

Western Hog Journal



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- **Individual sow feeding stalls offer simple but effective system**
- **Tackling sow infertility problems**

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Western Hog Journal

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COVER PHOTO

Free access sow stalls seen at a farm in Denmark

WEBSITES OF INTEREST

PROVINCIAL ASSOCIATIONS

Alberta Pork	www.albertapork.com
Saskatchewan Pork	www.saskpork.com
Manitoba Pork Council	www.manitobapork.com
Nova Scotia Pork	www.pork.ns.ca
Ontario Pork	www.ontariopork.on.ca
PEI Pork	www.peipork.pe.ca

NATIONAL ASSOCIATIONS

Canadian Pork Council	www.cpc-ccp.com
Canada Pork International	www.canadapork.com
National Pork Producers	www.nppc.org

MARKETING ASSOCIATIONS

Manitoba Pork Marketing Co-op Inc.	www.mpmc.mb.ca
SPI Marketing Group Inc.	www.spimg.ca
Western Hog Exchange	www.westernhogexchange.com

OTHER SITES OF INTEREST

Banff Pork Seminar	www.banffpork.ca
Lacombe Research Centre	http://res2.agr.ca/lacombe/
Prairie Swine Centre	www.prairieswine.com
U of A	www.afns.ualberta.ca
VIDO	www.usask.ca/vido

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For new subscriptions, change of address or other subscription queries, please contact Shannon Simonds at Alberta Pork, phone (780) 474-8288, fax (780) 479-5128 or email shannon.simonds@albertapork.com

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PUBLISHER

Paul Hodgman

BUSINESS MANAGER & EDITORIAL DIRECTOR

Bernie Peet
Phone: (403) 782-3776
Fax: (403) 782-4161
email: whj@albertapork.com

ADVERTISING:

James Shaw
1 Burnhamthorpe Park Blvd.
Islington, Ontario
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Fax: (416) 233-4858
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• Editor's Notes



The COOL train has rumbled on for years, with endless speculation about exactly how it would be implemented and what implications it would have for the Canadian pork industry. When it finally came into effect on October 1, there was still uncertainty as to how events would unfold. Would US processors decide not to purchase Canadian market hogs? Would piglet producers still be able to ship pigs to the USA for finishing? In the first months after implementation it is clear that COOL is having a serious effect on trade with the US.



According to the CME, by the end of November there had already been a 20% drop in the number of Canadian hogs being slaughtered. For the month of November, imports of market hogs were down by a massive 74% and feeder pig movements to the USA were down 13%. During 2007, market hog exports accounted for 3.28 million pigs so, if this trend continued, it would result in annual exports of 0.85 million and 2.4 million extra pigs looking for shackle space. Clearly this has created severe hardship for many producers at a time when they are already under economic pressure.

The benefit of COOL to US producers and consumers is questionable, especially as we effectively have one market for agricultural products and food. With just 6 months to fully implement systems of product segregation and labelling, it's not surprising that some US packers have decided to slaughter

hogs of US origin rather than incur the costs associated with separate product lines. Hopefully, some of these packers will change their policy, especially if the predicted drop in market hog numbers materializes later this year.

As we went to press, Canada had launched formal consultations under the WTO dispute process, which gives both parties 30 days to resolve the issues by negotiation. If this fails, the matter will be brought before a formal WTO panel that will seek to mediate the dispute. If there is an appeal against the findings of the panel, the process can drag on for more than a year and even more damage will be done to our industry. We must hope that common sense prevails and a compromise is found that allows the mutually beneficial trade with the USA to continue without the sort of trade barriers created by COOL.

Bonnie Peck

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Ed Schultz inducted to Agriculture Hall of Fame

Former general manager of Alberta Pork, Ed Schultz has been recognized for his contribution to agriculture by being inducted into the Alberta Agriculture Hall of Fame on September 26 last year.

“Ed Schultz’s passion for the pork production industry saw him dedicate a lifetime career to improving a vital part of our agricultural economy,” says a government news release. “Schultz was key in establishing the Pork Quality Assurance Program, hog export contracts in Alberta and developing a large export market for Canadian hogs and pork products. In 2006, he was named by Alberta Venture’s POWER LIST as one of Alberta’s 50 most influential people.”

Also honoured were Dr Prem Kharbanda, for his contribution to the field of plant pathology, and Tom Livingstone, who worked with and supported numerous community organizations, agricultural and livestock related commissions, committees and associations.

