

For more information contact Sue Charlton on (780) 237-1033, by fax to (780) 438-1079, or by emailing susan.charlton@ualberta.ca. A registration form can be found at <http://www.ales2.ualberta.ca/afns/sbmw/>. The cost of the workshop is \$250, which includes refreshments, breakfast, lunches, evening reception and a copy of the proceedings.

KemTRACE® brand Chromium Propionate now available for gilts and sows in Canada

Kemin Industries has announced that the Canadian Food Inspection Agency (CFIA) is now permitting the use of KemTRACE® Chromium Propionate in diets for breeding and lactating gilts and sows in Canada.

“Kemin is pleased to receive this additional product registration in Canada for KemTRACE Chromium Propionate,” says Cody Swan, product manager for Kemin Agrifoods. “KemTRACE Chromium Propionate is designed to provide swine producers with a powerful tool to maximize the nutritional value of feed.”

KemTRACE Chromium Propionate is a safe, highly bioavailable, and patented organic chromium source. Chromium propionate is intended to improve average daily gain when fed continuously from weaning to finishing, and is also used as a chromium supplement for breeding and lactating gilts and sows, says the company.

The use of KemTRACE Chromium Propionate has been permitted in the USA for all production phases since 2000. It is also currently the only chromium source available for use in cattle in the United States.

KemTRACE Chromium is available in Western Canada thru Pro-Ag Products, located in Winnipeg, MB. For more information, please contact 1-800 806-2737 or visit www.pro-ag.com

New Executive Director for Alberta Farm Animal Care

Alberta Farm Animal Care (AFAC) has announced the selection of Lorna Baird of Calgary as the organization’s new Executive Director. Baird took over from Interim Manager, Jim Haggins, at the beginning of February.

Baird joins AFAC as she is completing her PhD in Animal Science from Queen’s

University, Belfast. Raised in Winnipeg, she obtained her BSc. in Agriculture (Animal Science) from the University of Manitoba and followed that with an MSc. in Agricultural Sciences (Animal Welfare Program) from the University of British Columbia (UBC). Her theses at UBC and Queen’s, focused on various aspects related to lameness in dairy cattle. Baird has eight years of experience developing and delivering “Lameness in Cattle” training sessions and research presentations to various audiences.

“I believe the most powerful way that animal agriculture will move forward in Alberta is through collaborations between industry, government and research to provide a clear, cohesive, forward-thinking message to the media and consumers,” says Baird.

Baird’s clear understanding of welfare issues, experience in management and research, communication skills and her dedication and passion for animal behaviour and care will be excellent assets in fulfilling her responsibilities to AFAC. She is excited about the opportunity to work with the board of directors, staff and the Alberta livestock industries in leading AFAC into the future.

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Lorna Baird, the new Executive Director of AFAC

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MAG International announces new Business Development Manager for Alberta

Mid-America Genetics Int'l Inc. has announced the appointment of Stewart Watson as Business Development Manager for the province of Alberta with support responsibilities for target markets in Montana. This newly created position builds on the company's commitment to expand services to their customers across Western Canada and the mid USA.

Formally educated in Advanced Farm Management, and Animal Sciences in Great Britain and with 20 years of Western Canadian industry experience Watson brings a solid background

in swine genetics, pig production, technical and business knowledge to the position. Based in Lethbridge, he is well situated to service the heart of pig production in Alberta and the company's growing customer base in the province and Montana. Additional responsibilities will include management and business development of boar and semen sales in both markets.

More than 40 percent of Canadians prefer bacon to sex

Canadians are passionate about bacon. When asked to choose between bacon and sex, more than four in 10 (43%) chose bacon, according to a recent survey commissioned by Maple Leaf Foods.

The company commissioned the For the Love of Bacon survey to mark the launch of their newest product innovation, Maple Leaf Reclosable Bacon.

"We wanted to probe how deeply rooted Canadians' passion for bacon is - and the For the Love of Bacon survey sure opened our eyes!" explained Adam Grogan, VP Marketing, Maple Leaf Foods. "Our research also told us that Canadians' number one frustration with typical bacon packaging is that it can't be reclosed (71%) and that it's too messy (52%). We know people love bacon, and now with Maple Leaf Reclosable Bacon, they'll love the package too."

Nearly three out of four survey respondents (73%) said they love bacon. In fact, nearly one in five Canadian men (18%) agreed that some days, they just can't survive without bacon. Also, when asked to rank various aromas by preference, 23% of men ranked bacon as number one, leading Maple Leaf to suggest that bacon fragrance for ladies could be the way to a man's heart.

It seems bacon lovers think they are better lovers, the survey suggests. When asked if they are good lovers, four out of five respondents (82%) who said they love bacon, also said they are good lovers. And when asked if they are romantic, four out of five respondents (81%) who said they love bacon also agreed they are romantic.

The survey also revealed some noteworthy regional differences. It may be bacon trumps love in the Prairies. Nearly one in four of respondents (23%) from Manitoba and Saskatchewan wondered if 'my partner loves bacon more than me'. "Maybe a little more sizzle in the bedroom instead of the kitchen is in order!" suggests the Maple Leaf news release.

Western Canadians are especially enamoured with bacon. Of respondents from British Columbia, 50% said they would give up sex before bacon, versus 37% of respondents from Quebec.

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• FX Aherne Prize Winner



F.X. Aherne prize honours innovators

Three Canadian pork industry innovators were presented with awards for their accomplishments at the 2010 Banff Pork Seminar. The winners of this year's F.X. Aherne Prize for Innovative Pork Production include Paul Wurz of Butte Colony in Bracken, Sask., Stephane Clement and Alain Lefebvre of JYGA Technologies in St. Nicolas, Que. and Thomas Jacob of Genetic Alliance Ltd., in Acme, Alta.



FX Aherne Prize winners – (Left to right) Ruurd Zijlstra, chair of the FX Aherne Prize committee, with Alain Lefebvre and Stephane Clement of JYGA Technologies, St. Nicolas, Que., and Thomas Jacob of Genetic Alliance Ltd., Acme, Alta.

“All three of this year's award winners are very deserving,” says Ruurd Zijlstra of the University of Alberta, chair of the F.X. Aherne prize committee.

The F.X. Aherne Prize for Innovative Pork Production is an opportunity for the industry to recognize those individuals who have developed either original solutions to pork production challenges or creative uses of known technology.

The awards are named after the late Dr. Frank Aherne, a professor of swine nutrition and production at the University of Alberta in Edmonton and a major force for science-based progress in the western Canadian pork industry.

“These awards honour the memory of Dr. Aherne, who was responsible for a number of innovations that the pork industry still benefits from today,” says Zijlstra. “They are an important recognition of those who continue to make innovative contributions to the pork production industry.”

Wurz received the award for his invention of a “pregnancy check extension.” This extension, which fits onto a typical pregnancy checking tool, allows for pregnancy checking sows from the front of stalls, or from the back, without bending over or getting into the stall. This innovation can also be used to pregnancy check sows or gilts in group pens, when a bit of feed is placed on the floor to keep the livestock occupied and still.

Clement and Lefebvre earned the prize for their invention of the gestalt feeding station, a computerized feeding system for farrowing sows. The feeder communicates with a computer using wireless technology and provides sophisticated management feedback to the farm that offers many possibilities to optimize the productivity of each sow and the follow-up of the herd. The invention is touted as a simple solution that will feed small amounts of fresh feed on demand by the sow, resulting in less feed wastage. The data it gathers provides a wealth of information to support farm management.

The recognition for Jacob was for his innovative new design for a safe and efficient boar training pen. Highlights of the system, which is based on a two-dummy method, are up to 90 percent success rate in the first training session and the ability to train up to 10 boars per hour, resulting in major time and cost savings.

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• Graduate Student Competition



The best of current research is on display at the Banff Pork Seminar each year. Along with that, students from various institutions have an opportunity to do an oral presentation on their research efforts. Presentations are judged by a panel of industry

representatives, and an award presented to the top student.

This year's winner was Miranda Smit of the University of Alberta. Second prize went to Prajwal Regmi, also of the University of Alberta.

Effects of supplementation of omega-3 fatty acid to sows on reproductive performance and growth performance of their litters

M.N. Smit, J.L. Patterson, S.K. Webel, R. O'Donoghue and G.R. Foxcroft
Presented by Miranda Smit

Dietary supplementation of omega-3 fatty acids is reported to be beneficial for reproductive performance in sows, and also to increase litter size and birth weight when supplementation with omega-3 fatty acids occurs during gestation and lactation. However, results are inconsistent. For this study, 108 gilts were allocated to be either control sows fed standard gestation and lactation diets, or treated sows fed the standard diets supplemented with 84 g/d of Sow Fat Pack 10, a fish-oil based supplement rich in omega-3 fatty acids, from day 60 of first gestation, through a 21-day lactation, and until euthanasia at day 30 of their second gestation. Litter characteristics, changes in sow metabolic state and reproductive performance at day 30 of gestation were compared between treatments.

Net energy balance during lactation and sow body composition were not different between control and treated sows. The total number of piglets born (13.0 ± 0.4 vs. 12.9 ± 0.3) and average piglet birth weight per litter (1.32 ± 0.03 vs. 1.34 ± 0.03 kg) were also not different between treatments. However, measurement of average piglet weight per litter showed that litters from treated sows had improved overall growth performance to the end of the nursery stage and higher average piglet weights at weaning than litters from control sows (5.57 ± 0.10 vs. 5.88 ± 0.10 kg, respectively).

Weaning-to-estrus interval, ovulation rate, and embryo weight/crown-rump length and survival to day 30, did not differ between treatments. However, average weight of the corpora lutea at day 30 was higher in



Ruurd Zijlstra (left) with Graduate Student Competition winners Miranda Smit and Prajwal Regmi

continued on page 16

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treatment compared to control sows (378.1 ± 6.9 vs. 341.0 ± 7.1 mg, respectively).

Implications: Supplementing sow diets with omega-3 fatty acids during late gestation and lactation positively impacted litter weight gain after birth but had little impact on subsequent reproductive performance of the sow. The higher weaning weights and nursery growth is likely to result in faster growth to market weight and the cost effectiveness of such a treatment will depend on the financial benefits of this compared to an added cost of \$15/sow per cycle.

In vitro starch digestion predicts the kinetics of glucose absorption in swine

P.R. Regmi, J.J. Matte, T.A.T.G. van Kempen and R.T. Zijlstra

Presented by Prajwal Regmi

Slow and continued glucose absorption has been linked to greater feed efficiency and lower body fat content in swine. In humans, reduced glucose absorption results lower blood insulin level that may benefit the management of diseases such as diabetes. Thus, prediction of glucose absorption is important to properly formulate diets so that desired blood glucose and insulin level can be maintained. In vitro starch digestion affects in vivo glucose response, but the relationship between in vitro digestion and in vivo glucose absorption kinetics is unknown.

The aim of this study was to determine this relationship for an in vitro assay using 4 different purified starches [maximal rate of in vitro digestion: 0.22 (slow), 0.38, 1.02, and 1.92%/min (rapid)]. The starches were included at 70% in 4 diets fed to pigs fitted with catheters in portal vein, carotid artery and an ultrasonic blood flow probe. In vitro glucose release and net portal glucose flux peaked at 15 min and 1 hr, respectively. After 2 hr, up to 45.5% of the total starch was digested in vitro and up to 54.5 % of the total starch had appeared in portal circulation. Compared to other starches, slow digestible starch had lower total in vitro glucose digestion and portal glucose flux (49 and 28% of total starch, respectively) at 8 hr. Cumulative portal glucose flux was strongly related to in vitro glucose release, although an unacceptable non-linear bias was observed. After correcting in vitro release with predicted stomach emptying, the relationship further improved and became linear ($R^2 = 0.95$; $y = 0.95 x$). Thus, the study clearly showed that in vitro starch digestion corrected for stomach emptying predicts glucose absorption up to 8 hr after feeding.

Implications: The regression equation developed in the present study can be useful for estimating the intestinal absorption of glucose from different starch sources. With the approach used in the present study, starch types can be selectively chosen for improving feed efficiency and pork quality in swine and for improving health status of humans with chronic metabolic diseases.

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Global picture of zoonotic disease outbreaks



Soren Alexandersen

Zoonotic pathogens, which are microorganisms capable of causing disease in both humans and animals, are becoming more and more important on both a local and a global scale, says Soren Alexandersen from the National Centre for Foreign Animal Disease in Manitoba. The close interactions among animals, humans, and the environment have dramatic impacts on animal, as well as public health, he believes.

Factors of importance include international

movement of animals, animal products, and people, and climate and other environmental changes, including those affecting wildlife populations and their interactions with livestock and pets. Alexandersen looks at the impact of zoonoses, in particular the H1N1 influenza pandemic in 2009, and predicts what other new diseases may emerge in future.

ZOONOTIC DISEASES

Newly discovered human pathogens

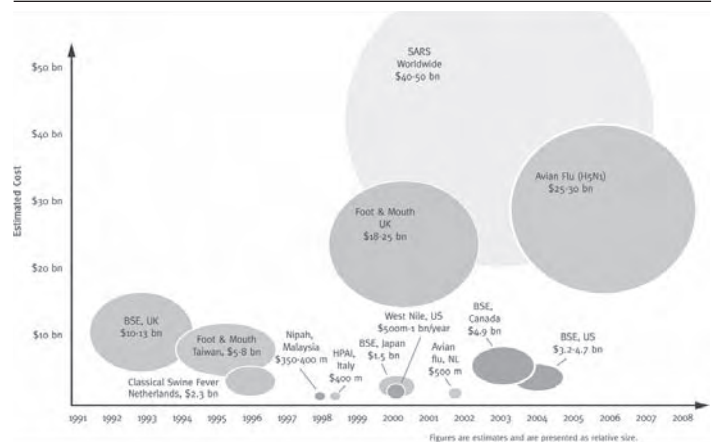
There are approximately 1400 human pathogens of which approximately 60% are zoonotic. Only 100-150 of these pathogens are capable of causing major disease outbreaks in humans and of these around 30-50% are zoonotic, suggesting that around 50 zoonotic pathogens currently exist capable of causing major outbreaks in humans. The majority of recently discovered pathogens originate in wildlife and most are caused by viruses, mainly RNA viruses.

The groups of animals most often involved as reservoirs of these novel human pathogens were ungulates, followed by carnivores, rodents, bats and primates, followed by birds and marsupials. It is, of course, important to emphasize that pathogens may not always jump from animals to humans, but that jumps also occur the opposite way or between animal species.

Animal pathogens

Approximately 600 pathogens are currently known in livestock and 400 pathogens in dogs and cats; of these around 40% and 70%, respectively, are zoonotic. Of particular concern are the diseases listed by the International Organisation for Animal Health (OIE). These have the potential for rapid spread and extremely serious socio-economic consequences. Although only 18% and 11% of the pathogens causing disease in domestic livestock and domestic carnivores, respectively, are viruses, of the emerging pathogens in livestock and carnivores, viruses

Figure 1: Economic impact of novel & emerging pathogens. (source – Bio-Era, 2008).



contributed 55 and 59% of the pathogens. In addition, 50% of the OIE-listed pathogens are viruses, so clearly virus infections play a central role in zoonotic disease.

Economic impact of new pathogens

The economic impact of novel and emerging pathogens can be significant and sometimes staggering. Examples from the last 15 years are shown in Figure 1. These include known diseases only affecting animals such as foot-and-mouth disease and classical swine fever as well as zoonotic infections such as BSE, Nipah, West Nile Fever, SARS and influenza. Other examples involving swine include PRRS and PMWS/PCVAD (Porcine Circo Virus Associated Disease). Of these costly examples, 7 are caused by RNA viruses, 1 (PMWS/PCVAD) by a DNA virus and 1 (BSE) by an unconventional agent, a prion. Another related example is the recent pandemic H1N1 2009 virus, also an RNA virus, causing significant hardship to the swine industry mainly due to the perceived importance in relation to human health.

New viruses to come

The most likely novel pathogen to emerge in future is a virus, most likely an RNA virus. Statistical analyses indicate that there may still be 40 to more than 500 more viruses not yet discovered and that 10-40 new viruses will be discovered before 2020, averaging around 1-3 new viruses per year. Although the ability of these novel viruses to spread and cause disease may only be severe for a few of them, they are likely to have zoonotic potential and be cause for significant concern. These viruses are likely to come from an animal (often wildlife) reservoir.

Pandemic H1N1 in 2009

Influenza A virus occurs naturally in aquatic birds such as ducks and shorebirds. The virus can adapt to different species including mammals and certain subtypes evolve and become particularly adapted to particular species, such as humans, swine, horses and dogs

etc. Humans and swine appear to have certain lineages of H1N1, H3N2 and H1N2 circulating and with a known ability to cross from humans to swine and from swine to humans, however, usually with a preference for either humans or swine.

This new pandemic H1N1 virus (pH1N1 2009) contains genes of several known viruses of swine, avian and human origin. The ancestor to this virus may have been present 10-15 years ago and it, as far as is known, was not detected in pigs or any other species during this period. Consequently, it is still unclear where, how and in which species this novel virus evolved before being recognized in April 2009. Subsequent work by CDC and others has indicated that the first confirmed case in humans goes back to 24 February 2009 in Mexico.

On April 28 2009 we became aware of a suspected outbreak in swine in a herd in Alberta associated with a worker returning from Mexico and becoming ill with influenza like symptoms while working in the barn. Affected pigs showed only mild clinical signs of disease typical of influenza in pigs and subsequent analyses indicate that this worker infected the pigs. Analysis of samples from the farm at NCFAD confirmed the presence of the pH1N1 virus.

Subsequently, various other countries have reported identifying the H1N1 virus in pig herds, including Argentina, Australia, Indonesia and the UK. The virus was also detected in two turkey flocks in Chile. Screening of swine herds by provincial laboratories has produced further positive findings in swine herds in Manitoba, Quebec and Alberta.

How do we prepare?