“Agriculture is a rich part of Albertan’s past and it remains a vibrant part of Alberta’s identity thanks to the dedication, innovation and passion of individuals like this year’s inductees” said George Groeneveld, Minister of Agriculture and Rural Development.

The Agriculture Hall of Fame began inducting recipients in 1951 to recognize outstanding contributions to agriculture and a commitment to rural Alberta. The awards are presented every two years.

Hytek sources foreign workers for Neepawa plant

By Myron Love

Business is looking up for Hytek Ltd., having been spurned a couple of years ago in its efforts to build a new multi-million dollar hog processing plant in Winnipeg, the company, which is headquartered in La Broquerie, southern Manitoba, turned its ambitions to western Manitoba.

Last winter, Hytek purchased the Springhill Farms hog processing plant in Neepawa. The company is investing \$35 million in expanding the plant and expects the work to be completed late next year. The enlarged plant will have a workforce of about 550 as compared to about 340 now.

To fill its manpower requirements, Hytek is looking both locally and abroad. Peter Mah, manager of community and business relations for Springhill Farms, reports that the company welcomed its first group of close to 80 Korean workers to Neepawa in late August. “The Federal Government has given us approval to hire 200 workers from offshore,” Mah says. “We were looking for people with some meat cutting experience. Some proficiency in English was also one of our criteria.”

Although housing is in short supply in the Neepawa area (which is about 250 km northwest of Winnipeg), Mah reports that the company has been able to find accommodation for the new workers in local hotels and motels and in some private residences. “The community has been very welcoming,” Mah says. “The churches, the chambers of commerce, the school division and people in general have all helped our new workers settle in the community.” The company has also established an English-as-an-alternative language program for the new recruits.

Mah reports that he and other Hytek personnel have also visited the Philippines to recruit new workers. “We were encouraged with the response we received in the Philippines,” he says. “We expect to be bringing in more foreign workers by the end of the year.” (Winnipeg and Manitoba are already home to more than 40,000 Filipinos.)

Mah notes that while there are always ups and downs in the hog processing industry, worldwide demand for pork right now is high. As well, he says, there is an oversupply of hogs in western Canada and not enough processing capacity. Hytek’s plant expansion should help redress the balance.

Real cost of ethanol will hit red meat industries hard

Ethanol development based on corn in Ontario comes at a net cost of about \$150 million per year to the Ontario economy, according to a recent George Morris Centre report. This cost will be borne most directly by the pork and beef industries, it says.

The report finds that the rapid development of ethanol production capacity in Ontario could lead to a permanent import

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pricing basis for corn, which would undermine the basis for cost-competitive pork and beef industries, and induce dramatic downsizing. "As it stands, Ontario marketings of hogs and cattle have already outstripped the capacity of domestic corn to feed them, so downsizing is warranted. But the appetite for corn from ethanol plants coming on line in the near future is immense, and backed by subsidy. The export-based red meat industry in Ontario will be unable to compete for corn with ethanol, and the firm import pricing basis for corn that results will decimate the red meat industries", says Al Mussell, Senior Research Associate at the George Morris Centre and lead author of the report.

The report traces the link between corn production, consumption in feed and industrial uses, and ethanol production and distiller's dried grains (DDG) in its analysis of forthcoming adjustments as ethanol production increases. "Even when we force the maximum feasible inclusion rates of DDG into livestock rations, the implied shrink in hog and cattle marketings that would return Ontario to competitive corn basis levels is simply dramatic", says Graeme Hedley, a George Morris Centre Associate.

The report concludes that, even at \$148-156 million per year, these results significantly understate the entirety of

adjustment costs. According to Mussell, "our results only scratch the surface, as we have not included losses or asset devaluation in feed, veterinary, or animal breeding. Clearly this also has implications for ethanol production in Western Canada. The bottom line is that this will result in a very hard landing for red meat segments in Eastern and Western Canada, based on our current course."

The complete GMC report entitled "Crowding Out: The Real Ethanol Issue in Canada" is available on the George Morris Centre website: www.georgemorris.org

Topigs purchases Maple Leaf genetics business

TOPIGS Canada Inc. announced last month that it had completed the purchase of the swine genetics business operations and assets from Maple Leaf Agri-Farms.

Under the terms of the sale agreement, TOPIGS Canada acquired Maple Leaf Agri-Farms' genetics business, including the assets of Lean Team International, a marketing arm of the genetics business, along with a nucleus farm located in Manitoba, Canada. The two companies have also formalized an agreement where TOPIGS Canada will supply genetics to Maple Leaf Agri Farms hog production operations.