The future is likely to see additional novel and emerging pathogens at a rate of 1-3 pathogens per year of which most will have zoonotic potential. Based on what is known from the past, most of these novel pathogens will be viruses, most often RNA viruses, with an origin in wildlife and often driven by human activities including population growth. The most efficient way to counteract novel pathogens is to discover them early by applying a "One World One Health" (OWOH) concept to strengthen surveillance efforts for unknown viruses, in particular RNA viruses, among domestic animals and wildlife. This should be combined with a strong preparedness for dealing with the emerging pathogens that we consider most likely to become the next problem, as well as a general preparedness and ability to react to new and unforeseen situations, including the spread of novel pathogens not even "on the radar".

What we currently do at NCFAD is to be as well prepared as possible. First, we try to have a strong preparedness regarding already known

infections affecting livestock, in particular the transboundary animal diseases as defined by OIE, including foot-and-mouth disease, vesicular stomatitis, swine vesicular disease, classical and African swine fever, bluetongue and Newcastle disease, as well as avian influenza and influenza in other species including swine. Apart from African swine fever virus these viruses are all RNA viruses. Clearly, influenza is of major importance. Should the highly pathogenic avian influenza H5N1 from Eurasia come to North America, this could be devastating for the poultry industry, for people affected, and potentially for the swine industry, because this virus does have the capacity to infect swine.

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Estimating the market cost of H1N1

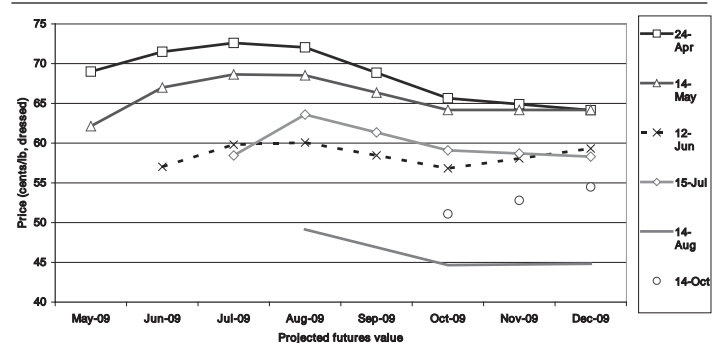


Ron Gietz

demand for pork and resulted in trade barriers being put in place, some of which still linger. But what is the cost of such a problem? Ron Gietz, Business Development Specialist – Pork, with Alberta Agriculture & Rural Development, attempts to estimate the impact of H1N1 on hog and pork markets.

Unexpected disease outbreaks can have massive effects on international trade. Over half a decade after the discovery of BSE in an Alberta cattle herd in May 2003, North American producers are still trying to regain their previous export markets. Foot and Mouth Disease in Taiwan in 1997 wiped out their pork trade with Japan. Then, in 2009, a relatively mild strain of H1N1 influenza was given the name swine flu which had a huge effect on

Figure 1: Lean hog futures on selected dates (Sep & Nov imputed)



Futures market impact

The first step to gauge the impact of an event on the pork market is the CME lean hog futures trade. Over the long term the lean hog futures have been demonstrated to provide an unbiased view of market prospects, while incorporating the latest market information. Although the news of H1N1 was trickling out prior to April 24th, the new “swine flu” really did not come to the general market’s attention until it became the leading news story in the US. We will follow the progression right through to the settlement of the December 2009 futures contract. The loss in value is stark. As of October 2, every contract has closed out sharply lower than its trading value on April 24. For example, May futures closed out 7.25 cents lower, June 14.625 lower, July 14.15 lower, August 22.93 lower. You can fill in the blanks for October and December, also down sharply initially, although mounting a fall recovery.

Clearly, lean hog futures traders did not take the “swine flu” news kindly. After initial limit declines, the slide continued for some days, with the nearby May contract dropping almost 12 cents in the first seven trading sessions post-H1N1, an average daily decline of 1.71 cents.

Moving past the initial sharp drop, can we really attribute all of the spring and summer selling and negative market vibes to H1N1? Would the Chinese have abandoned US pork imports regardless of the outbreak, as many contend, owing to sharply increased production there? What about a record cool July in Iowa, contributing to much higher carcass weights this summer? Plus much larger than anticipated US hog marketings all through the spring and summer months? Overall, the futures market suggests a large and dramatic initial H1N1 impact, but other news probably helped to perpetuate the downtrend. Furthermore, chartists will point out that a steady downtrend was already well underway by April 24.

Analyst forecasts

Prior to the outbreak of H1N1 it is safe to say that no analyst was predicting a May market of \$60 for lean hogs, nor a June average price of \$58 and most certainly not an August average of only \$51, the lowest in decades. Like the futures market, the

continued on page 22

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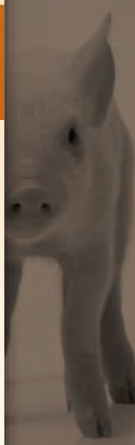
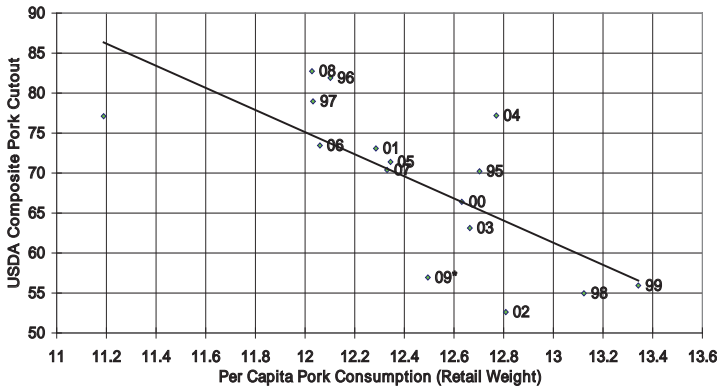


Figure 2: Per capita pork consumption vs. USDA composite cutout: 3rd quarter, 1995-2009



expectations of forecasters were sharply above the price levels actually achieved. Throughout the industry there was a general expectation of a return to profitability during the spring and summer of 2009, based I might add, on highly reliable seasonal price patterns.

Trade impacts

What are the possible mechanisms by which H1N1 would impact the pork market? The first and most obvious is trade.

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As the news of H1N1 broke in late April, a number of countries were quick to place restrictions on imports of swine and pork from North America, in some cases singling out specific provinces or states rather than the entire country. Alberta fared particularly poorly thanks to its well publicized outbreak on a hog farm in the province. Some of the restrictions were lifted fairly quickly, while others remained in place for long periods. Thankfully, many of our highest value and largest volume importers resisted the temptation to place non-tariff barriers to trade. Only two major importers imposed restrictions on North American pork: China and Russia. While trade restriction did have an effect during 2009, exports to these two markets were already down sharply prior to the outbreak of H1N1 in North America.

Demand impacts: wholesale and retail

Surprisingly, it is much more difficult to measure effects in the domestic pork market than in export markets. We know that the North American consumer showed an initial level of concern about swine flu that was quite high, up to 25% in late April. But the disease faded in the public's consciousness, with only 8% of US consumers concerned about getting swine flu (as the survey question was worded) by mid-June, according to Gallup.

Of those consumers who are concerned about the flu, a much smaller subset is going to alter their pork purchasing habits. Anecdotally, it would appear that the message that H1N1 is not transmittable from eating pork has gotten out fairly well, and most consumers are behaving as they always would, or if they are cutting back it is only a subconscious reaction.

I believe the general conclusion from the available data is that pork demand at the retail level did not suffer dramatically post-H1N1. However, the conclusion from the wholesale data is that North American packers were struggling mightily to keep the pork from backing up in their coolers in the wake of H1N1. There was more pork to sell thanks to ample production and sharply lower exports. This pork was moving out the back of the plant only at sharply discounted prices; packer margins were poor to mediocre at best.

Figure 2 supports my contention that pork demand at the wholesale level has been abysmal. Just how bad? Prices since spring 2009 have been running at least 10 cents per lb below the historical average relationship between per capita pork supplies and the wholesale cutout, similar to 2002 and worse than 1998 pork demand. In other words, with average pork demand, prices would have been about 10 cents higher this spring and summer, even accounting for the much larger-than-expected production and the sharply reduced export volumes. Then the question becomes, how much of this demand destruction do you want to ascribe to H1N1, and how much to everything else in the marketplace from a weak economy, to savvy pork buyers eager to take advantage of a compromised seller. In the meat business, one man's pain is often another man's gain.

=WHJ=



Effective advertising and promotion of pork in a challenging environment



Ellen Goddard

Advertising and promotion continue to be a significant driver of consumer purchasing, particularly for fresh pork and in certain regions. However there is a lot of evidence that consumers are becoming more responsive to economic factors such as price and advertising, say Ellen Goddard and Xu Zhang from the University of Alberta. With changing consumer preferences within the marketplace, there are different messages

that need to be pursued through promotion – messages about country of origin or production practices that will trigger different responses by different demographic groups within Canada, they believe. Reaching the consumer is becoming more complex as more niche market production systems and products are developed. Further investigation of consumer purchasing at the individual level is critical if advertising and promotion will continue to be a successful investment for the industry

New directions in advertising and promotion

Traditionally, for commodities, advertising and promotion largely focused on the benefits of the commodity. For many years generic advertising and promotion, funded largely by commodity organizations, was the major marketing strategy in sectors such as meat and dairy. But commodity markets are being broken into many niche markets with products differentiated by experience and

credence attributes. In the context of food products, experience attributes refer to characteristics of foods that cannot be verified by consumers at point of purchase but can be verified at the time of consumption (flavour, for example) and credence attributes refer to characteristics of food that cannot be verified by consumers even after consumption (animal welfare or other production characteristics, for example). Another credence attribute, origin of product (domestic, imported, local), is becoming a major focus for many consumers, particularly given international food safety 'scares' and the difficulties of identifying origin in many purchasing channels. Communicating experience and credence attributes to consumers may require specialized advertising and promotion based on industry or government developed standards and/or directed point of purchase information. As well, interest in adding value to commodities through further processing is a significant strategy for most commodity sectors and the investments in further processing and product development warrant significant investment in brand advertising and promotion. Advertising and promotion in the market today will contain a mixture of brand/firm advertising and promotion, generic advertising and promotion and industry developed indicators of credence attributes (the new Canadian Pork label is an example).

Measuring the impact of advertising

The first indicator of whether advertising is, or has been, effective can be based on aggregate data - essentially per capita disappearance of pork in Canada. On a per capita basis, disappearance is likely to be related to price of pork and other meats, changes in disposable income and advertising and promotion activity. Annual per capita consumption of the four largest meat categories are shown in Figure 1 - it is clear that pork consumption is more variable around a flat trend than either beef or chicken. From the data on per capita pork consumption and pork retail price movements over the last twenty

continued on page 24

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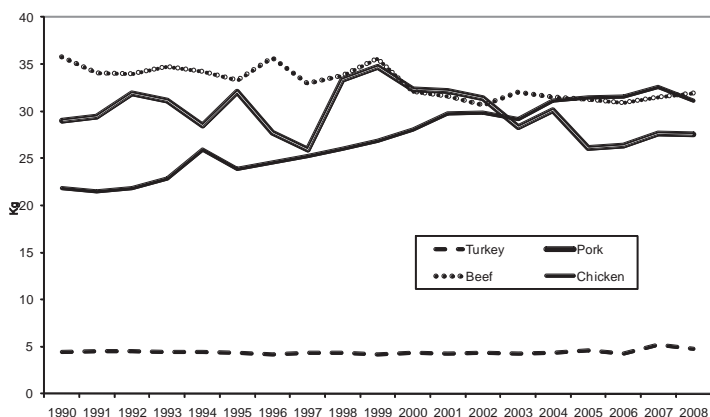
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Figure 1: Annual per capita meat disappearance, Canada (kg/year)



years it also appears that there is a direct and negative relationship between pork sales and price.

Pork consumption over the last 18 years (1990-2008) is significantly more price responsive and responsive to changes in advertising expenditure than might be suggested by a model incorporating data from a longer period (1978-2008). For producers, it is important to know that the total pork advertising budget continues to have a statistically significant impact on sales of pork products (advertising includes both generic and branded advertising dollars). Consumers are becoming more responsive to both price and advertising over time - something that has both pros (potential to positively impact sales through advertising) and cons (bigger changes in quantity sold from any change in price) for hog producers.

What is going on at the individual household level?

There is significant variability in the sales of pork at a household level when the country is examined, using AC Nielsen Homescan™ data. Understanding some of the variability across consumers is critical to any ability to influence markets through advertising and/or promotion. The data shows that people in the Maritimes are most likely to spend more than \$100 per year on pork and people in British Columbia are least likely to do so. A somewhat more worrying trend is that in Ontario and Alberta there are growing differences between the rural and urban populations with urban

populations in those provinces less likely to spend more than \$100 per year on pork.

Pork is also considered something of a luxury food. Households with higher incomes are more likely to spend more than \$100 per year on pork than those with lower incomes. Households where the age of the household head falls between 18 and 34 are the least likely to spend more than \$100 on pork per year while households in the 55-64 age category are the most likely to spend more than \$100 per year. Households with children under the age of 18 are more likely to spend more money on pork than those without.

To examine the impact of advertising on household meat purchasing behaviour, pork spending was broken down into fresh pork spending, semi-processed pork spending and fully processed pork spending (ham and dinners). Two provinces, Alberta and Ontario, have been examined to see if there are any significant regional differences in responses to household characteristics and to market variables such as price and advertising. In both provinces, spending on fresh pork is statistically affected by the household aggregate meat budget and by whether or not the household has children. In Alberta, if the household is in an urban setting fresh pork expenditure will be higher and in Ontario previous fresh pork spending levels are important in explaining current levels. Fresh pork advertising has a statistically significant effect on fresh pork spending in Alberta but not in Ontario. Advertising expenditure on semi-processed and fully processed pork products does not help explain spending on those two meat types. This is in spite of the rather significantly higher advertising budgets associated with fully processed pork products. Demographic characteristics associated with households have much less explanatory power in semi-processed and fully processed pork than for fresh products. These initial results suggest that much of the actual impact of advertising may be being captured in the fresh pork category rather than in the other value added categories. The importance of habit formation in purchasing across all pork products suggests that households may be less persuadable through activities such as advertising to try new things.

What is left to be examined in advertising and promotion?

Pork is no longer a commodity. There is significant variety in the number of different types of hogs being raised, feeds being used and production practices being applied at the farm level. The majority of producers are registered in the CQA on-farm food safety program but it is not clear that final consumers actually recognize the quality implied by the system. This has the potential to be a driver in the pork market given increasing consumer concerns about food safety.

The industry has recently embarked on a branding Canada program to ensure that Canadians understand when they are consuming Canadian pork but it is not yet available to all consumers in all stores across the country. Effectively this is a promotion program based on country of origin. There are numerous aspects to hog and pork production that affect quality and consistency and further research is necessary to examine which aspects of hog production produce value for consumers in the form of their willingness to pay for specific attributes and which types of information, which branding exercises and which types of promotion can best reach individual consumers and encourage changes in purchasing.

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Corn, oil and the future of the livestock sector

By Brad Brinkworth, Meristem – www.meristem.com



Kevin Grier

market analyst Steve Meyer, of Paragon Economics, in a key “story inside the story” of his joint presentation with George Morris Centre’s Kevin Grier on how the continent’s pork industry will look after the dust settles.

Here’s a collection of a few of the key nuggets of information and perspective he delivered on a topic that is fast becoming the elephant in the room for the future of the livestock business:

On the US blenders tax credit and import tariff on ethanol. “These subsidize and protect the US biofuels ethanol business. Both are going to expire at the end of the year. There’s going to be a lot of political wrangling on this. I would say the vote on Tuesday in Massachusetts would point to helping these expire and I think we’re going to get some movement on this. But the analysis says even if you take these two things away it doesn’t change the amount of ethanol we make very much, and doesn’t change the price of corn or ethanol very much.”

US biofuels policy is nothing short of a tsunami creating havoc with everything from corn to oil and the future of the North American livestock sector. The “bell” of massive ethanol production can’t be “unrung” and needs a safety valve in the event of drought combined with low oil prices.

This was the picture painted by respected US based livestock sector economist and

On the renewable fuels standard (RFS). “The RFS says it doesn’t matter if it makes any economic sense, by god you’re going to make this stuff and use it. That means 15.5 billion gallons of corn based ethanol in 2015. The number for this year is 12 billion gallons. There are 193 plants currently operating. There’s another 13 still being built or expanded. We can’t unring that bell. Those plants will be operating.”

On the corn-oil connection. “The relationship between corn price and oil price is a strong one. My observation so far is that anytime oil is over \$70 a barrel this positive relationship is far stronger.”

On the ‘new normal’ corn price. Corn at \$4 is foreseeable within the year and unlikely to budge much, says Meyer. Even if blenders tax, import tariff and RFS were removed, research involving Texas A&M predicts the price impact would only be 0.50 cents lower. “They found if we remove the blenders tax credit, corn prices go down less than 1 percent. So at \$4 corn that’s less than 4 cents. Removing the tariff lowers the price about 3 percent. Removing the RFS has a bigger impact of 5 percent but we’re not going to take the RFS out in my opinion. It’s a question here what the impact is but the point is we’re not going back to \$2 corn. That’s just not going to happen with those plants sitting there using corn, unless we can increase yield substantially”.

On the need for a safety valve. “One thing we do need is an automatic trigger of some sort for the scenario where we get a drought and especially if oil prices are low. We can turn off ethanol plants relatively quickly. It’s pretty hard to turn off the livestock sector. We could end up with \$7 or \$8 dollar corn and if oil is \$50 dollars or even \$70 a barrel, that scenario says burn gasoline in your car for a year and feed that corn to the livestock, but our policy says ‘Thou shalt use the grain to make ethanol.’ I think we need something to set that aside.”

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• The boom after the bust



China's pork industry and its implications for the world



CJ (Chenjun) Pan

China produces and consumes half of the world's pork. Pork continues to hold a dominant position in China's total meat structure, although it is growing at a slower rate than poultry. While the country's industry is characterized by countless small-sized farms, pork production has surged by more than 300 percent since the early 1980s and the pork supply chain has been restructured, explains CJ (Chenjun) Pan, Senior Industry Analyst with Rabobank in Beijing. This

has a number of implications for the rest of the world, with the potential to supply technology and feed grains as the industry continues to expand and restructure, he says. And, while Chinese preference for fresh meat will limit the import of raw meat, potential will exist for offals as well as premium processed meat.

Demand dynamics

Pork leads CPI fluctuation

Pork is the single most important item in China's consumer price index (CPI) basket. While food makes up one-third of CPI, pork takes up 8%. Pork price was the main reason for the consumer price inflation in 2007 and 2008.

Meat consumption trends

While rising income level is the primary reason for increased meat demand, lifestyle changes, urbanisation and supermarket

growth are also altering the dietary and purchasing habits of Chinese consumers, from 'food as a need' to convenient, healthy and value-added food products.

Generally speaking, urban and rural areas reveal totally different patterns in food consumption. Wealth disparity has widened since the mid-1990s owing to the faster growth of the urban economy. While the more expensive chilled meat and a variety of processed meat products are available in the cities, less expensive fresh 'hot' pork and high-temperature sausages are mainly consumed in rural areas.

Pork share declines slightly

The share of pork consumption within total meat consumption has decreased, due to both rising consumer health consciousness and the increased affordability and availability of other meats. Chinese consumers are increasing the shares of poultry, beef, sheepmeat and seafood in their diet. Over time this trend has resulted in a consistent decrease in the share of pork within total meat consumption from 80 percent in 1985 to 66 percent in 2008. Going forward, the meat structure will continue to favour poultry at the expense of pork, which will decrease slightly to 64% by 2015.

Demand outlook: excellent potential for 'safe meat'

China's per capita meat consumption is still low compared to western countries. However, the growth of meat consumption is expected to slow down in the coming years. Rabobank forecasts per capita meat availability to grow at a compound annual growth rate (CAGR) of 3 percent and reach 67 kilograms by 2015. Meat consumption in urban areas is reaching saturation, while rural areas still have tremendous potential for further growth.

Urban areas will see more changes in qualitative aspects, such as food safety and convenience, and a shift in demand towards different protein sources. Rising living standards will be accompanied by rising consumer awareness of food safety. This



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will have significant implications for meat producers, processors and retailers. It is estimated that roughly half the meat produced by illegal butchers is not up to national standards. If the market share of illegal butchers falls to 20 percent and the population rises to 1.38 billion by 2015, the market size of safe meat would increase to 80 million tonnes, from the current 40 million tonnes. This compares to a growth rate of 26 percent for the overall meat sector.

Food safety top in consumers' minds

Consumers are increasingly concerned about food safety after a number of food scandals in recent years, the most severe being the melamine crisis in 2008 which killed six and sickened nearly 0.3 million. 'Made in China' has raised worldwide concern after media coverage about the detection of melamine in China's products, whether factual or exaggerated.

This creates opportunities for companies that can address food safety and better quality. Leading pork companies such as Yurun and Zhongpin have put great emphasis on food safety and reported much better market performance than the market average.

Pork price trends

Pork prices reached a record high in 2008, due to the blue ear disease outbreak and the supply shortage following the disease. However, entering 2009 quick recovery of pork production and the economic slowdown resulted in oversupply and, thus, a fall in pork price. Piglet and hog farm-gate prices decreased by 54% and 25%, respectively, while pork retail price decreased by only 15% on a year-on-year basis. Along the supply chain, farmers have been hit hardest, while processors and distributors can obtain better margins as the gap between production cost and sales price is increasing.

Restructuring in the pork supply chain

Consolidation of hog farming

Hog production is currently conducted by three categories of producers: backyard farms, specialized household farms and commercial farms. While there is no strict definition of the three types of farms, in general:

- backyard farmers usually raise less than 50 hogs,
- specialised household farms raise 50 to 3,000 hogs and
- commercial farms raise more than 3,000 hogs.

About 42% of live hogs now come from small, individual backyards, compared to about 74% in 2001. Specialized household farms and commercial farms are gaining importance, especially in developed areas where backyard farming is declining. These specialized household farms and commercial farms usually produce hogs for contracted slaughterers/processors.

The reduction in backyard producers is due to a number of factors. With the urbanization and migration of rural labour to cities, the cost of rural labour has increased. Moreover, backyard production is synonymous with low quality and poor sanitation. These factors led backyard farming to lack competitiveness to specialized production. The gap left by backyard farmers has been filled by specialized households and large scale farms. As farming structures change, the relationship between slaughterers and producers will be develop towards a coordinated supply chain.

Consolidation in slaughtering and processing

Due to market liberalization between 1985 and 1992, the slaughtering sector has developed from a state-run monopoly to the current system of designated slaughterhouses. As a result of consolidation, the number of designated slaughterhouses has decreased from 30,000 in 2006 to the current 12,000, due to the government's efforts to close down medium and small sized players with lower efficiency and higher safety risk.

The number of slaughterhouses is expected to decrease by another 30% in the next three years. In the meantime, the government is cracking down on illegal slaughtering, which once accounted for over 40% of total pork supply. These two factors will leave a huge gap in slaughtering capacity and offer great opportunities for large companies to expand further.

Limited pork trade

China has limited pork trade with the rest of the world. China used to be a net pork exporter, mainly exporting high value-added pork meat to Japan, Hong Kong, South Korea and Malaysia. China mainly imports frozen pork and dark meat, with the latter accounting for more than half of the total import value. Major frozen pork and dark meat exporters include the United States, Denmark and Canada. China became a net importer in 2007 and 2008, with imports of fresh and frozen pork increasing substantially. Given the oversupply situation in 2009, China's pork

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imports have fallen sharply, while exports have increased modestly. Going forward, China will remain self-sufficient in pork supply and is unlikely to become a major importer. This is not only because Chinese consumers prefer fresh meat but also because pork is considered a strategically important food to Chinese consumers. Stabilizing pork supply is a priority for the government.

Implications for the world

The ongoing structural changes will have three primary implications for international players. First, demand for technology, knowledge and food safety systems will create opportunities for international players to break into the market. Rather than focusing solely on promoting the industrialisation of livestock production, the government has made technological

development, food safety, breed improvement and productivity enhancement its top priorities.

Second, import potential continues to grow for some specific products, such as dark meat, high-end products and livestock breeds, though the preference for fresh meat and low domestic meat prices will limit consumption of imported frozen meat.

Third, while China is unlikely to rely on exports to supply pork for the domestic market, the possibility that China will import feed grains to meet the rising demand for manufactured feed from farming industrialisation is high. Rabobank believes China will continue to import large amounts of soybeans and soybean meal in order to cover the widening gap in the domestic market and become a small net importer of corn in the coming years. **WHJ**

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Challenging our pork marketing models

Summarized by Marvin Salomons

A topical marketing session at the 2010 Banff Pork Seminar was a breakout that stimulated thought on the current models Canada uses to market pork. Sounding out their positions on the topic, Canadian pork industry icons Kevin Grier and Martin Rice reviewed and questioned the current models used to market pork and how the status quo “just isn’t going to work for Canada anymore”.

Views on differentiation and segmentation

Grier opened the debate saying the views held by the majority of industry stakeholders tell us the pork industry suffers because pork is produced and marketed as a commodity. He went on to say the key points the industry consultants, governments and academics stress is we need to differentiate our pork from US pork, we will get higher prices if we do differentiate, we need to find new markets and finally we have to segment our pork more than we are doing now. Grier admits basic marketing 101 teaches every business should try to differentiate itself and everyone should segment. These strategies are long seen as a competitive tactic and should in theory work well and be followed by every individual firm.

Grier countered these ideas saying that “if the entire industry differentiated itself wouldn’t that be a commodity? Who says differentiation means higher profits if the differentiated commodity then becomes the norm?” Grier sees that differentiation, by definition, cannot be a strategy for success of an entire industry. Traceability and age verification add costs, but are good animal health tools as well as marketing strategies. They do give market paybacks but Grier sees that in a few years both will become commoditized across Canada at the expense of those producers and packers who worked to differentiate their products. Today’s differentiated product then becomes tomorrow’s commodity.

So what then?

Grier sees an analogy between snowflakes and pork. Despite every pig, every carcass, and every pork chop being uniquely different, when all is said and done like snowflakes it is still just a pile of snow. With pork, Grier says it is still just tasty pig meat. Pork is pork. In that regard Grier questions how different can Canadian pork be? Do we really send different pork to different markets or is it just similar pork with a specification for that market? Domestically and internationally it is all about price. Differentiating on things like food safety may have marginal gains in some markets but Grier sees this as just the cost of entry into those markets. Safety is now expected. He sees the same scenarios for traceability, environmental responsibility and animal welfare. We shouldn’t, over the long haul, expect extra points differentiating our pork on these attributes.

For consumers price is paramount. If, given the choice between Canadian and US pork, Canadians will likely choose Canadian assuming of course the price is right. Producers benefit from



Branding Canadian pork could be the salvation for the industry, suggests CPC’s Martin Rice

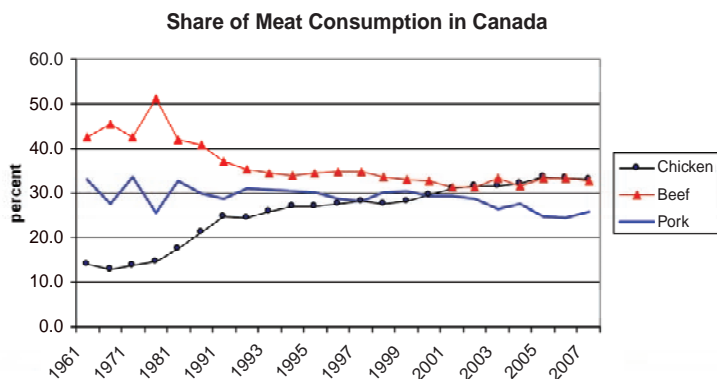
increased overall pork demand not just increased demand for Canadian pork. Even though we would like to see more Canadian pork consumed the best strategy would be if marketing programs succeeded in getting more pork consumed, regardless of the source. Grier stresses that we are still in a North American market and the Canadian pork producer has a stake in a Saskatchewan consumer enjoying a pork chop from Alberta as well as a stake in a consumer in Halifax enjoying a pork rib from an Illinois pig. Grier says all along we thought people loved our pork but they just loved our dollar.

Differentiating – How are we doing?

Differentiating is a tough business. There is a view that the integrated North American market and dependence on the US market makes it difficult to differentiate. In 2002 the US accounted for 50% of Canada’s pork exports while in 2009 it accounted for only 29%. Price determines where pork is going to flow. It is a small world and still getting smaller. Every buyer around the world knows the price, there are no untapped markets, and Canadian exporters are world leaders in accessing these markets. Can we do better? Grier answered that saying, “of course we can....it all comes down to price”.

Grier summed up saying we need to price independently from the US. It is back to basics of supply and demand as pork now moves freely across the Canada-US border. Next door we have the richest market in the world within one day’s drive. To be in the market we need to work hard at differentiating our farms or firms and work hard to segment our firm’s customers. An entire country, province or industry cannot differentiate or segment customers. Grier challenged policy makers and industry leaders to focus on efficiencies, tax burdens, regulatory reforms, pork quality and feed costs. Pork is a commodity and Grier feels that’s just OK.

Figure 1: Share of Meat Consumption in Canada (1961 – 2008)



Current challenges and trends

Teaming up with Grier in this session was Martin Rice, Executive Director of the Canadian Pork Council. No stranger to the history and the challenges in the Canadian pork industry, Rice talked about current marketing challenges facing the industry and built a case for branding Canadian pork. He touted there were a lot of reasons that led the Canadian pork industry to be successful in the 1980's and 90's but they just don't exist today.

The industry's rough rides over the past several years can be attributed to a host of issues that Rice sees culminating in the perfect storm. The rapid appreciation of the Canadian dollar, the large increases seen in feed and other costs, the US country-of-origin labelling (COOL) legislation, the global economic recession and finally H1N1 have seriously impacted producer's bottom-lines and export markets. Rice questioned "if we had done things differently to get where we are today would the pain have been less and would we find ourselves in as poor a position relative to our competitors?" The big question remaining is how can we secure a future for the industry within today's realities?

Looking back over the past decade Rice indicated pork consumption has been on a downward slide. Despite the rise seen in pork imports, calculating the overall disappearance of pork shows sales of pork at the consumer level has fallen more than 30% since 1999. Rice equates this to 3 million less market pigs consumed in the marketplace. Canadians are just not simply eating less pork but overall domestic pork consumption has declined from a 30% share of the total meat consumed in the 1960's to where we are struggling to hold on to a 25% share (Figure 1).

Today's picture

The good outlook for prices of oil and commodities (unfortunately not pork) suggests a continued strong Canadian dollar. This outlook combined with increased competition for cereals and oilseeds from sectors like biofuels suggests it will be a rough and volatile road for the pork sector. Rice sees the US continuing as a major exporter of pork and countries like Brazil expanding as a supplier. Rice says the North America market has been seriously disrupted by COOL and the free movement is now one-way...North! Rice summed it up saying the continued reliance on undifferentiated pork sales to sustain a large Canadian pork industry will be problematic over the long term.

Rice noted we have come a long way in improving our pork. Canadian pork is viewed as high quality by those who know it's Canadian (like our exporters and retailers) but only viewed that way by very few consumers, even in Canada. The study of Canada's industry by GIRA concluded the Canadian pork chain is highly dysfunctional with GIRA concluding the only thing that flows along the chain is pigs. Rice said the GIRA study shows Canadian hogs are the cheapest in the world but are not the cheapest to produce. He says we need to increase our focus on ways to differentiate our pork in order to obtain greater returns for our hogs. Rice views the work currently being done on various fronts helping, such as Canada Pork International's (CPI) Canada pork story, Pork Marketing Canada's (PMC) buy Canada and retail partnership programs, and also Alberta's pork branding strategy.

The case for a Canada brand

Rice noted there's a need for change and a need to "brand". The Canadian pork producer knows that in the realms of today's issues they can no longer extract a profitable return from the commodity pork trade. CQA and traceability programs that we are building into the industry are attributes that add value and differentiate pork. Rice sees the need to create a sustained and repeated loyalty for Canadian pork that goes beyond the scope of being just branded Canadian. A successful branding package needs to offer something that distinguishes Canadian pork from other products and between which the consumer is able to choose.

Rice summed up the session saying GIRA described the Canadian pork market as "under attack from inside and outside" and recommended we need to do something about it, find ways to enhance value to consumers, and give them a reason to choose Canadian pork. "Those initiatives and ideas can potentially be wrapped into a brand" says Rice. Things must change to improve the bottom line for producers, and branding may be the powerful alternative the industry needs to implement to lift it out of its current state.

≡WHJ≡



Reducing feed costs – practical applications

Summarized by Bernie Peet



Roger Campbell

UPDATE ON AUSTRALIAN FEEDS RESEARCH

The Pork Cooperative Research Centre (CRC) has invested in a range of feed related research projects over the last four years. Its CEO, Dr. Roger Campbell, summarizes the results and commercial and scientific implications of the research and where future research investment might have the greatest returns to pork producers and the grains industries.

Feed grains for pigs

Screening varieties of triticale and barley for both yield and DE content has resulted in the identification of varieties with consistent improvements in both traits and in particular increased ileal DE. The latter has led to the development and commercial release of two triticale varieties with yield advantages over the benchmark varieties of 12 to 16% over a wide range of dry land conditions and 30 to 35% under irrigation. The two new varieties have higher ileal DE

levels compared to the benchmark varieties ranging from 9 to 12%.

The new varieties offer grain growers the potential to increase energy yields per hectare by 20 to 25% and for pork producers to reduce feed/grain costs on a DE basis. The Pork CRC has also invested in a pea breeding project which has developed and released a new variety called Maki which out yields the current benchmark varieties by 20%.

NIRS and the rapid evaluation of grains

Research is also taking place to measure the variability in the energy value of grains across animal species and the develop NIRS (Near Infra Red Spectrometry) calibrations to predict the available energy contents of grains for pigs, ruminants and poultry.

The calibrations for pigs are based on wheat, sorghum, barley and triticale. Ileal and faecal DE values varied between grains by 9% and 15% respectively. Within grains the variability in faecal and ileal DE values ranged from 8% to 15% with the

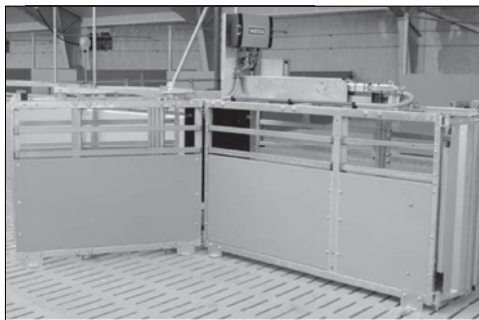
Table 1: The feed: gain of pigs offered diets based on different grains during the first 21 days after weaning (From report on Project 2B 101 –Pork CRC)

Grain	Feed: gain	Range
Sorghum	1.45 a	1.28 - 1.45
Wheat	1.27 b	1.20 - 1.40
Barley	1.28 b	1.23 - 1.34
Triticale	1.26 b	1.08 - 1.40

a, b means followed by different letters are significantly different (P<0.05)

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greatest variation occurring in the ileal DE of wheat and barley samples.

The differences in DE between grains and within grains were generally reflected in feed efficiency differences of weaner pigs offered diets based on the same grains (Table 1). However, while sorghums had the highest DE contents they resulted in the worst feed efficiency.

The NIRS calibrations are available to industry and in use in Australia's larger feed mills. Within-grain variability in DE content has been found to consistently range by as much as 2 MJ/kg.