"The swine genetics of Maple Leaf Agri-Farms combined with the existing activities of TOPIGS in Canada form a perfect basis for the future developments of our business in Canada," said Martin Bijl CEO of Pigtire Group. "With the purchase we expand our market share and acquire market knowledge that makes it possible to grow further."

Manitoba government passes bill banning pork production expansion

By Myron Love

On Wednesday, September 24, Manitoba's NDP Government passed its controversial Bill 17 despite widespread opposition. The Bill permanently bans hog barn expansion or building of new hog barns in the Red River Valley and areas to the north.

During public hearings throughout June, more than 300 individuals and organizations spoke on the issue and virtually all were opposed to the legislation, reports Andrew Dickson, the Manitoba Pork Council's general manager. Among the groups represented, he says, were different Chambers of Commerce, leading academics and researchers and the Business Council of Manitoba representing the province's major companies. Nonetheless, the government was unswayed from its course.

The government argues that it is an issue of protecting the quality of the province's lakes and rivers and Lake Winnipeg in particular. To that, Dickson responds that the ban has nothing to do with hog producers and the environment. "We're just a footnote," he says. "This is a matter between the government and the Opposition."

The Manitoba Pork Council had waged a \$200,000 advertising campaign opposing the initiative including full page ads in Winnipeg newspapers as well as ads in rural papers, radio ads and billboards throughout Winnipeg asking "who took the friendly out of Manitoba?"

"The bill will have no effect in restricting the flow of nutrients into Lake Winnipeg which the legislation is supposed to be addressing," Dickson says. "There is no good reason for this legislation. The question of how to manage hog manure is about storage. Hog producers know that if the land isn't suitable for absorbing the manure, then they are not going to be building or expanding on that land."

CPC applauds Colombia Canada trade deal

The Canadian Pork Council has applauded the Canadian Government's recent signing of a free trade agreement with Colombia. Colombia is currently Canada's 25th largest market for pork and pork products, accounting for \$3 million of sales for slightly more than 2,000 tonnes over the first eight months of 2008.

However, with the creation of a 5,000 tonne tariff-rate quota and the elimination of the in-quota tariff over five

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years, there is important potential for growth in Canadian pork exports to Colombia. The tariff-rate quota will increase annually and the in-quota tariff will be eliminated over the first five years of the agreement's implementation.

The CPC's support for the completion of the Doha Round of multilateral trade negotiations remains strong and unequivocal, it says. However, the slower pace of the WTO negotiations has led many of our competitors - such as the United States and Chile - to pursue bilateral and regional trade agreements. "We cannot rely on multilateral trade negotiations to offset preferential access obtained in bilateral trade agreements" said Jurgen Preugschas, CPC's President. "Without this dual-focus on both multilateral and bilateral trade agreements, Canada's ability to supply current export markets, as well as breaking into emerging markets, will be undermined."

The CPC says it is an avid supporter of current negotiations to liberalize trade with Korea and the Central American Four (El Salvador, Guatemala, Honduras and Nicaragua) countries. The CPC also encourages trade negotiations with Japan, India and the Dominican Republic.

IBM tracks Manitoba meat with digital passport

IBM and the Province of Manitoba have successfully tested a new system which makes it possible to digitally trace the journey food takes before it ends up in consumers' shopping carts. Through the project, Manitoba has taken the first step in implementing a provincial traceability program. The project tracked data about product movement, animal history and characteristics, processing history and transportation data throughout the complete value chain.

IBM provided business consulting and project management services, working with the Province of Manitoba and more than 16 supply chain partners, including beef and pork producers, animal feed ingredient producers, feed manufacturers, farmers, processing plants, truckers and a retail grocery chain.

The wide scope of the Manitoba project was essential. The average dinner has been through a complex supply chain by the time it reaches a consumer's table. Dozens of companies are involved in the production of just a single rib eye steak. Consumer product recalls - from spinach and chocolate to peanut butter - illustrate the importance of access to timely information, when needed, at any point along the supply chain, for safety and quality assurance reasons.

Using Global Traceability Network (GTNet) software from IBM business partner TraceTracker, Manitoba's project demonstrated it is possible to securely and accurately gather and crunch data about a piece of meat from a variety of sources and share that information, at any step in the process. As a web platform, the GTNet allows trading partners to exchange critical product information so they can communicate key messages to customers and consumers.