Grain processing

While the impact of feed processing (grind, particle size etc.) receives a lot of attention in the USA, it has been of much less interest in Australia. A number of studies have been conducted recently to assess the effects of grind and particle size distribution on in vitro starch digestibility and on feed efficiency measured in vitro.

The results suggest that grain particles above 1 mm diameter adversely influence in vitro starch digestibility through effects on the rate and sites of digestion. In a recent experiment pigs were offered diets based on wheat and sorghum hammer milled through a 3 mm or 2 mm screen.

Table 2: The effects of grain type and hammer mill screen size on the feed: gain of entire male pigs offered pelleted diets for 49 days starting at 24 kg

Grain Screen size, mm	Wheat		Sorghum		Significance (P=)		
	3 mm	2 mm	3 mm	2 mm	Grain (G)	Screen (S)	GxS
Feed: gain 0-21 days	1.81	1.75	1.80	1.91	0.049	0.50	0.029
Feed: gain 0-49 days	2.00	1.85	2.01	2.00	0.029	0.20	0.065

During the first 21 days the feed efficiency of pigs offered the wheat-based and sorghum-based diets was improved significantly when the screen size was reduced from 3 mm to 2 mm (Table 2). Pigs offered the wheat based diet exhibited a 7.4 % improvement in feed: gain when the grain was ground through the 2 mm screen. For pigs offered the sorghum based diets feed: gain was higher than for the wheat based diets and unaffected by screen size.

The results suggest that for pelleted feeds the effects of grain processing differs between grains. The improvement in feed efficiency for pigs offered the diet based on the finer ground wheat averaged 8.4 % which represents a substantial reduction in feed usage and potentially in feed costs.

Other research

Blend feeding 20-100 kg

Research in this area compared the performance and economics of changing the pig's diet on three occasions

between 20 and 100 kg (industry practice), changing the diet weekly or using a single diet over the period that was formulated for pigs averaging 60-65 kg live weight.

Changing the diet weekly or using a single diet had no effect on overall performance or carcass traits but both strategies reduced feed costs by approximately \$3.00/pig compared to the three diet phase feeding program.

In line with expectations, changing the diet weekly allowed the pig's changing requirements to be met more closely and enabled overall feed costs to be reduced. However, pigs offered the single diet exhibited poorer growth and feed efficiency in the period to approximately 60 kg but grew faster and were considerably more feed efficient during subsequent development than pigs on the other two treatments. The cost savings achieved on the single diet were associated with the lower cost of the diet at the start of the period and the improved feed efficiency supported after 60-65 kg.

Phasic feeding

Research with pigs between 25 and approximately 105kg suggests that feeding pigs twice daily over set time periods can result in an improvement in feed efficiency of 9%-10% compared to offering the same diet(s) ad libitum.

continued on page 34



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Table 3: The effects of offering pigs feed ad libitum or for two one hour periods daily (0900 and 1600 h -phasic) for 49 days on growth performance and carcass fat and muscle contents

Trait	Ad libitum	Phasic	Significance P=
Daily gain, g	981	960	NS
Feed intake, kg/d	2.63	2.39	NS
Feed: gain	2.68	2.49	0.039
Carcass fat, %	16.3	13.7	0.03
Carcass muscle, %	57.9	60.7	0.03

The results of one experiment to investigate the effects of offering pigs feed ad libitum or the same diet for two 60 minute periods daily are shown in Table 3. There was only a small difference in the feed intake of pigs on each treatment but those offered the phasic feeding treatment exhibited a significantly lower feed: gain and contained significantly less fat in the carcass than those offered the diet ad libitum. The difference in feed: gain between the two treatments was 10% or some 20 kg/pig. The fact that pigs on the phasic feeding treatment were also leaner than their ad libitum fed counterparts suggests there is a degree of metabolic inefficiency associated with ad libitum feeding.

Higher NDF and dietary fat levels

Recent results have shown that improvements in feed efficiency, at least over the short term, can be achieved by increasing the NDF (Neutral Detergent Fibre) level of finisher diets to 19%. A study to investigate the effects of added fat and higher levels of NDF on the performance of pigs over the last six weeks of growth showed that during the first 21 days adding 5% fat or increasing the NDF level to 19% in diets with similar DE content (14 MJ /kg) markedly improved feed efficiency. However, over the six week period, increasing the level of dietary fat to 5% had the greatest effect on improving profitability, increasing it by \$4.80/pig for intact males and by \$5.80/pig for females compared with the control diet. The improved returns were associated with reduced feed costs (better efficiency) and increases in carcass weight. The results



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CURRENT FEEDING TRENDS IN UK AND EUROPE



Increasing volatility in feed material markets has resulted in both producers and nutritionists looking at strategies to limit the potential damage from price fluctuation, suggests Mick Hazzledine, Pig Director of Premier Nutrition Products in the UK. He discusses some feed industry trends that influence feed costs and pig performance.

Nutrient definition of raw materials

Mick Hazzledine

Most of the major EU pig producing countries use net energy systems and have done so for some years; many use different NE values for sows and growing pigs to allow for the higher fibre digestibility in older animals. Amino acids are increasingly specified as standardized ileal digestible, with formulations now including valine, isoleucine and histidine all of which can become limiting as we look at reducing crude protein concentration and increasing the use of crystalline amino acids. Available phosphorus has been replaced by digestible phosphorus and crude fibre by neutral detergent fibre. Even with a corn/soy feed this level of precision is worthwhile; with increasing quantities of raw materials having a lower digestibility it is absolutely essential.

Nutrient density

Canola meal and DDGS are increasingly used by the feed industry in Europe. However, they may not be cost effective because the nutrient density of the finished feed is too high. A recent trial at the Prairie Swine Centre comparing diets with a range of energy densities showed that pigs consumed less of a higher nutrient density feed in an attempt to maintain a constant energy intake. A 15.4% change in nutrient density resulted in a 14.3% change in FCR.

In the UK 10 years ago a typical finisher feed, fed from 60 kg, would have had a DE of 3.27-3.32 Mcal/kg; today it would be 3.15-3.20 Mcal/kg and there will be increasing pressure to reduce this further as DDGS volumes increase. How low can we go in nutrient density before pig performance deteriorates?

Historically my experience has been that as the energy density falls below about 3.10 Mcal DE/kg then growth increasingly deteriorates (I should stress that much of this experience is based on entire boars rather than castrates, and relatively low appetite genotypes). Now that our matrices are more refined is this still the case? A major concern is likely to be the fibre level because a high fibre level will eventually constrain intake.

Phosphorus

There has been a considerable amount of research to determine both the digestible phosphorus levels in raw materials and the pig's requirements. Whilst originally driven by pollution legislation, this research has proven extremely useful with the escalation in phosphate prices that we have seen recently. Of course all research needs commercial interpretation. We need to consider pig factors such as feed intake and prolificacy, as well as physical factors such as mixer efficiency. Phytase at 1000 FTU has been widely adopted. Interestingly, the digestible P levels used in sow feeds in Europe are lower than those used in North America; the differences are only partly explained by prolificacy and intake. In the UK, levels used have proved robust – lameness in sows is currently running at 0.4% and sow mortality at 4%.

Vitamin E

The vitamin E price increased 6 fold at the end of 2006 and resulted in many nutritionists reviewing and reducing supplemental levels. These had tended to increase previously in an attempt to stem the losses from PMWS. In Premier, we reverted to a “rule of thumb” that suggested 30 IU vitamin E/kg feed per each 1% polyunsaturated fatty acids in the feed. This resulted in typically 63-72 IU/kg in feeds from 13-30kg, 45-48 IU/kg in finishing feeds, 50 IU/kg for dry sows and 72-100 IU/kg in lactating sows. Most starter feeds in the UK contain 250 IU/kg of vitamin E. Reducing vitamin E levels to those indicated here resulted in few obvious problems on commercial farms.

We are currently examining plasma vitamin E across 10 client herds. While the average levels for pigs at weaning are within the recommended range, there is considerable variation. Plasma vitamin A levels drop sharply after weaning and although the average is just above the recommended minimum level, if we accept that the requirement is considerably higher for optimum immune response, a majority of pigs may be immuno-compromised.

In addition to the levels shown above, our approach to date has been to increase vitamin E levels in lactation feeds so as to boost colostrum and milk levels. We are also considering vitamin E in the drinking water for 7-10 days post-weaning.

Feed and commodity purchasing

Feed manufacturers have seen a major shift away from branded products to contract manufacture of the farmer's own feeds. Whilst a number of farmers still purchase feeds for a set time period, increasingly they maintain a raw material book with the supplier (wheat, barley, soya, canola normally) often adding cover “little and often” to take the peaks and troughs out

of commodity prices. The increased transparency is a major advantage; risk management is transferred from the mill to the farmer and his nutritionist. For example, within branded feeds the manufacturer decides upon maximum canola levels - with contract manufacture the nutritionist points out the potential savings and risk to the farmer i.e. “we are currently using 10% canola meal which looks conservative and moving to 13% will save £1.50/t but there is a small risk of reduced intake”.

Entire boars for meat production

Few countries (UK, Ireland, Australia, and South Africa) use entire boars for meat production because of the risk of taint arising from the sex hormone androstenedione and the tryptophan metabolite, skatole. There is increasing welfare pressure to cease castration or to insist that it is carried out under anaesthesia (which presents a number of practical difficulties!). Alternative strategies to castration include immune-castration (Improvac® Pfizer), sexed semen and genetic selection to reduce androstenedione and skatole in boars.

Recent research has shown that we can reduce skatole production by nutritional means.

Boars show a 12% improvement in FCR over castrates, have 23% less back fat, and a similar growth rate. Their lean growth rate is 16% better and lean FCR 20% better. They do require higher levels of amino acids in their feeds and are more difficult to manage at higher weights than castrates. Nutrition and genetics look the most likely solutions to reducing boar taint in the UK in the short term.

Conclusion

In the last 10 years our basic research understanding of pig nutrition has improved significantly. However the commercial application of this research varies markedly from country to country despite the fact that the information is freely available. The art of the commercial nutritionist is to identify financial limitations to client profitability, and through reviews and on-farm testing, where practical, modify feed formulations in a timely manner. Inevitably there are safety margins (and “comfort zones”) imposed by both nutritionist and producer. These should be recognized as such, costed and continually challenged.

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Livestock health surveillance systems

Summarized by Bernie Peet

A NEW SWINE VETERINARY SURVEILLANCE SYSTEM FOR WESTERN CANADA

In order to maintain a competitive and sustainable livestock industry, we must retain long term access to both our North American and global export markets. Most if not all of these markets, and also domestic consumers, demand that we show a commitment to food safety and public health by monitoring the production of our food supply. Veterinarians Brad Chappell from Steinbach, MB and Gail Cunningham from Kelsey, AB, have developed a database of herd health information for their clients that provides assurance for all of our markets relating to pig health. They describe how it works and the benefits that it provides.

Introduction

Swine Database Services (SDS) arose from the shared vision of like-minded private industry veterinarians in Alberta and Manitoba. These groups came together because they recognized the need to compile and organize the large volume of health information in their practices, and to use the power of this information to:

- Make better decisions for their clients.
- Create and maintain accurate tracking of antibiotics and medicines, enable establishment and maintenance of efficient and reliable client food safety protocols.
- Improve epidemiologic data, to aid disease investigations.
- Improve practice management, and individual quality of life for SDS stakeholders.

The group of veterinarians recognized the need to create knowledge from the collection of data that currently existed in a format that was not organized or searchable. These goals are

being achieved through the development of an online database of health information. This database will perform many functions to aid veterinary practice management for SDS members.

Development and application

Different parts of the database were developed independently in the two Western provinces. When the two groups met together to learn from one another, they saw the opportunity to create something that was greater than the sum of its parts. In essence, they discovered an innovative real-time information management infrastructure that could support finding comprehensive solutions to challenges facing their swine clientele in general, and quite likely the swine industry as a whole. When the database grew larger and more complex, the services of an IT company were used to incorporate the new features. They loaded the database onto an online server, so that SDS members in both provinces could access it and maintain real time data. Each individual practice maintains a separate confidential and password protected copy of the database.

Although the SDS database is multi-functional – designed first and foremost as a clinical veterinary practice tool – the parts can be managed separately, and each part is dynamic. The first version of the database is completed and copies of the independent database are currently being used in two practices in Alberta and one in Manitoba. Thus private industry veterinarians (including SDS stakeholders) will be able to access their own clients, but not the clients of other veterinarians.

As mentioned earlier, the primary reason the database was developed is to facilitate practice management. Key area practice management modules that have been integrated into the database are:



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- Generation of the producer Medication and Vaccination Usage Plans
 - Standardized medication information for clients as outlined by the CQA program
- Diagnostic information recording
 - Summarization of diagnostics information for reporting to clients in a searchable format.

The secondary objective is to provide a real time on farm swine surveillance tool. The various provincial veterinary associations mandate that:

- Veterinarians must keep medical records. These medical records include herd health visits, phone consultations, export visits and Canadian Quality Assurance validations.
- Within the veterinary-client-patient relationship all information must be kept confidential.

With these veterinary association bylaws already in place and with their medical training it became obvious that this would work very well. In the database each farm is given a unique code that is only known to the herd veterinarian. Thus the farm name or other farm identifiers do have to be included when data is shared.

SDS has been sharing data with Alberta Agriculture and Rural Development under a pilot project of the Alberta Veterinary Surveillance Network (AVSN) since February 2009. The goal of the Alberta surveillance project is to develop a system for the early detection of new or emerging diseases. The data that is submitted to the Government includes:

- Unique farm code number
- Census district of the farm location
- Key farm attributes – farm type, size, etc
- Syndromic information – how much coughing, sneezing, etc

Conclusion

This database will produce real time health information and standardized reports that will provide assurance to all of our markets of the health of our pigs. Effective practice records and animal health surveillance are needed in today's world to ensure we create the highest quality product and maintain the demand for Canadian pork.

continued on page 38

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ALBERTA VETERINARY SURVEILLANCE NETWORK

Effective animal disease surveillance systems are a requirement for livestock and meat exporting countries in today's world. All trade dependent livestock industries, including the swine industry, need internationally accepted surveillance that can detect and respond to disease threats and produce scientifically valid animal health information, believes John Berezowski, with Alberta Agriculture and Rural Development. It is in the best interests of all intensive livestock industries, including the swine industry in North America, to promote the development of advanced provincial and national surveillance systems that support access to markets and help to maintain animal health, he says. He outlines how surveillance systems have evolved, and provides an overview of the Alberta Veterinary Surveillance Network.

History

The World Trade Organization (WTO), established in 1995, tasked the Organization Internationale des Epizooties (OIE, or World Animal Health Organization) with developing regulations to govern the effect of disease on trade in animals and animal products. The OIE developed a list of the most important animal diseases. In response, many OIE member nations focused their resources and legislation on detecting and responding to OIE reportable diseases, and reduced their capacity and legislative

authority to investigate and respond to emerging diseases.

In 2007, the OIE changed disease reporting requirements to include emerging diseases. OIE member nations are obligated to report the occurrence of any of these diseases, especially if they present a threat to animal or public health. In order to report these disease occurrences, trading nations must have the capacity to detect their occurrences. Trading nations cannot claim absence of trade limiting diseases without actively looking for them. Not looking for diseases can result in closed borders and the OIE is checking up on countries.

Surveillance systems

Surveillance systems must do more than just detect disease. Trading nations cannot make claims about the effectiveness of their surveillance systems without backing their claims. Their surveillance systems must stand up to scrutiny by international teams of inspectors and they must produce scientifically acceptable information documenting both the disease status of their livestock and the effectiveness of their surveillance system.

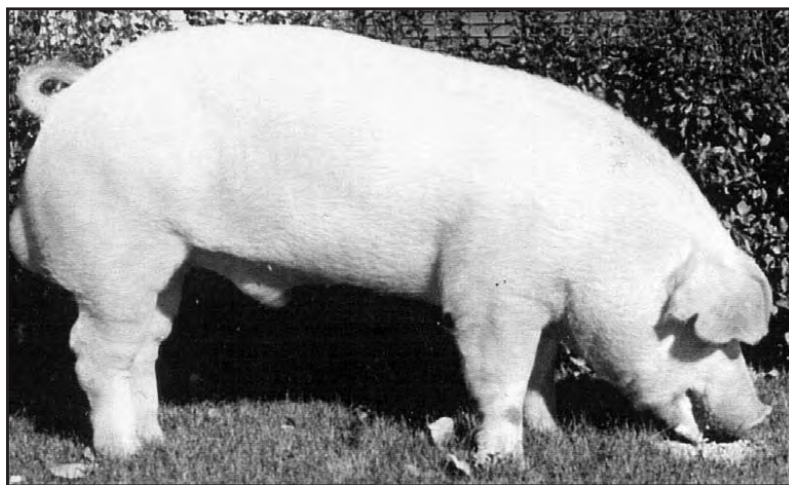
Although surveillance systems directly benefit livestock and food production industries, in many countries including Canada, they are funded and lead by provincial or national governments. In Canada, the federal government has legislative authority and responsibility through the CFIA for OIE reportable diseases. However, surveillance for OIE reportable diseases is shared



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between the CFIA and the provinces. Examples of shared surveillance in Alberta include surveillance for BSE, influenzas, scrapie and chronic wasting disease. Currently the provinces conduct most of the emerging livestock disease surveillance and it was for this purpose that the Alberta Veterinary Surveillance Network (AVSN) was created.

Alberta Veterinary Surveillance Network

The AVSN is an infrastructure (people, processes and technology) for the systematic, continuous observation of Alberta livestock and poultry. It has three functional components: disease detection, disease response and communication. Data from multiple sources is collected and analyzed for rapid detection and timely, appropriate response to livestock, poultry, food safety and public health events. The AVSN produces and communicates information about the health and disease status of Alberta livestock and poultry and the safety of Alberta's products.