"As the agricultural industry continues to grow in Manitoba, so does the need for a traceability system that keeps track of all products from farm to fork," said Manitoba Agriculture, Food and Rural Initiatives Minister Rosann Wowchuk. "Now that the proof of concept has been completed, we can look at implementing a traceability program that will help to assure the quality and safety of all consumer goods and also ensure that consumers - locally and across the country - feel confident in the products they consume."

Ultimately, the system can also be used to provide messaging that will help re-establish and reinforce consumers' confidence in the food products they're buying. In fact, IBM surveyed more than 1,600 consumers in 2007 and found nearly 70 per cent expressed a low overall level of trust in the claims branded food products make about their environmental impact and health benefits. Almost half of consumers were concerned about safety, and nearly two out of every five said they buy different brands today because of these concerns.

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Hypor announces multiplier performance figures

Hypor Canada has just completed an analysis of its 2007 performance results which show an impressive overall average of 25.0 piglets weaned/mated female/year over 23,294 multiplication sows. The data is collected by Hypor from all its multipliers across Canada each year.

“Our sows are capable of weaning large numbers of piglets, without compromising birth weight, piglet survival at birth, weaning, mothering ability or sow longevity. We select for balance with a lot of emphasis on Weaning Capacity traits. For us weaning capacity is the genetic potential to maximize the weight of piglets weaned and pork sold for each sows productive lifetime,” said Eric Aubin, Hypor’s Sales Manager for Canada. This concept of Weaning Capacity is a focus for Hypor.

“The results are always visible first in the nucleus barns, secondly in the multiplication farms and then filter into the commercial farms,” notes Aubin. “Typically a hybrid female used in a commercial barn provides an advantage of about 1.5 piglets per year over a purebred female in multiplication.”

The winner of the Hypor benchmark was Schwoba Farms in Ontario. They achieved 26.9 piglets weaned/mated female/yr. “These numbers are possible because of the breeding potential of Hypor animals but also due to the good management at Schwoba Farms,” Aubin comments.

Genesis presents award for 31 pigs per sows

Canadian swine genetics company Genesis has recently presented Martin Waldner and Phillip Kleinsasser from Camrose Colony with the Genesis Trophy at the Genesis 25 plus Awards Banquet in Great Falls, Montana. The colony, which is in Ledger, Montana, received the Genesis Trophy for being the highest performing customer, achieving 31 pigs weaned per sow in a calendar year and became the first farm in the United States to exceed 30 pigs per sow. Camrose uses Genesis Duroc and

Genesis F1 gilts. Jim Long, President of Genesis, congratulated them for this outstanding achievement. “When we first called Camrose and told them they were the first US farm to exceed 30, they didn’t believe it. They thought there were many farms over 30,” he said. Martin and Philip said: “We don’t do anything special, we just go to the barn everyday and do what has to be done.”

Breeding herd performance – Camrose Colony

Average pigs born alive/litter	12.9
Litters/mated female/year	2.54
Pigs weaned per sow	12.2
Adjusted 21 day litter weight (lbs)	164.0
Average age at weaning	20.8
Pigs weaned/lifetime female	52.0
Pigs weaned/mated female/year	31.0





Genesis awards – Jim Long, president of Genesis (left) presents the award to Martin Waldner (centre) and Philip Kleinsasser from Camrose Colony

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1. J. de Koeijer, R.E. B. Toes, J.E. van den Broek, P.S. van der Meulen, P.S. van der Meulen, P.S. van der Meulen. The effect of circovirus type 2 on pig performance. Proceedings of the 10th International Conference on Swine Health and Production, 2009, pp. 100-101.

• New Product Showcase



Water treatment improves pig health and performance

Electro-activated water technology provides total disinfection without side effects, leading to improved pig health and performance, says Envirolyte Can-Am Ltd., the exclusive distributor of Envirolyte equipment in Canada. "Until now, chlorine was the answer to many water hygiene problems, however, research shows that chlorine may be carcinogenic," says the company. "On-site chlorination is not only labour-intensive, expensive and dangerous, it also does not provide the desired effect in killing off pathogenic microorganisms."

The Envirolyte process distinguishes itself by the fact that there are no harmful side effects or end products whatsoever, it says. "The major benefit of electroactivated water to the end user is a reduction in the use of chemicals and medicines. The result is healthier people and animals and a cleaner environment."

Envirolyte units electrolyze salt and water (brine) using polymer or ceramic membranes to separate the positive and negative ions. As a result of the chemical reactions two types of activated solutions are produced, Anolyte and Catholyte. Acidic Anolyte is an acid equivalent, with a pH value around 2, so it can replace chemical agents where an acid agent is used. It is guaranteed to yield better results and be more cost efficient. Catholyte is a caustic soda equivalent. It has a pH around 12-13 and can replace chemical agents where caustic soda is used more efficiently and at a far less cost than any chemical formulation.

Treatment of drinking water at a ratio of 1:2000, depending on the level of contamination, is enough to remove all bacteria and bio-film, says the company. It claims that the water treatment improves fertility, reduces disease problems such as mastitis and diarrhea and leads to improved feed efficiency.

Envirolyte Can-Am can be contacted at 388, Knowles Avenue, Winnipeg, MB, R2G 1E2, by phone on (204) 295-0335 or by email at envirolyte.canam@mts.net

Feed bin monitoring system provides remote access

HerdStar®, LLC., the Mankato, Minnesota based animal technology company, has just released its second major version of Bintrac.com, a web interface to HerdStar's BinTrac™ PRO bin monitoring system. This highly accurate end-to-end bin monitoring solution now allows remote access to feed bin levels, consumption, feed ordering, and feed delivery tracking, says the company.

This new BinTrac release features an all new Feed Order Desk which provides new decision tools for analyzing feed levels, consumption, and reorder amounts. Point and click to build a feed order and then BinTrac tracks delivery on that order. BinTrac feed level data is also available to any third party feed ordering and diet management software solutions.

Tom Baarsch, Vice President Technical Operations, the chief designer of Bintrac.com. explains: "Bintrac.com monitors on-farm feed bin inventory and forecasts for the user when to order feed and how much to order. The system tracks these orders and reports whether the delivery was early, late, or on time. BinTrac also reports how much feed was delivered and whether it went to the right or wrong bin." Baarsch goes on; "The BinTrac Order Desk is designed to require no special experience to place an accurate feed order."

The heart of the BinTrac system is its accurate, yet affordable, load cells and mounting brackets that allow for installation without cranes on empty or filled bins. Users are able to eliminate climbing feed bins and shift the feed ordering process to a central office, thus reducing labour, increasing feed budget accuracy, and enhancing worker safety.

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New job site for pork industry

A new online agricultural human resource site to connect individuals and companies for employment in the swine industry has recently been launched. PigCareers.com delivers swine related job information, job postings, resume postings, and other relevant career information regarding the pork sector.

Jim Eadie, from PigCareers.com, felt that a career forum specific to the pork industry was needed. "When you look at specific career websites, there aren't many that are specifically related to the swine industry. A lot of our own internal business - Dynamik Group and Farmersshowcase.com - revolves around the swine industry therefore we found it important to promote and market careers in the industry. We believe the swine sector has many exciting opportunities and we need to continue to market this sector. The cutting edge technology and growth of the Internet for farmers has made these websites popular for farmers to access as most business is being shifted to the Internet."

Employers and job seekers can each post resumes and jobs. All postings will be free for a limited amount of time; the site also includes featured job listings, related videos and other information useful and relevant to the career side of the sector.

For further information, contact Jim Eadie on (519) 438-0444, by email at jim.eadie@pigcareers.com or go to www.pigcareers.com

CircoFLEX- MycoFLEX® combo receives CFIA approval

Boehringer Ingelheim (Canada) Ltd. (BICL) has received approval from the Canadian Food Inspection Agency to market the Ingelvac CircoFLEX-MycoFLEX® combination to protect pigs against both porcine circovirus type 2 (PCV2) and Mycoplasma hyopneumoniae.

Ingelvac CircoFLEX® and Ingelvac MycoFLEX® can be mixed and administered as a single-dose, 2mL

injection to pigs 3 weeks of age or older, which saves time, labour and stress on pigs.

Both vaccines contain ImpranFLEX™, the proprietary aqueous-based polymer adjuvant that helps promote quick, long-lasting immunity while reducing the risk of systemic and injection site reactions.

Ingelvac CircoFLEX-MycoFLEX® has been proven effective as an aid in the prevention of enzootic pneumonia

caused by Mycoplasma hyopneumoniae and lesions associated with porcine circovirus type 2 (PCV2). Both Ingelvac CircoFLEX® and Ingelvac MycoFLEX® are non-viscous, highly syringable, single-dose vaccines.

For more information contact Yolande Panaccio, Business Unit Manager - Swine 1-800-263-5103 ext. 4550 **WHJ**

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Arginine supplementation improves piglet growth

We have reported previously on research suggesting that supplementing the sow gestation diet with arginine leads to improved litter size, although not all trials show this. Now a recent study in the USA suggests there are benefits to piglet growth during the suckling period.