The goal is to identify diseases as early as possible after they emerge, or are introduced into Alberta livestock populations, providing as much time as possible for producers, veterinarians and governments to effectively respond to them. Early detection allows timely responses and reduces losses to the industry.

Event detection systems

Disease reports come from veterinarians, meat inspectors, public health officials, farmers, the public and others. The AVSN collects data from many sources including screening programs for BSE, CWD, scrapie, avian influenza and incorporates information from research projects and surveys from other agencies, academia, governments and industry.

Veterinary Practice Surveillance System (VPS)

Currently, the VPS system is a voluntary, veterinary practitioner-based system used for cattle surveillance, with systems being developed for poultry, swine, and small ruminants. The swine system has been operating as a pilot project since February 2009 with two swine specialty practices (see earlier in this report).

Participating veterinarians in the VPS cattle system collect data about their interactions with cattle and report data directly into a database through the AVSN website. Since January 2006, approximately 30 practices have participated in the VPS. Data was collected from 4,500 farms in 2006 and 4,900 farms in 2007.

The VPS system uses targets and signals to identify events. Targets are specific clinical diagnoses or important syndromes. To detect targets, veterinarians who work with the

AVSN review daily reports looking for important disease events. Signals are changes in the number or distribution of submissions. The data are examined for changes in time and space that might indicate an unusual disease.

Conclusion

Animals, animal products and people are being moved around the world faster and in greater volumes than ever before, creating an ever increasing risk for the introduction of new diseases into swine operations. Surveillance systems such as the AVSN are essential tools for reducing the risk and harm caused by the introduction of new diseases into livestock populations of all species, including swine.

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Producing antibiotic-free pork

Summarized by Bernie Peet



Manon St-Hilaire

HOW TO RAISE ANTIBIOTIC-FREE PORK: A SUCCESS STORY

A project in Quebec to produce 4000 pigs per week to antibiotic-free standards has proved a great success. The 10,000-sow system produces market hogs without using animal by-products in the feed and without any use of antibiotics. More than 80% of the pigs produced are able to be sold as antibiotic-free according to standards set by the certifying organization Agro-Com. Manon St-Hilaire, a veterinarian and consultant for Aliments Breton, describes

the requirements for antibiotic-free production, the problems experienced and the approach taken to achieve good pig health and performance.

Steps towards an antibiotic-free farm

As part of the antibiotic-free (ABF) production program, all types of antibiotics, either injectable, oral, for prevention or for treatment, must not be utilized on the farm. The specifications also prevent the use of other medicine such as anti-inflammatory drugs and wormers. The only products permitted are vaccines, vitamins and mineral supplements. Fortunately, all the farms that were part of the project used these different products in a preventive and curative approach, but only on a small scale.

To set up the new program on production farms, we evaluated the health status of the different herds. As such, we verified that they all originated from PRRS negative farms. Secondly, we made a list of the various antibiotics that were being used. We determined the critical points in time throughout the production process where the elimination of antibiotics would have the greatest impact. One should keep in mind that in each step of the production, whether it is farrowing, nursery, or finisher, the use of antibiotics plays a role in the control and prevention of diseases, and helps to increase performance. We estimated that the suppression of antibiotics would lead to a 10 to 15% performance reduction. The premium received from the slaughterhouse would have to cover all losses and even more.

At the time of setting up the ABF program, every producer involved had to be audited by an Agro-Com-certified person. From then on, the producer or manager of each farm in the project committed to:

- Not to administer antibiotics in any way to a group of pigs;
- To clearly identify a pig that received antibiotics with a black ear tag so that it could be removed from the program;
- To take a sample of each feed delivery;
- To take all necessary precautions to keep the farm clean and to ensure proper management of the group of pigs.

The vast majority of farms applied the program without problem and became certified only months after it came into effect.

Frequently encountered problems

While the program was being set up, and even today, we have noticed some minor health problems. Fortunately, these problems are often similar so that we could develop some approaches to avoid losses.

In farrowing, the most-frequently encountered problem has been neonatal diarrhoea. Vaccination with commercial or wild vaccines has controlled E. Coli, Rotavirus and Clostridium. Coccidiosis was the main problem we had to deal with. A readjustment of the management techniques around birth, as well as the use of alternative products, helped to control this disease.

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In the nursery, post-weaning diarrhoea and coughs caused us some problems on a very occasional basis. Here again, better management at weaning and the use of several alternative products gave good results.

During the finishing period, health problems were infrequent. We were more preoccupied by PRRS, Influenza and Mycoplasma contamination in not so well-located sites, which had high pig density.

Alternative solutions to antibiotics

We also looked at the different alternatives that were relevant in our case: vaccines, probiotics, acidifiers, and other products. We tried almost every product available on the market and results for the most part met or exceeded our expectations, but were sometimes deceiving.

Vaccination has been a significant contributor to the success of the project. The vaccination program aimed at sows was adapted in order to increase maternal antibodies in the colostrum, thus protecting piglets for as long as possible. In some pyramids we have used additional vaccines specifically for piglets, to prevent PRRS and Mycoplasma.

Success of the program

As a whole, the program has been functioning well. Since the start, 82% of our pigs have been produced as part of the ABF program. The performances in farrowing and in finishing have only been slightly affected. A more important loss has been observed at the nursery level, where a decrease in ADG and in feed efficiency has been evaluated at 10%. The number of deaths has generally remained very low; however, we noticed an increase in the number of animals that have to be injected individually: approximately 50% in maternity and close to 20% in nursery.

DOES ANTIBIOTIC-FREE PORK HAVE A PLACE IN TOMORROW'S MARKET?

The use of antibiotics in livestock feeds has been met with increasing opposition, in particular the level of non-therapeutic antibiotics fed to animals. Consumers have created demand for products they feel are safe, wholesome, and environmentally friendly, leading to niche markets for pork products that have evolved over the years. Producers must analyze the costs and benefits to ascertain if it would be profitable to produce antibiotic-free pork. Darwin Kohler and Chad Bierman of Babcock Genetics, Inc. consider the performance and economic implications of producing for the antibiotic-free market, using case histories of farms they have been involved with.

Introduction

Although there are differences between antibiotic-free (ABF) programs, they are similar in not allowing animal products, antibiotics, growth promoters, or hormones to be used. They are termed "Never-Ever" programs meaning that no antibiotics can be given to the pigs in any form from birth to market.

Experience in Sweden and other evidence suggests that the reduction in performance through not using antibiotics leads to an increased cost of US\$5.24 per pig marketed. This is due to fewer pigs weaned per sow, slower growth, higher mortality at both the pre- and post-weaning stages and poorer feed efficiency. The question is - can ABF pork production in North America be more successful than this?

Case study 1

This 1,000 sow farrow to finish conventional confinement system has been closed to live animal introduction since 1996. Since December 2004, no antibiotics, growth promoters or animal byproducts have been used in pigs from birth to market. Very few pigs require treatment (<1%). If prohibited medication is used, the pigs are marked (double-tagged) for identification and are sent to conventional markets.

The sow herd's performance before and after the implementation of ABF production was unchanged and a comparison of data shows no consistent advantage to the use of antibiotics. Pigs had received an antibiotic at birth before ABF implementation and an increase in pre-weaning mortality might be expected. While it did increase from 8.2% to 9.9%, this was not reflected in pigs weaned per mated female per year.

Table 1 shows the herd's finishing performance before and after ABF production was started. There are only small differences in performance. Feed Conversion showed a small increase and vegetable oil was later added to the diets to improve both ADG and feed efficiency. To determine the economics of the production differences, profitability comparisons were made. No changes were seen in Average Daily Gain, Pigs Weaned / Sow / Year or in Finisher Culls. Poorer feed conversion after ABF resulted in a cost increase of \$0.68 per market hog. Sow death loss was actually slightly lower and resulted in a saving of \$0.25 per market hog. Finisher death loss was

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Table 1: Finishing performance before and after ABF implementation for Case 1.

Grow/finish trait	Before and after ABF difference (Before minus After) ¹
Feed used / pig placed, kg	-12.89
Total days group was open, d	-1.42
Feed cost / pig transferred & sold, USD	-.30
Finishing mortality rate, %	-0.10
Average days to market, d	-0.60
Average live weight: all pigs entered, kg	-2.94
Average live weight: all pigs transferred & sold, kg	-3.95
ADG, kg/d	0.00
Feed used / pig transferred & sold, kg	-15.01
Feed / Gain², g/kg	-0.04
Feed cost / unit of live weight gain, USD	0.00

¹ Total pigs sold before and after ABF implementation was 54,697 and 67,900 respectively.
² Feed conversion adjusted to common entry and sale weight.

0.10% higher resulting in a cost increase of \$0.07 per market hog. Average drug cost before ABF of \$0.18 per market hog resulted in a savings after ABF. The additional ABF premium was \$13.33 per

head in the years of 2005 -2007 and the additional profit per pig was \$13.01. No increase in feed cost was observed here, but this may not be true in all cases.

Case study 2

Can the cost of depopulation-repopulation to produce ABF pigs be recovered? Are the premiums received from these markets worth the effort? The following case study looks at 5 farms, 3 of which are currently selling ABF pigs, and two that desire to. The history of the latter two farms will help answer these questions.

The first three farms provide a benchmark for herds 4 and 5, which have never been depopulated and had difficulty producing ABF pigs consistently. An analysis comparing the economic benefit of improving health through a depop-repop, as well as attaining the ability and financial advantage of marketing ABF pigs was performed.

Results show good production numbers from Farms 1-3 compared to Farms 4 and 5. There is a 0.17 pound per day advantage in ADG and a 0.19 better feed conversion in Farms 1-3. Mortality is 3.8% better. PSY were identical and sow death losses are similar. The ABF herds received a \$15.49 premium over the average of similar herds marketing non ABF pigs. In addition there was \$13.59 additional revenue derived from cumulatively better ADG, F/G, and mortality.

Farms 4-5 are now selling ABF pigs after the depop-repop. These farms were successful in their efforts to recover production costs and attain ABF premiums. With limited data, we have recovered \$24.25 out of the \$29.08 we projected from comparisons of the farms' performance.

Management considerations

Herd health has remained high, although some of these herds are positive for PRRS and mycoplasma. Efforts to block entry of new diseases or strains cannot be stressed enough. Sound vaccination programs must be in place. Good biosecurity and sanitation is essential.

Nutritionists must develop ration formulations without using blood plasma, fish meal, choice white grease, meat and bone meal, or any other animal derived product. In some cases, the rations may be more expensive even after considering the savings from removing all antibiotics.

Environmental management and sanitation must be raised to a new level. Temperature variations and drafts can set off scours or respiratory breaks and must be avoided. Air intakes must be operating properly and be well-maintained.

Conclusion

Success for these herds is multi-factorial, but includes maintaining a closed herd, and having high biosecurity to keep pathogens out. Good management in the areas of animal husbandry, nutrition, environmental control, prompt treatment or removal of sick pigs, and attention to detail is essential. We still need antibiotics to treat bacterial infections in pigs. Treated pigs are identified, removed from the program, and sold through alternative markets. Managers must have good record keeping and be watchful to the details of these programs. It is highly desirable to adhere to the protocols of the most stringent ABF programs in order to gain the most market accessibility.

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H1N1 – Everything you always wanted to know

Summarized by Marvin Salomons

H1N1 was front-page news around the globe throughout most of 2009. For the majority of people there wasn't a day that went by without hearing or reading something about this disease. No exception at the Banff Pork Seminar this year as those in attendance were treated to a great breakout session on H1N1 that covered everything one wanted to know about H1N1, and probably more.

The session highlighted four experts covering H1N1 topics ranging from the effects of H1N1 on pigs to people. In addition all were taken back to the H1N1 Alberta farm case, hearing the details and how industry and government responded to the disease situation.

Effect on the swine population

Mary Gramer, a veterinary researcher at the Veterinary Diagnostics Laboratory, University of Minnesota laid out the framework as to why the industry has an interest in knowing what H1N1 is and its origins, what its relationship is with other global influenzas, and how it impacts the health status of swine operations. Gramer, a specialist when it comes to influenza, knows the concepts around the disease are not easy for all of us to grasp and understand. She gave a brief rundown on how the H1N1 virus came into such infamous standing over the past several decades culminating into the World Health Organization declaring an H1N1 pandemic on June 11, 2009.

Gramer says the H1N1 virus is quite complicated and made up of three types (influenza A, B and C) with A being the one most talked about. To understand the origins of any influenza A virus she said you must first understand the basics:

- The real details - influenza virus is an enveloped, segmented, single-stranded negative sense RNA virus belonging to the family *Orthomyxoviridae*.
- Swine influenza virus (SIV) is a type A influenza virus (the most talked about one).
- Influenza A viruses cause disease in animals, birds and humans.
- Influenza B viruses appear to only cause disease in humans.
- Waterfowl are the main vectors infecting other species (even exotic zoo animals).
- Influenza C viruses are very rare but can affect humans, dogs and swine but there is no evidence that C viruses are now circulating and causing disease in pigs.
- The 2009 H1N1 pandemic virus genes are a mixture of North America and Eurasian H1N1 influenza A viruses.
- The goal of a virus is to constantly change to evade the immune system.
- A changing virus can jump species. Pigs are very susceptible.
- Pigs have receptors on the epithelia cells in their respiratory tract (called 2,6 and 2,3 receptors) where the virus attaches itself.

- The virus prefers pigs because it can replicate easily in pigs without causing high mortality.
- Pigs are good mixing vessels and intermediary hosts for avian, human and swine flu viruses.

What H1N1 appears as in pigs

The clinical signs of influenza A infection in pigs can be varied and usually are mild. It can affect pigs of all ages and is typically displayed as an acute respiratory disease with a fever, cough, anorexia, nasal discharge and eventually poor weight gain. When a fever shows, Gramer says the pig is usually shedding virus and this usually lasts 4-6 days after the clinical signs appear. The pandemic H1N1 is so important because pigs can be the intermediary host where re-assortment of the virus or change in the virus takes place. Gramer says influenza is known as a "shared virus" so we need to be cautious and vaccinate people working closely with pigs. Pigs can be clinically normal but still shed virus. This is important information for farm workers as well as global exporters of live pigs.

Gramer summed up saying the growing complexity of influenza viruses combined with a high affinity for re-assortment makes



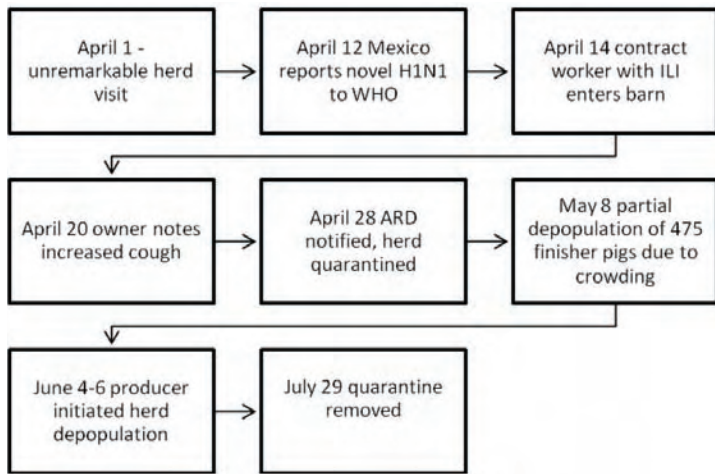
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Figure 1: Timeline of events in H1N1 Alberta swine herd



the North American pig population an important reservoir for future outbreaks. Controlling flu will likely continue to be dynamic and difficult. Preparedness and strategies to reduce transmission are paramount if we want to reduce future potential impacts of this virus.

A case on an Alberta farm

In 2009 Alberta was in the frontlines of a global media frenzy regarding the confirmation of H1N1 influenza A in a swine herd. Two Alberta veterinarians closely involved in the case described the identification of H1N1 in the pig operation involved and the subsequent responses by governments and industry. Egan Brockhoff with the Faculty of Veterinary Medicine, University of Calgary and Julia Keenlside with Alberta Agriculture & Rural Development in Edmonton described details following their identification of the H1N1 virus in a 220 sow farrow-finish central Alberta herd and how they had to bring government and industry together to deal with the situation.

Brockhoff, also with Prairie Swine Health Services, during a routine herd visit on April 1, 2009 noted no problems. By April 20th coughing was noted in the pre-grower and grower barns. A week earlier (April 12th) Mexico alerted the World Health Organization of a novel H1N1 human epidemic in that country. This alert coincided with a contract worker who had returned from Mexico on April 14th and had entered the barn to do some ventilation equipment repairs. During his time in the barn the worker had showed signs of influenza-like illness. The owner, concerned for the well-being of his family and herd, responded quickly by notifying his herd veterinarian. On April 28th the Canadian Food Inspection Agency (CFIA) placed a precautionary quarantine on the infected farm. The entire

sequence of events from identification of the disease in the herd, the epidemiology of the disease, and the final decision by the owner to cull his entire herd is depicted in Figure 1.

Brockhoff noted the mortalities and flow of disease in this herd was of interest to analyze and follow and showed everyone the biosecurity challenges human influenza virus A can pose to pigs and also to the people that work in the barns. He noted vigilant veterinary surveillance is a key tool needed in responding to emerging zoonotic diseases and that this case represents what we will see more of in the future.

Response from the regulators

Keenlside, who was also intimately involved from the beginning of this case, outlined the role and responses her government and other key industry associations plus local and federal agencies had in implementing and responding to the policies and legislation for this disease. A new Provincial "Animal Health Act" that came into effect about four months before the disease broke had designated swine influenza as a "notifiable" not "reportable" disease. She noted notifiable diseases are recorded for surveillance purposes and although the farm was quarantined by CFIA the new legislation did not play a role, as no quarantine was required under the Act.

Keenlside outlined how CFIA reaction was swift, stopping pig movement immediately and samples taken from pigs the same day were delivered by hand to the National Centre for Foreign Animal Disease (NCFAD) lab in Winnipeg the

continued on page 46

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following morning on April 29th. After initial tests showed both negative and doubtful results, on May 2nd positive results showed the gene was similar to the virus isolated from human cases. Keenlside said that, as required, the results were then reported to the World Organization for Animal Health (OIE).

Keenlside said the ensuing herd quarantine and subsequent border closures had a significant impact on the farm and the Canadian pork industry that is still felt today. The decision to do a partial cull of the herd for animal welfare reasons and ultimately the owner's decision for a complete cull had to be done with the involvement of numerous agencies, all of who had significant stakes or jurisdictions in the outcome. Despite research showing swine do not present a significant risk to human health, Keenlside stressed this experience demonstrates the need for human and animal disciplines to constantly work together in solving the challenges of emerging zoonotic diseases.

Effects on the human population

Influenza kills between six and eight thousand Canadians every year. Despite research and development of new antivirals and vaccines we continue to be warned about a possible looming pandemic that could have significant impact on humans. This was a message delivered by Kevin Fonseca, Clinical Virologist and leader of the Influenza Program at the Alberta Provincial Lab in Calgary. Fonseca noted that with swine acting as an intermediary host in the development of a new virus, this would

be the most likely source of a future pandemic. He said the 2009 pandemic that surfaced in various countries around the globe showed again the importance of surveillance programs for viral hosts like pigs. Fonseca says that next time we may not be as fortunate and we could see a pandemic similar to the one experienced in 1918.

Fonseca explained the workings of human influenza viruses in simple terms for workshop participants. He posted a list of 10 viruses / agents that cause influenza-like illness in humans of which two are influenza A & B viruses. Fonseca says A and B are big players in humans and we'll never get rid of them. Influenza A is the only one that causes pandemics while influenza B causes outbreaks. The detection of viruses is also critical in getting on top of outbreaks and pandemic situations with a need for sensitive tests. Fonseca indicated new molecular testing is highly sensitive with quick turnaround times but the advantage is that it only works for what you tell it to look for. This is an important consideration with viruses capable of progressing to a pandemic level quickly.

Fonseca summed up saying surveillance programs are crucial to keeping on top of any potential future pandemics. He sees the animal industry reluctant to implement active surveillance programs that can have an impact on human health. The human costs associated with deaths and hospitalizations each and every year due to influenza and H1N1 viruses cannot be ignored.

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Summarized by Bernie Peet

USE OF CRYSTALLINE AMINO ACIDS IN GESTATION AND LACTATION SOW DIETS

One of the greatest limitations for North American production systems is that we have failed to understand the nutrition and management needs of our very prolific sows, believes Gary Allee from the University of Missouri-Columbia. His team has established a sow research program to increase understanding of these prolific sows, in particular their nutritional needs. There are tremendous opportunities to reduce the cost of feeding sows during gestation and lactation, Allee says. Based on the limited information available, feeding two gestation diets and the use of crystalline amino acids in gestation diets can save \$2.00 to \$6.00 per sow per gestation. Using aggressive crystalline amino acid supplementation during lactation can reduce feed cost during lactation by \$5.00 to \$15/per ton, and reduce nitrogen excretion by 20 to 30%, without detrimental effects on litter growth rate, sow weight change or subsequent reproductive performance. Allee discusses his team's recent studies on the lysine requirement of sows by parity and the evaluation of the use of L-lysine.HCl with supplemental threonine and a methionine source.

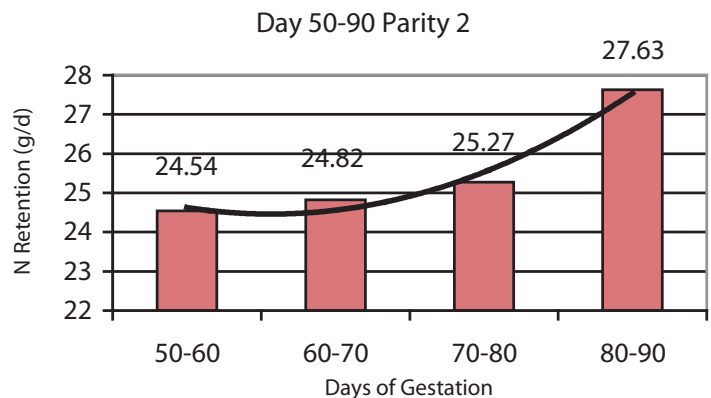
Gestation

Very limited information is available on the amino acids needs of sows during gestation. NRC recommends feeding 9.7 g/d of SID lysine.

Studies at the University of Missouri-Columbia suggest that the SID lysine requirement to maximize nitrogen retention (an indication of protein deposition) was higher than previously determined with 13 g/d SID lysine required in early (d 40-50) and mid (d 70-80) gestation and 17 g/d SID lysine for late gestation. These studies also showed that nitrogen retention increased dramatically after d 80 of gestation (Figure 1).

Protein deposition in the fetus and the mammary gland is very low until 68 and 80 d of gestation, respectively. The combined lysine requirement for gestating gilts has been calculated to be 6.8 and 15.3 g/d of SID lysine for 0 to 70 and 70 to 114 days of gestation. Recently a group from Germany suggested a SID lysine intake of 9.4 g/d in early (d 1 to 85) of gestation and 14.6 g/d in

Figure 1: Nitrogen retention as influenced by stage of gestation



From: Srichana et al, 2007

late (d 85 to 115) of gestation. Researchers at the University of Alberta have reported that the threonine requirement of gestating sows is more than double in late gestation (d 92 to 110) as compared to early gestation (d 35 to 53).

Crystalline amino acids, such as L-lysine.HCl can be used in gestation diets at an inclusion rate of up to 0.20% without affecting nitrogen retention. In both conventional corn-soy diets and diets supplemented with synthetic lysine, nitrogen retention is the same whether sows are fed once or twice per day.

With our current feeding program for sows during gestation, it appears that we are over feeding amino acids and probably energy in early gestation and underfeeding in late gestation which results in sows entering the farrowing house in a catabolic state.

It would certainly appear that a two stage gestation feeding program might provide the opportunity to better meet the nutrient needs during gestation and reduce feed cost. At this conference last year, Ron Ball's group presented a new sow feeding program for gestating sows with a lower energy and a lower amino acid intake in early (d 1 to 84) gestation and a higher energy and a higher amino acid level in late gestation (d 85 – 112). In their comparisons using either a corn or barley based diet, the phase feeding program could save as much as \$5.00 per sow during gestation. Neither of these diets contained crystalline amino acid additions. With the current prices, the use of crystalline amino acids would further reduce the cost of these gestation diets.

Lactation

A series of studies has evaluated the SID lysine requirement of lactating sows by parity and determined how much of the lysine requirement could be met with L-lysine.HCl. These determined that the lysine requirement of P-1 sows, with a litter growth rate of 2.5 kg/d, was 1.12% SID or 63 g of SID lysine per day.

The replacement of L-lysine.HCl for soybean meal was evaluated, using 1st parity sows. Increasing the L-lysine.HCl inclusion up to 0.3% in the corn-soybean meal diet decreased crude protein from 21.0 to 18.2%. There was no effect of dietary

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treatment on sow feed intake, litter weight gain, weaning weight or pre-wean mortality. Aggressive use of crystalline amino acid did not affect sow body weight change, wean to estrus interval or percentage of sows mated within 10 days post-weaning.

Subsequent litter size (second litter) was not influenced by aggressive amino acid supplementation. Also, the second litter was larger than the first litter with no "P-2 slump".

These studies demonstrate that lactation diets can contain up to 0.30% L-lysine.HCl with supplemental threonine and methionine source and have no detrimental effect on litter growth rate, sow feed intake and weight change, or subsequent reproductive performance, and decrease nitrogen excretion by 30 percent.

More recent studies have demonstrated very similar results in both P-2 and P-3 females. By adding crystalline lysine, a portion of the soybean meal or other protein sources can be removed from the diet. In the trial of P-1 females, when 0.30% L-lysine.HCl was added to the diet 25% of the soybean meal was removed from the control diet. Based on the prices we have experienced in 2009, this has resulted in a cost saving of \$5 to \$15 per ton of lactation feed.

STRATEGIES TO MAXIMIZE WEAN-TO-FINISH NET RETURNS: FOCUS ON FEED AND OTHER TECHNICAL ISSUES

The enduring losses in pork production in North America have challenged the way all of us think – particularly on the subject of what really is important in both the structure of the pork industry and on individual farms, says John Patience of Iowa State University. Losses have also focused attention on what is foundational in terms of long-term success, he believes. He suggests "Ten Actions" for the grow-finish herd that draw on past experience and, in particular, the lessons of the last few years. These relate to nutrition and operational management actions that provide the opportunity for significant financial return if they are not already being addressed. Particular attention is paid to actions that require little or no capital investment.

1. Decisions based on financial returns, not just performance

As a general rule, herds that achieve a higher level of productivity will have a lower cost of production, but like so many other things in life, "general rules" can be dangerous if followed blindly. Time and time again, surveys of farms have revealed that the herds with the highest profits and lowest cost of production were not necessarily the herds with the highest levels of productivity.

There are many examples of actions taken to improve productivity that actually lowered net income.

Whether one is considering a major or minor change in management, such as evaluating a new feeding program, adopting a new sire line or modifying the operation of the ventilation system (temperature set points, etc), financial return needs to be included in the decision-making process. It may not be the only consideration, but it must be considered a very high priority.

2. Feeding programs adjusted to economic conditions

The optimum feeding program, in terms of net income, will be different when market prices are low and feed prices are high, as

continued on page 50

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compared to when market prices are high and feed prices are low. Increasingly, pork producers are making changes in their feeding programs to find that balance between productivity and net returns. If there has ever been a time to revisit a farm's feeding program, 2008 and 2009 provided it.

Although this approach is not without its challenges and technical skill in nutrition is essential, rewards in the range of \$1 to \$2 per pig are reasonable expectations if the changes are done correctly.

3. Adherence to a feed budget

The feed budget is a tool used by nutritionists to link the pig's growth to its nutrient requirements; it is also a tool used by feed mill managers to determine the quantity of feed required per delivery. Most critically, the feed budget is a mechanism to link the feeding program to a financial budget. As such, it is a powerful tool that offers many advantages to the producer.

However, deviations from feed budget as high as \$3 to \$6 per pig are not uncommon; adjustments made to correct such deviations routinely reduce costs by \$1 to \$5 per pig sold. It is a simple process and an excellent way to track feed costs in real time.

4. Purchasing procedures and risk management, especially for feed

The structure of the feed market is different from what it was 10 years ago, or even 5 years ago. The advent of the biofuels sector has changed the availability of cereal grains. Different industrial sectors are involved in the purchase and sales of grains and oilseeds, and these new participants have brought a different way of trading, of managing risk and even how they view the market.

Consequently, the old "rules" either do not apply, or apply with less precision than they did before. More than anything else, the level of sophistication has increased and buyers not operating at the level of their competitors are going to be leaving dollars on the table.

5. Health status

Another feature that distinguishes the Canadian pork industry from many of its competitors, at least in western Canada, is the health status of the pig herd. We must maintain a single-minded emphasis on biosecurity and herd health management. Just as producers at that time underestimated the benefits of a higher health status, we must not underestimate the cost of allowing the collective health status to deteriorate. It is a precious competitive advantage that must not be lost.

6. Extract as much economic value from manure as possible

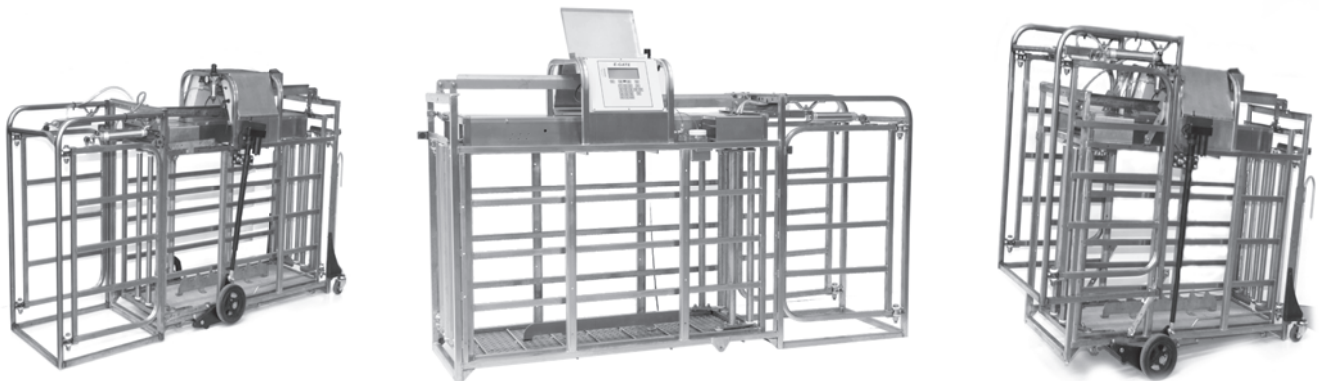
The value of manure has been estimated at upwards of \$75 per acre when applied at recommended levels. Yet, for the most part in Canada, the only people who derive the full value of this co-product are producers who apply it on their own land, and adjust their fertilizer application rates and procedures according to the nutrient value of manure applied on their land. Extracting as much value from the pig as possible will be essential in future – and its manure is currently a greatly undervalued co-product.

7. Information management

Organizations that manage information most effectively have a huge advantage over those that do not. The same applies to farming, and specifically to pork production. There are many sources of information, but they can be divided into two basic



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categories: internal and external. Each producer must ask the question: what information do I need to make decisions necessary to achieve success in the industry? It must include information on animal performance, on carcass quality and on finances.

It is important to collect or access the best quality of information on subjects of immediate interest, and then use that data to make informed decisions. It is also important to note that bad information will lead to bad decisions, so data quality is always extremely important to the process.

8. Quality control

Feed analysis is a surprisingly difficult practice to implement correctly. Do you analyze ingredients or finished diets? What do you do with the data once you have it? What do you analyze for? How important is particle size? These and other questions abound and the answers are not simple. I prefer to focus on analyzing ingredients during the first few months of a new crop year, and then switch to mixed feeds, to confirm that everything is working as it should for the remaining 9-10 months.

Feed consistency is very important, so checking feed distribution throughout the barn is an important part of any quality control system. Particle separation has been found to be a serious problem in some barns, and the only way to identify this is by sampling feed along the delivery system and ensuring delivered feed is consistent in quality throughout the barn.

9. The little things

One of the most obvious common denominators among successful farms is their attention to detail – the little things that

often add up to great results, or when missed, conspire to impair productive and financial performance. Following is another list of 10 examples of “little things” that affect daily success:

Barn issues

- Good rodent control
- Split sex feeding
- Split sex barns, rooms within barns or pens
- Manage barn temperatures correctly
- Correct inlet management

Pen issues

- Feeder adjustment
- Feeder access
- Drinker access and adjustment

Pig issues

- Timely treatments
- Timely euthanasia

10. Grind costs as low as possible

When market financial conditions are bad, achieving low-cost production is an important way to achieve profitability at the lowest possible market prices, or minimize losses in equity when profits are not possible. In other words, grinding costs down is essential to survival in weak markets. When the industry is in an extended period of losses, sometimes difficult decisions must be made to jettison expenses that may seem essential in normal times, but are not when losses are mounting – and survival is at stake.

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Summarized by Bernie Peet



John Waddell

ACHIEVING 30 PIGS/SOW/ YEAR – A REVIEW OF KEY DIFFERENCES IN HIGH PRODUCING FARMS

Veterinarian John Waddell examines some of the management strategies that result in high breeding herd output with reference to Danish herds that consistently produce 30 pigs per sow. Noting that the potential for such high performance can only be achieved by attention to many aspects of management and extreme attention to detail, he says that genetic improvement in litter size provided the basis for

levels of production that were unimaginable in the past. Some of the most important aspects are summarized here

Genetics

Large strides have been made in the last 15 years to improve litter size, with annual increases of up to 0.25 pigs per litter. An average litter size of 14 total born is now commonplace. However, as litter size has improved, the risk of more variability in birthweight and smaller, less viable pigs in the litter has increased. This led the Danes to select for the number of piglets alive at day 5, which has increased by nearly 2 pigs since 2004.

Gilt development

In attempts to keep non-productive days at a minimum by breeding gilts younger, we have inadvertently reduced both their litter size and longevity in many cases. A happy medium has been

reached by allowing gilts to reach at least 136 kg live weight or 240 days of age prior to mating.

Gilt isolation and acclimatization are an essential part of every production system. Gilts should be housed in pens or stalls allowing approximately 1.2 to 1.3 square meters (13-15 sq.ft.) per animal.

Age at first mating

Gilt age at first mating tends to be at least a month older in Denmark than what is considered normal in North America. The Danes have shown that there are significant reproductive efficiencies to be gained by waiting until gilts are at least 8 months of age regardless of weight. Furthermore, this same research demonstrates that the gilts bred later in life have significantly more live pigs in their second litter when compared to the “early” mated gilts.

Danish gilts tend to be older and carry more backfat to endure five weeks of lactation and still be expected to return to heat and actually increase their litter size of their second litter.

Challenging first litter gilts and lactation length

It is believed that “challenging” the gilt during the first lactation, by placing 13 piglets on each female, results in improved milk production in subsequent parities. Another part of this strategy is that gilts wean their own litter at around 21 days and then foster another litter, from a parity 2 sow, for a further 10-14 days. The extended lactation period improves fertility in the next cycle.

The longer lactation lengths in Denmark also lead to larger litter sizes in subsequent litters. One rule of thumb is that for each additional day of lactation, the litter size increases on the subsequent litter by 0.1 pigs.

Inventoried female to farrowing stall ratio

Where the typical farm in North America has a ratio of 6.25 inventoried females per farrowing stall, it is not unusual to find ratios of less than 4.5 inventoried females per farrowing space, due to longer lactation periods.