The trial looked at the effects of arginine supplementation during gestation and lactation on the lactation performance of first parity sows. Supplemented diets had L-arginine added at a rate of 1%. The gestation diet was fed at a rate of 2kg/day and the lactation ration fed to appetite. Litter size was standardized to 10 pigs on all females by cross fostering.

There were no differences in bodyweight, backfat thickness, daily feed intake, or days from weaning to estrus among treatment groups. There was no effect of the gestation diet or a gestation x lactation diet interaction on any parameter measured: in other words arginine supplementation of the gestation diet did not influence the effect of supplementation in the lactation diet. On day 7 of lactation, plasma concentrations of arginine and insulin in sows, as well as concentrations of most amino acids in milk, were greater in response to arginine supplementation during lactation compared with the control. Weight gain of piglets from sows fed the arginine supplemented diet during lactation was greater between farrowing and day 7 ($P < 0.01$) and between days 0 and 21 ($P < 0.05$) of lactation compared with piglets from sows fed the control diet. Collectively, results from this study indicate the potential beneficial effects of dietary arginine supplementation in improving the lactation performance of first parity sows, say the authors.

WHJ comment: Piglet weaning weight is one of the key drivers of growth rate through to market, so anything that can be done to improve piglet growth will have an effect right through the pig's life. The significant effect of arginine supplementation on weaning weight shown in this trial provides one possible route to doing this. However, as with most research, the economics are not assessed. Even if they were, the benefits post weaning would need to be taken into account as they are likely to be much more

valuable than the increase in weaning weight itself. Commercial evaluation at farm level would be worthwhile.

Reference: R. D. Mateo, G. Wu, H. K. Moon, J. A. Carroll and S. W. Kim - Effects of dietary arginine supplementation during gestation and lactation on the performance of lactating primiparous sows and nursing piglets. *J. Anim Sci.* 2008. 86:827-835. doi:10.2527/jas.2007-0371

Late introduction of sows and gilts to the farrowing pen

Research at the University of Aarhus in Denmark indicates that there are no adverse effects on the progress of farrowing or maternal behaviour when older sows are introduced late to farrowing pens, although gilts had more stillborn piglets.

In order to investigate the effect of late introduction to farrowing pens on the progress of farrowing and maternal behavior, gilts and older sows were subjected to two treatments; the first where they were introduced to the pen early and the second where they were moved in close to farrowing. The difference between sows that were housed in loose farrowing pens and those housed in crates was also investigated for sows moved into the pen late.

Sow behaviour and piglet birth intervals were recorded using video recordings from 16 hours before the birth of the first piglet (BFP) until 48 hours after BFP. Before farrowing (16 to 3 hours before BFP), sows introduced late to pens had more postural changes per hour than sows introduced early to pens (12.7 -v- 8.9), whereas there were no differences between sows introduced late to crates and sows introduced late to pens.



Gilts introduced to loose farrowing pens just before farrowing have less stillbirths than gilts housed in crates



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The interval between births, the variation in the inter-birth interval and percentage of stillborn piglets were affected by an interaction between parity and treatment. In multiparous sows, there were no differences between treatments either in the progress of farrowing or in the percentage of stillborn piglets. For first litter sows, there were no differences between those that were introduced late to pens and sows that were introduced early to the loose farrowing pens.

First litter sows that were introduced late to crates had longer inter-birth intervals compared to those housed in pens (29 ± 4.9 min -v- 16 ± 2.9 min), a greater variation in these intervals and a greater percentage of stillborn. After farrowing, neither postural changes, time spent in lateral lying, number of near-crushing situations, nor the response to a "piglet scream" test were affected by treatment.

When sows and gilts were introduced late to farrowing pens, neither progress of farrowing nor maternal behaviour relevant to piglet crushing was influenced. However, crating first litter sows that were introduced late to the farrowing environment compared with pen housing had detrimental effects on the progress of farrowing and the percentage of stillborn piglets.

WHJ comment: The normal recommendation for moving sows and gilts into the farrowing pen is to do so about 5 days before the date that farrowings is due. However, pressure on farrowing space often means that movement is closer to farrowing. It is clear from this study that the effect of this practice is to increase the time taken to farrow, resulting in a higher level of stillborn pigs. If insufficient farrowing space is available to enable all sows and gilts to be moved in at 5 days, this work suggests priority should be given to ensuring gilts enter the crate well before farrowing, whereas older sows can be moved in close to farrowing without detrimental effects. It is also interesting that first litter sows introduced late into a farrowing pen showed no differences to those moved in early.