Herd parity structure

At the farm level on the high producing farms, rarely are sows allowed to remain in the herd after eight litters and generally sows are removed after six litters. Continuous genetic improvement is expected with each generation but since sows peak in production in parity 3 to 5, they target 50% of females to be within this parity spread.

The people factor

The top farms in Denmark employ highly trained, motivated and detail-oriented people who are on a mission to exceed 30 pigs per sow per year. Targets for various production parameters are clearly outlined and the current and prior weekly production numbers are prominently displayed. Employees are routinely rewarded for outstanding performance based on the entire farm's production.

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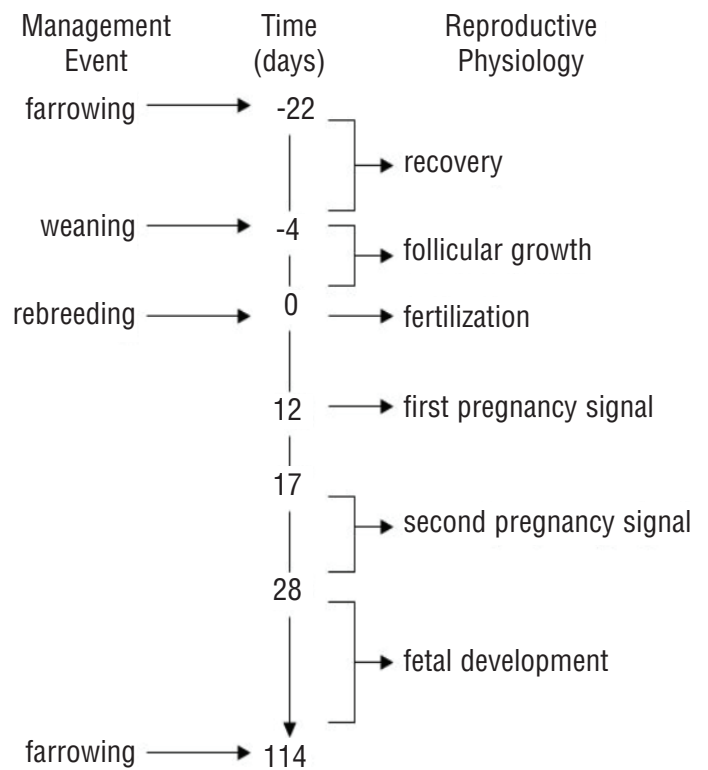
Billy Flowers

looks at some of the reasons why poor reproductive performance may occur.

TROUBLE-SHOOTING REPRODUCTIVE PROBLEMS

Given the complexity of reproductive problems, use of a systematic approach for addressing them is important, says Dr. Billy Flowers of North Carolina State University. This requires a thorough understanding of the physiology involved with normal reproduction. In other words, one needs to know "what should have happened" and use this as the basis for trying to figure out "what went wrong", he believes. He

Figure 1: Chronological sequence of major reproductive and management events in sows



continued on page 54

Physiology of reproduction

Figure 1 contains a time line of the major events during the management of a sow during her production cycle and the corresponding reproductive processes that must occur for a successful pregnancy.

Recovery and follicular growth

After farrowing, the reproductive system of sows requires time to recover from the previous pregnancy. The ovaries, brain and uterus are the three most important ones. The ovaries recover very quickly and their follicles are capable of resuming normal growth, if properly stimulated, within a few hours after farrowing. The brain's recovery after farrowing is a "two-step" process and requires about 12 days. Recovery of the uterus contains two phases and requires between 14 and 16 days.

Fertilization and pregnancy signals

Fertilization requires that sufficient numbers of fertile spermatozoa be present in the oviduct several hours prior to ovulation. After fertilization, embryos remain in the oviduct for several days and then enter the uterus. Around day 12 of pregnancy they begin to elongate and produce estrogens. This local production of estrogens by the embryos is the first signal required for pregnancy. It has been estimated that there needs to be at least 5 viable embryos in the uterus by day 12 in order to produce enough estrogen for the first pregnancy signal. If there are less than 5, then sows never know that they are pregnant and return to estrus in 18 to 21 days.



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¹ Armbruster, G. et al. Review of *Lawsonia intracellularis* seroprevalence screening in the United States, June 2003 to July 2006. *Proc. AASV*, 2007.
² Paradis, M. et al. Subclinical ileitis produced by sequential dilutions of *Lawsonia intracellularis* in a mucosal homogenate challenge model. *Proc. AASV*, 2005.
³ Data based on ADG and F:G differences over 21 days from treatment A, B, and F; base price of market hog of \$130/100 kg, carcass yield of 79.9%, index of 108, and nursery feed cost of \$250/tonne.
⁴ Guedes, R. Update on epidemiology and diagnosis of porcine proliferative enteropathy. *J. Swine Health Prod.* 12(3), 2004.

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If sows receive the first signal by day 12, then pregnancy is maintained. The embryos continue their elongation process and actually begin to form attachments with the uterine lining.

Sometime after day 17 and before day 28 of pregnancy, the developing embryos initiate a second period of estrogen production. This second pregnancy signal is associated with the development of the fetal portion of the placenta. It is assumed that there also needs to be at least 5 embryos present for this to happen as well. If there are less than 5 during this period, then sows usually return to estrus between 28 and 35 days after they were bred. If there are more than 5 then they usually maintain pregnancy to term if managed properly.

Fetal development

After day 30, implantation is complete and the developing embryos begin to resemble live pigs so they are referred to as fetuses. In addition, there is no minimum number of fetuses that need to be present in order for pregnancy to continue. This is one reason why litters of one or two pigs and pseudopregnancy (not-in-pig) occur. During fetal development, the skeleton initially is composed mostly of soft tissue. Between days 50 and 60 of gestation, calcification of this soft tissue begins. When fetuses die prior to this time sows can break down and reabsorb most of the fetal remnants. In contrast, if fetuses die after days 50 to 60, then sows are able to reabsorb only the soft tissue, but not bones that are being calcified. These are referred to as mummies. Stillborn pigs are morphologically normal pigs that are born dead. Most stillborn pigs die during the last week of pregnancy or during farrowing.

Based on the normal course of fetal development, the following observations can be made. Pseudopregnancy and small litters with no stillborns or mummies result from problems between days 30 and 50 of gestation. Small litters with a high number of mummies arise when problems occur between day 60 and 100. Finally, small litters with a high number of stillborns are caused by problems that occur during the last week of gestation or during farrowing itself.

Critical analysis of reproductive performance

Production data such as farrowing rate, litter size and return interval combined with the ability to break down records into subsets, for example by parity, season, etc., allow reproductive problems to be identified and investigated.

Poor farrowing rate and number born alive coupled with regular return intervals can be caused by poor fertilization rates, high

embryonic mortality during the first two weeks of pregnancy and low ovulation rates.

Poor farrowing rates and small litters in conjunction with irregular return intervals indicate that there were sufficient numbers of embryos to produce the first pregnancy signal at day 12, but not for the second one. This is why the return intervals of sows are greater than 28 days. Low ovulation rates and high embryonic mortality between days 12 and 28 are most likely candidates for creating this situation. Conversely, it is unlikely that fertilization failure is a contributing factor.

PROFIT ROBBERS – MISTAKES YOU CANNOT AFFORD TO MAKE

In the current financial crisis a producer must continually look for every way possible to achieve efficiency. Tim Loula from Swine Vet Center in Saint Peter, MN explains what he has been focusing on with his clients over the past 24 months. Those who “right-size” and “best cost” their units will be among the survivors, he says.

Go for best biological performance

Moving to weaning at 22-24 days has brought many benefits, including lower grow-finish mortality and more full value market hogs. Also, sows have a higher farrowing rate, increased total born, decreased wean-1st service interval, decreased non-productive days, increased pigs weaned/sow and increased weaning weight.

60% or more of costs are feed related, and 60% of the feed cost is incurred during the grow-finish phase. Many systems with multiple finishing sites have some poor operators. We have focused very hard in the last year to eliminate this type of operator from our clients' systems. We either train them, change their habits or remove them from the list.

Producing a high level of full-value pigs – with the goal at 94-95% of all pigs weaned falling into this category – is essential. Selecting the right pigs for every load is also critical as is handling pigs properly during loading and trucking to reduce death loss during this process.

“Right sizing” the farm means not pushing the system too hard and thereby hurting biological performance. Balancing the production system will optimize productivity.

Health treatments

Excessive treatments and vaccinations should be controlled. For example, not giving iron and antibiotics to small pigs at birth (< 1.5

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Tim Loula

lbs or < 0.68 kg.) and not giving expensive Circovirus vaccine to pigs < 6 lbs or < 2.72 kg at weaning.

Producers should re-evaluate routine treatments such as giving antibiotics after weaning to see if they are still necessary. Being more targeted with treatment, in respect to timing and type of antibiotic is a more precise approach. Producers will spend less money and will be more effective through early identification and treatment of the pig via injection compared with mass treatment through the feed or water.

Similarly, reviewing vaccination protocols can also save cost. PLE (Parvo-Lepto-Erysipelas) vaccination on older sows is being reduced. Pre-farrowing vaccine usage for scours has also been reduced where there is a good feedback program in place.

If pigs have no chance of becoming full value market hogs, they can be euthanized, including pigs that are small and weak at birth (< 1.5 lbs or < 0.68 kg), substandard or small pigs at weaning (< 6 lbs or < 2.72 kg) and feeder pigs < 20-25 lbs or < 9.1-11.34 kg. Also, problem pigs should be euthanized quicker because too many producers allow these pigs to stand around far too long consuming feed. These include belly ruptures, inguinal ruptures, humpback pigs and severely lame pigs.

Feeds and feeding

The use of automatic lactation feeders has increased feed intake by about 2lbs (0.9kg) per day and minimized wastage. This has improved wean to breeding interval, reduced lost days and resulted in higher subsequent litter size.

Checking feed particle size to ensure it is 500-600 microns results in improved digestibility and derives maximum value from the feed. Since the use of Circovirus vaccine, the incidence of stomach ulcers in sows caused by small particle size seems to have disappeared.

Pigs held off feed anywhere from 12 to 18 hours prior to shipping will suffer less transportation losses and will provide a better carcass. Not only does this save feed cost, but it also results in better meat quality. This can produce significant savings.

On farm management

During the busy planting and harvest seasons, contract growers often do a poor job of carrying out routine chores, resulting in a loss of performance. Now, a strategy to ensure that such mistakes do not happen has

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6.5	47.12	75.59	118.29
7	50.74	81.40	127.39
7.5	54.37	87.22	136.49
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5	1.5	1.0	0.6
5.5	1.4	0.9	0.6
6	1.3	0.8	0.5
6.5	1.2	0.7	0.4
7	1.1	0.7	0.4
7.5	1.0	0.6	0.4

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PRODUCTION FOR PROFITABILITY CONTINUED



Reviewing treatment and vaccination protocols can eliminate unnecessary treatments and result in cost savings

been implemented because they are so costly.

Energy is a major cost in North America. Swine Vet Center is conducting energy audits on farms, trying to find heat leaks and checking controllers to make sure they are being used cost effectively.

It is increasingly important to have very detailed system records to identify when deaths are occurring, to carry out the proper diagnostics and determine what can be done to reduce death loss. Historical records are also important to help find out if there are seasonal issues that can be prevented in the future.

More and more farms are doing research. The feed programs on farms

have changed dramatically in the last 2-3 years due to the high price of feed. Knowing what's available, knowing how to use it, and knowing cost effectiveness of rations has been a big help to many clients.

It is very important to train farm staff properly so that they understand prevention measures and daily management to help maximize production, which will help to lower costs. Also, doing a better job of health and production leads to more satisfied workers. Managers and owners often underestimate how depressing poor health and bad production are to farm staff and in turn how important a role that plays in labour retention.

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Planning for the animal welfare issues

Summarized by Bruce Winkler, Alberta Pork

The issue of animal welfare continues to increase in its importance in all sectors of animal agriculture, and in all parts of the world. Legislation and the development of international standards will all have an impact on the Canadian swine industry, says Dr. Ed Pajor, from the University of Calgary's Faculty of Veterinary Medicine. Animal welfare research is still in its infancy and basic questions need to be addressed, he suggests. More specifically, issues such as sow housing, and management practices which may result in pain, suffering or discomfort are key issues that the swine industry must address in the immediate future, Pajor believes.

The OIE (World Organization for Animal Health) is developing standards that will increase the importance of animal welfare for issues concerning trade and the development of legislation internationally. The OIE's future activities include

developing standards for housing and management of farm animals.

The EU's Welfare Quality Project defined four animal welfare principles: good housing, good feeding, good health, and appropriate behaviours. Within these principles, twelve animal welfare criteria were identified. The protocols have been tested on hundreds of farms and will provide clear and reliable information for consumers and retailers on the welfare status of farms from which their food products were derived.

One of the key elements in developing this system is the use of animal based measures versus engineering standards. Many of the systems developed in North America have emphasized engineering standards, such as, size of pen, ventilation rates, and stocking densities. These variables are easy to measure, but many animal welfare scientists believe that they inadequately detect effects on the animal's welfare itself. The new approach uses forty different animal based measures and will have a huge effect on how future codes of practice will be developed and how existing codes and assessment programs are received internationally.

In the United States, legislation banning the use of gestation stalls has been passed in numerous states. As more and more states ban the use of sow gestation stalls, the pressure on other states to do so, or the pressure to pass national legislation to ban stalls, will also increase. These activities can do little but increase pressure on Canadian producers to follow.

Key aspects of welfare that are of importance include:

Sow housing: With the pressure to move towards group housing systems for sows, research into the different alternatives and comparison with stall systems is high priority.

Regulations are likely to increase and will be greatly influenced by international activities. Legislation usually comes about due to public opinion and welfare will have a huge impact on international trade. Regardless of the housing system used, identifying the welfare advantages and

disadvantages of various systems and developing management practices to alleviate welfare concerns is of great importance to producers considering a range of housing systems.

Flooring and enrichments: Regardless of what housing system is used there are other features of the environment which will need to be addressed in order to improve animal welfare. These include the type of flooring and the provision of enrichments. Comfortable flooring may impact many aspects of an animal's state of welfare including an animal's lying behaviour and its ability to change postures as well as the incidence of lameness and lesions.

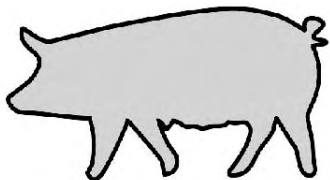
The provision of environmental enrichments to sows will become an important consideration for improving their welfare. European directives state that pigs should have access to manipulatable substances such as straw. Many studies have demonstrated that there are numerous benefits to animal welfare if straw is provided. The current design of most commercial barns in Canada makes the use of straw impractical. However, other materials may provide sows with some welfare benefits.

Sow aggression in groups: Aggression in group-housing conditions can lead to injury, as well as, cause fear and anxiety in the sow. Developing management procedures and skills to minimize sow aggression will be a key issue in improving the welfare of sows kept in group systems.

Piglet processing and castration: Physical alterations which are perceived as stressful and painful, such as piglet processing and castration, will continue to be considered serious animal welfare concerns. In particular, if the procedures are carried out on young animals and if attempts to minimize pain (e.g. anaesthetic, analgesia) are not used.

REDUCING LOSSES IN TRANSPORT

Transportation losses represent a major cost to the industry but are largely avoidable, believes Brian Hay, Maple Leaf Foods. These losses occur after the



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maximum investment has been put into the animal. Losses due to pigs that are dead on arrival and non-ambulatory pigs are not only financial but also create a significant welfare issue, he says. He looks at some of the main reasons for losses and the steps that can be taken to minimize them.

In 2007, Maple Leaf Foods (MLF) published a Hog Logistics manual which incorporated research and practical loading requirements that aid in not only reducing losses to the producer, but also help to improve the quality of the finished product. Above all it formalized the company's requirements and provided truck drivers and field staff with the necessary tools to educate producers on proper loading techniques.

Controlling density on the trailer was a large component in reducing transport losses seen at the plant. MLF has mandated that all producers and truckers follow the Recommended Code of Practice for Transportation when loading their animals. It is a responsibility that is equally shared between producer and driver to ensure that the densities are adequate for the conditions.

Training is another aspect that is critical in order to reduce losses associated with transportation and shipping. It is critical to ensure that all stock people are trained and understand proper procedures for loading and unloading. Having dedicated Standards of Practice in place ensures that employees have a firm understanding of areas that they are responsible for and the levels of performance expected of them. The Transportation Quality

Assurance program (TQA™) was introduced in the US in 2002 and since that time there has been a steady decline in the rates of DOA's arriving at the plant.

Gentle handling of livestock is of critical importance in the hours leading up to harvest. Aggressive handling in the last few hours can undermine any other positive factors including nutrition or genetics. It is critical to place value on calm, low stress handling and working with the hog's natural movement rather than against it. Far too often meat quality is ruined or bruising is increased due to aggressive handling in the last 12 hours.

In order to spot trends, it is imperative to monitor losses regularly. Keeping an eye on losses and where they are occurring allows a producer/trucker/plant staff to determine the cause and make the necessary adjustments.

Reducing losses does not mean a huge capital expense. It requires production and transportation managers engaging fully in understanding the areas that can be improved on.

FUTURE OPTIONS AND ALTERNATIVES FOR CASTRATION

Most countries castrate male pigs in order to reduce the incidence of "boar taint" in pork, which makes it unappetizing to many consumers, notes British veterinarian John Mackinnon. In some countries surgical castration is considered unacceptable from a
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welfare viewpoint and is not carried out, while there is a move towards some form of anesthesia prior to castration, he says. Now, the advent of immunization against gonadotrophin-releasing hormone (GnRH) has provided the industry with an effective alternative. Mackinnon looks at the alternatives to physical castration.

The EU Commission will likely accept that a total ban on castration would be inappropriate in the short to medium term and so the EU will likely recommend anesthesia and analgesia in the future, but in the long term any castration will be abolished due to the pain, stress and opportunity for infection.