Reference: L.J. Pedersen and T. Jensen. Effects of late introduction of sows to two farrowing environments on the progress of farrowing and maternal behaviour. J. Anim Sci. 2008. 86:2730-2737. doi:10.2527/jas.2007-0749

Adding ground wheat straw to the gestation diet

A regional experiment was conducted at 8 experimental stations to evaluate the efficacy of adding 13.35% ground wheat straw to a corn-soybean meal gestation diet for three successive reproductive cycles compared with sows fed a control diet without straw. There were a total of 708 litters farrowed over 3 reproductive cycles. The basal gestation diet intake

averaged 1.95 kg daily for both treatments, plus 0.30 kg of straw daily for sows fed the diet containing ground wheat straw (total intake of 2.25 kg/day). During lactation, all sows on both gestation treatments were fed the standard lactation diet used at each station ad libitum.

Averaged over 3 reproductive cycles, sows fed the diet containing wheat straw farrowed and weaned 0.51 more

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pigs/litter, and had total litter birth and weaning weights that were 0.87 and 3.59 kg heavier, respectively, than sows fed the control gestation diet. Sows fed the gestation diet containing wheat straw consumed more lactation diet per day than control sows. There were no gestation diet treatment differences for farrowing and rebreeding percentages, culling rate, sow bodyweight and backfat measurements, or weaning to oestrus interval. Lactation diet intake and all sow bodyweight and backfat measurements increased with increasing parity as would be expected. In conclusion, when the daily intake of the basal gestation diet was equalized for both treatments, the addition of 13.35% ground wheat straw to the gestation diet improved sow and litter performance with increases in litter size and total litter weight at birth and weaning compared with control sows and litters.

WHJ comment: The improvements in both birth weights and weaning weights are very significant and worthwhile, although one can speculate about the causal effect. Sows are able to digest fibre quite effectively in the hind gut to obtain energy and this could be part of the reason, but there may be other properties of the fibre that has an effect. Sows in bedded systems have higher lactation feed intakes due to the gut fill expanding the stomach and, as a result tend to wean bigger pigs. However, they eat a lot more than 0.3kg/day as fed in this trial. Given that straw is cheap, even if it has to be ground, this may be a low-cost way of increasing the weight of pigs weaned.

Reference: T. L. Veum, J. D. Crenshaw, T. D. Crenshaw, G. L. Cromwell, R. A. Easter, R. C. Ewan, J. L. Nelssen, E. R. Miller, J. E. Pettigrew, M. R. Ellersieck and the North Central Region-42 Committee on Swine Nutrition - The addition of ground wheat straw as a fiber source in the gestation diet of sows and the effect on sow and litter performance for three successive parities. *J Anim Sci* 2008 : jas.2008-1119v1-20081119.

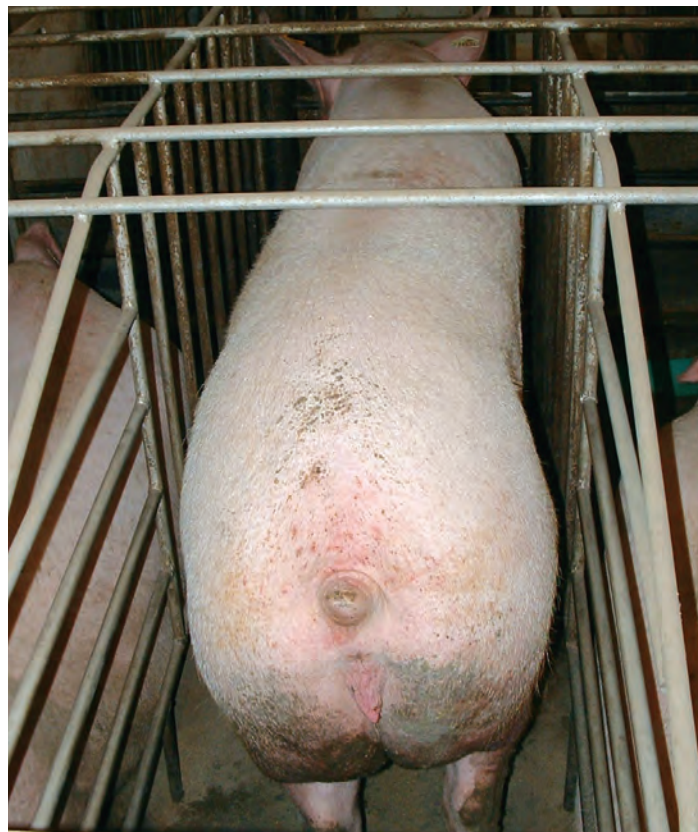
Welfare of sows in conventional and wide stalls

Concern over the welfare of gestating sows has increased in recent times. The space and movement restrictions in gestation stalls have attracted wide criticisms. Although stalls prevent aggression between sows and consequent injuries to a great extent, sow movements in limited space has been reported to cause injuries.