In The Netherlands castration without anaesthesia was banned beginning January 2009 and the aim is to ban castration totally by 2015. In Germany, analgesia is now required using non-steroidal anti-inflammatory agents. In Denmark, it is possible that anaesthesia will be required later in 2010. In the UK, whilst not illegal, the practice of surgical castration is considered undesirable and therefore quality assurance schemes do not permit the procedure as a routine.

Immuno-castration offers an effective alternative to castration. Immunization of boars against GnRH inhibits endocrine testicular function but the boar's specific growth potential remains. An anti-GnRH vaccine is now licensed in the EU (Improvac™, Pfizer). Studies in the EU and in many other pig-producing countries around the world have demonstrated a consistently high level of efficacy.

Research has shown that nutritional manipulation, the use of certain antibiotics, genetic selection and the use of same sex semen have all helped reduce boar taint but these methods have not eliminated the problem and some methods (same sex semen) are not cost effective. Detection of androstenone and skatole on the slaughter line is also possible, allowing tainted carcasses to be used in manufactured pork products.

The cost of immunocastration is higher than surgical castration, but is more than offset by improved feed efficiency and growth rate, lower mortality and improved carcass quality.

In conclusion, it is time to rethink the procedure of surgical castration. It is unacceptable to many consumers in the EU and many countries will be abolishing the procedure in the future. Immuno-castration offers producers a welfare friendly alternative.

for areas of improvement.

The swine industry is beginning to feel a push back to the production end of the industry for animal welfare verification. Poultry producers were the first to see the required third party audits move back from the processing plant to the farm. These audits look at production practices, housing, environment and transportation and are required for both layers and broilers.

The North American meat industry has been very proactive in improving animal welfare in the plant. In 1991, the Animal Meat Institute published the first guidelines on welfare for meat packers. Authored by Temple Grandin of Colorado State University, the illustrated guidelines offered detailed information about optimal handling of animals, how to troubleshoot animal handling problems in packing plants, how to stun animals effectively and maintain equipment thoroughly, and how to move non-ambulatory animals while minimizing stress. The guidelines were implemented widely by members of the meat packing industry.

In 1997, Dr. Temple Grandin developed a document called Good Management Practices (GMPs) for Animal Handling and Stunning. The new document detailed measurable, objective criteria that could be used to evaluate the well being of livestock in meat packing plants. In the years that followed, major restaurant chains started developing animal welfare committees and conducting audits of their meat suppliers. Beginning in 1999, compliance with AMIF's GMPs became part of many customer purchasing specifications.

AMIF's audit guidelines recommend that companies conduct both internal (self-audits) and third party audits using defined criteria. These include killing procedures, slips and falls, vocalizations, electric prod use and willful acts of abuse.

The AMI is currently in the process of updating its current guidelines which are due to be released in March of 2010. Incorporated into the new audit will be the recently developed *Transportation Audit* for animals arriving at processing plants. This is the first third party audit for swine to move outside the plant walls and will most likely begin the move back to production for auditing.

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ANIMAL WELFARE AUDITS

Animal welfare auditing has become part of the business structure of most meat processing plants in North America, points out Jennifer Woods of J. Woods Livestock Services, Blackie, Alberta. The vast majority of the large processing plants perform daily animal welfare audits to ensure that their employees are meeting the expectations of the company and to allow for timely troubleshooting for any problem areas within the handling system.

All major restaurant chains, grocery stores and food wholesalers demand that each of their suppliers undergo third party audits on a regular basis. This provides reassurance to the customers that their suppliers are meeting their expectations on animal care and wellbeing. Many of these businesses also have their own animal welfare committees that meet throughout the year to discuss animal welfare and look

Capturing genetic potential in the future

Summarized by Charlotte Shipp, Alberta Pork

Watson and Crick's discovery of DNA as the code of life in 1953 laid the foundation for the variety of new selection tools and applications now available. Today, the pig genome has been sequenced and contains some 25,000 genes. Hundreds of thousands of genetic markers have been identified, mapped and now industry can select animals for specific traits of interest. "Genetic selection provides an effective way of addressing economic issues in the pork industry," says David Casey, PIC US, "but genetic improvements take time." The quickest way to address any issue with genetics is to exploit differences between genetic lines or breeds. Sizeable differences between genetic lines for traits can readily be found and line differences can be used to address specific performance issues.

In the course of this session Dr. David Casey reviewed the recent genetic gains captured and Dr. Gerard Albers, Hendrix Genetics Research and Technology Centre, the Netherlands, revealed the latest selection techniques available to industry

Selecting for traits of interest in the North American pork industry

"The application of modern genetic selection techniques has brought about sizeable improvements in lean growth, feed efficiency and litter size," said David Casey, "and PIC is placing more emphasis on overall robustness of the animal."

Lean growth

A lot of progress has been made to improve lean growth over the last 25 to 30 years. In the 1980s a strong push from consumers to decrease the amount of fat in meat encouraged packers to pay producers based on lean content. In turn, selection for leaner pigs became a priority alongside the need for improved growth rates. Backfat, loin eye area, and growth rate are easily and accurately measured and are moderately to highly heritable therefore rapid genetic progress was made. Genetic selection in Duroc pigs has changed backfat by 7.9 mm, loin eye area by 6.9 cm², and growth rate by 10 g/day over 20 years and lean growth rate has improved by 2.35 g/day per year or 47 g/day over 20 years.

Feed efficiency

Selecting for leanness and growth also led to an improvement in feed efficiency as pigs require less feed when depositing lean tissue compared to fat. Most improvements were through lean growth improvements. However, if feed intake is measured additional efficiencies can be captured. As commercial pigs are penned in groups, it is important to get individual feed intake measurements and electronic feeders are needed. Electronic feeders are expensive and intake data has been found to contain substantial errors that require time to identify. These challenges have limited the quick adoption of electronic feeders for the industry. However, at PIC a 32 percent improvement in feed conversion has been realized over the last 35 years, 35 percent of which is due to feed intake measurement.

Litter size

PIC litter size is another trait that has experienced tremendous improvement in the last 15 years. Number of pigs born has increased by 2.3 pigs in 15 years. The successful improvement of litter size is

the result of genetic evaluation programs that were used starting in the 1990s. These evaluations use a statistical model that estimates the genetic value (EBV) of every individual based on all the records of the family. For example, a boar at the end of finishing has an EBV for litter size based on the farrowing records of his mother, aunts, and all his relatives. That EBV can then be used for more accurate selection.

Robustness

Most recently, PIC has placed additional emphasis on robustness. Selecting for the pig's ability to live in challenging circumstances is one way to improve robustness as death is a natural way of selecting for robustness. Additional selection can be done by selecting against families or individuals that have a tendency to die in challenging environments. Today's genetic evaluations combine pedigree and phenotypes to estimate the genetic value (EBV) of an animal for a trait like survival. However, calculating and using survival EBVs has several challenges. Survival traits have a low heritability and most of the observed variation is controlled by the environment, resulting in slower genetic progress. Survival traits are also discrete (0=lived, 1=died) which have different and more challenging analytical properties than continuous traits like

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growth rate. PIC calculates EBVs for piglet survival in farrowing, nursery, grow/finish, and also sow survival. These EBVs are used to select for individuals and families who survive in challenging circumstances.

Robustness is not only the pig's ability to live in a challenging situation but also defines the pig's ability to perform well in that same situation. Selecting for robustness can also be done by selecting for the best performing pigs raised in challenging environments. The challenge for animal breeders is to obtain accurate data from challenging environments, particularly because selection candidates from pure line populations are often raised under relatively healthy and well-managed conditions.

One way to obtain data from commercial environments is to do progeny performance testing in addition to conventional performance testing of pure lines. PIC has been using the progeny test program to select for commercial performance in both sire and dam lines. Selection for good performance in the commercial environment also selects for robust pigs.

Index selection and robustness

Robustness can also be improved by minimizing natural antagonisms between traits. Two natural antagonisms are: increasing number of pigs born can lead to an increase in stillbirths and a decrease in piglet survival; and, increasing leanness in pigs will tend to lower meat quality. The selection index is an equation which relates a pig's EBV to the marginal economic value (MEV) of the trait and all other traits in the index.

An index value is calculated for each individual and then animals are ranked and selected based on the index. The highest indexing animal would have a combination of high total born, low stillbirths, and high piglet survival which is the desired outcome to overcome the antagonisms. "Balanced selection has allowed PIC to simultaneously improve total number born, stillbirths, and piglet survival," says Casey.

Genetic markers for robustness

Genetic markers or Single Nucleotide Polymorphisms (SNPs) can also be used to improve robustness. Markers for robustness are very useful for lowly heritable traits (piglet survival) or traits measured late in life such as sow survival and traits that are difficult to measure such as robustness. Markers allow selection of robustness in pigs that are not raised in challenging

environments (nucleus herd). PIC has been using markers in its genetic improvement for over 15 years. Of the 216 markers that PIC includes in genetic evaluations, 120 are related to robustness.

What are Single Nucleotide Polymorphisms?

Single Nucleotide Polymorphisms (SNPs) are single point mutations where at a specific location or gene on a chromosome a single DNA base A, C, G or T can be found in different combinations in different individuals. The pig genome has millions of SNP locations which act as genetic markers. These markers may have a direct effect on a gene's expression by altering a sequence that codes for a specific protein or by altering a sequence that controls the expression of another gene. Alternatively, a SNP may merely be located close to, and inherited together with another gene of interest. In both cases, SNPs reveal genetic variation.

The pig genome is more complex than single gene interactions. Modern genetic selection models are based on the infinitesimal model which assumes that every trait is controlled by many genes. Therefore, many SNPs are needed to analyze and study the multiple genes influencing one trait.

The future of genomic selection in the swine industry

High throughput mapping

Dr. Gerard Albers, Hendrix Genetics Research and Technology Centre, the Netherlands explained high throughput mapping technology which uses SNPs to develop a genetic profile of a particular animal. This profile can then be analyzed for specific traits to allow for selection of animals most likely to pass along the traits of interest. To test large numbers of SNPs Hypor's newest tool is a DNA chip containing 60,000 well distributed SNP markers. The cost of high throughput genotyping is dropping rapidly. Now, a 60,000 SNP profile for an animal costs approximately \$150 CAD.

Genome Wide Selection

Hypor has begun utilizing Genome Wide Marker Assisted Selection (GWMAS) in their breeding programs. This principle states that if one had sufficient genetic markers to cover the entire genome of the breeding animal, it should be possible to explain all genetic variation for a trait by the variability of the genetic markers. Arbers explained that GWMAS will be a tool to more accurately estimate the breeding value of an animal for any trait at any age. Moreover, GWMAS offers the opportunity to readily select for traits that are very costly or impractical to measure. In several species other than swine, GWMAS technology is showing positive results. In poultry GWMAS estimates of breeding values for animals with as few as 20,000 SNPs are more than 80 percent accurate. "Our results in Hypor pigs are convincing us that we can significantly increase genetic progress in the Hypor programs by the use of this novel technology", said Albers. More complicated traits such as meat quality, disease resistance and fertility can be added to selection programs in the future. **=WHJ=**

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Boar taint vaccine can be given close to slaughter

A student at Western Australia's Murdoch University, Amy Lealiifano, has found that vaccinating boars for the second time with the boar taint vaccine Improvac two weeks before slaughter effectively controls boar taint, while also not affecting fat levels. The manufacturer's recommended timing is 4-5 weeks prior to shipping.

An objectionable odour and flavour detected when cooking pork from entire males, boar taint has inhibited demand for Australian pork, especially in important Asian markets.

As slaughter weight increases so does the concentration of androstenone and skatole, the two major components contributing to boar taint. Traditionally boar taint was controlled by physical castration in the first week of life but compared to entire male pigs, physical castrates are fatter and convert feed less efficiently.

Improvac effectively controls boar taint and has the production advantage that the pig has all the performance attributes of an entire male until it receives the second vaccination, recommended at four to five weeks pre-slaughter. However, Improvac treated boars eat more and gain more weight following the second vaccination, compared to entire males and consequently there may also be an increase in depth of backfat, making some producers question the cost effectiveness of the practice.

Ms Lealiifano's experiment measured the response of entire males and the incidence of boar taint when the second Improvac vaccination was given at different times pre-slaughter i.e. 0, 2, 3, 4 or 6 weeks.

Ms Lealiifano said: "Our results suggest androstenone and skatole can be eliminated when the second Improvac vaccination is given two weeks pre-slaughter."

"While it's still recommended that the second vaccination is given four weeks pre-slaughter, our results mean that if producers find a proportion of pigs have reached the target slaughter weight only two or three weeks after vaccination, then they can be safely sold as free of boar taint."

Ms Lealiifano said the experiment also showed that as the time between second vaccination and slaughter increased, so too did the increase in backfat at the P2 site. She explained: "This increase in P2 means some producers and processors might question the use of Improvac, regardless of how well it can control boar taint."

"Showing taint could be controlled without increasing P2 when pigs receive the second vaccination just two weeks pre-slaughter, greatly improves Improvac's attraction," she said.

"However, producers contemplating using Improvac this way should first discuss the strategy with their veterinarian and ensure no pigs are sent to slaughter less than two weeks post-vaccination."

continued on page 64



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Based on the results of this research, pork producers now have more flexibility in how they might use Improvac, while still being assured they have reduced the compounds responsible for boar taint.

Ractopamine improves growth in both entire and immunocastrated males

Ractopamine (Paylean) improves growth performance in both entire and immunocastrated male pigs without affecting meat quality, according to researchers based in Western Australia.

Research was conducted into the effects of ractopamine on the performance and carcass characteristics of entire boars and immunocastrated male pigs. Sixty entire male pigs were individually reared from 45 to 114 kg liveweight in an experiment to determine the interactive effects of sex (entire male pigs vs. male pigs immunologically castrated using Improvac with vaccinations administered at 13 weeks of age and five weeks before slaughter). Also, a ractopamine feeding program (constantly fed 0 or 5 ppm ractopamine for 26 days before slaughter versus a step-up program where 5 ppm of ractopamine was fed for 14 days followed by 10 ppm ractopamine for the final 12 days before slaughter) on growth performance, carcass composition and pork quality was carried out.

Following the second vaccination, immunocastrated pigs ate more and grew faster than entire male pigs without affecting feed conversion efficiency. Dietary ractopamine supplementation for the last 26 days before slaughter improved feed conversion ratio and daily gain. Dietary ractopamine supple-

mentation also increased carcass total tissue and total lean content without affecting the objective meat quality in both entire and immunocastrated male pigs.

The effects of dietary ractopamine and immunocastration were additive, such that pigs that were immunocastrated and received ractopamine grew 18 per cent faster than control entire males. However, a step-up program of ractopamine supplementation did not provide further improvements in growth performance and carcass composition when compared with constant 5 ppm ractopamine supplementation.

These findings indicate that ractopamine supplementation improved growth performance in entire and immunocastrated male pigs, thereby offering a means of improving growth performance of entire males without detrimental effects on pork quality.

Reference

Moore K.L., F.R. Dunshea, B.P. Mullan, D.P. Hennessy and D.N. D'Souza. 2009. Ractopamine supplementation increases lean deposition in entire and immunocastrated male pigs. *Animal Production Science* 49(12): 1113-1119. doi: 10.1071/AN09076

Whole body scanning could save processors a fortune

New technology could save pig processors a fortune, by showing workers exactly where to make each cut in the carcass to get the optimum end product, says a report in Britain's *Pig World* magazine. For instance it could identify where a pig is too fat for a retailer's particular product range, allowing unsuitable carcasses to be diverted for use elsewhere.

The new device, currently under development for pigs, uses hospital whole-body scanning technology. Computerized tomography scanning sends several x-ray beams, from different angles, through a body. Beams that have passed through less dense tissue such as lungs are stronger than beams that have passed through denser tissue, such as bone. Computer software can use this information to build a picture of the whole body (or pig carcass).

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The technique was invented in Britain but has now been tested on pigs in Denmark, showing a potential to save cooperative processors Danish Crown and Tican over \$10 million a year.

Brussels will be surrounded by sows in stalls

Come January 2013 when all European Union pig farms are supposed to have quit full-time use of stalls, Brussels — the epicentre of European pig welfare law — will probably be surrounded by pig farms that are breaking the law, predicts the UK's Pig World magazine.

It quotes a Flemish government research organization that has expressed the opinion that only a third of Flemish sow farms will have converted to loose-housing by the 2013 deadline.

Although technically not part of the sub-state of Flanders, Brussels is surrounded by Flanders, which is the northern part of Belgium, between Holland and France. For the past six years, the Flemish authorities have been monitoring the readiness of Flemish pig farmers to convert to loose housing. The study shows that fewer than a quarter of pig producers have converted to loose-housing, with another 6.9 percent saying they are planning to convert in the next two years.

Research suggests many of the producers who have already converted to loose-housing have been forced out of business by the current recession in the continental pig industry. Pig farmers who have continued in production have insufficient resources to invest in new higher-welfare housing.

Unlike the United Kingdom stalls ban, which came into effect in 1999 and prohibits all use of gestation stalls, the European ban allows their use for the first four weeks of pregnancy.

Even though they were given over ten years' notice, many continental pig producers will not be able to comply with the European ban when it comes fully into effect. They blame the current depressed state of the European pig industry and they called on the European farmers' organization Copa to lobby for more time to comply.

At a recent pig industry meeting in Brussels, Britain's Barney Kay, general manager of the National Pig Association, said continental producers had been given sufficient notice of the partial stalls ban and there was no reason why Brussels should be asked for a derogation. His view

was supported by Sweden which, like the United Kingdom, has already banned stalls, and Denmark, which is confident its producers will meet the December 2012 deadline.

But some countries cite exceptionally hard times with at least a third of producers making losses and a further third barely breaking even. They say that even if they had the confidence and the income to invest in new sow housing, they would find it extremely difficult to get financial backing from the banks. This points to a significant drop in the European herd in 2013 as those who are unable to comply with the partial stalls ban drop out of the industry, says Pig World.

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