Sow welfare guidelines have indicated that a pregnant sow in a gestation stall should have at least the minimum space to lie down without its teats extending into the adjacent stalls and its hind quarters not in contact with the back of the stall. Increasing the stall dimensions in relation to sow dimensions will increase the dynamic space available to the sow to make movements within the stall, thus minimizing injuries.

A study was carried out at Southern Research and Outreach Center, University of Minnesota, to evaluate the welfare of pregnant sows housed in conventional gestation stalls and in stalls with a width at least 75% of the height of the sow housed in it. Body measurements (length and height) of sows were taken before weaning and sows were allotted after weaning to either control or treatment group. Injury scores of all sows and behaviour of focal sows (24 in control and 27 in treatment) were recorded on day 6 post-breeding and on days 70 and 105 of gestation.

Width of stalls had no significant effect on various postural



Does providing a wider stall reduce injuries in sows?

behaviours studied except on the average duration of getting up (from either lying or from a sitting posture) which showed a trend towards lower duration in the treatment group. At day 105, sows spent a higher percentage of time lying on their side and standing and less time sitting compared to the other time periods. The groups did not differ significantly in terms of injuries. Farrowing performances were also similar among the treatments.

This study was an attempt to see the difference in welfare (behaviour, injuries and production) by ensuring at least 75% of the height of the sow as the width of the stall. The lack of significant effects with the exception of a beneficial trend in the duration of time needed for getting up indicates that additional space is needed inside the stall to have significant improvement in terms of behaviour.

WHJ comment: As breeding stock has been improved over the years, one consequence has been an increase in mature body weight, which has led to some welfare issues where stalls and crates have not reflected the change in size. However, this study suggests that adjusting stall width to a standard size relative to body weight and providing more space than a conventional stall does not make a great deal of difference. Making stalls very wide would enable sows to turn round, so there is a limit to the space that can be provided. Perhaps a better approach would be to use group housing and that system seems to be steadily gaining ground in North America.

Reference: L. Anil, S. S. Anil, and J. Deen - Evaluation of welfare of gestating sows in conventional gestation stalls and in gestation stalls with widths defined by the sow height. *Proceedings, Allen D. Lemay Swine Conference, University of Minnesota, St. Paul, September 2008.*

The effect of organic and inorganic trace mineral on sow reproductive performance

Different dietary trace mineral sources and levels were fed to developing gilts to evaluate their performance responses during the growth phase, and then treatments were continued into the reproductive phase in which subsequent reproductive responses were evaluated. In the first trial, three groups of gilts (total 216) were used with treatment diets initially fed at a weight of 30 kg. The first factor was trace mineral source (organic or inorganic), whereas the second factor evaluated dietary levels. The two different dietary trace mineral levels were the NRC recommended level and average industry standards (IND).

Organic trace minerals were mineral proteinates, whereas the inorganic minerals were provided in salt form. The results indicated that trace mineral source or level did not affect gilt growth or feed performance responses to 110 kg.

The second trial continued with the same animals but used 3 groups of females over a 6-parity period and had a total of 375 farrowings. Trace mineral levels and sources continued to be the same except that two additional pens of gilts had been reared using the IND trace mineral levels of both organic and inorganic trace mineral sources. At breeding, the gilts from these two additional pens were continued on the same trace mineral source and level but fed higher dietary Ca and P levels (IND + Ca:P). Litters were standardized by 3 days after farrowing within.

Sows fed organic trace minerals farrowed more total pigs (12.2 vs. 11.3) and live pigs (11.3 vs. 10.6) compared with sows fed inorganic trace minerals. Sows fed the IND + Ca:P level tended to have fewer total pigs born for both trace mineral sources. Litter birth weights were heavier when sows were fed organic trace minerals, but individual piglet weights were similar. Nursing pig ADG tended to be greater when sows were fed organic trace minerals. Other sow reproductive traits (bodyweight, feed intake, and rebreeding interval) were not affected by trace mineral source or level. Daily mineral intake increased by parity but declined when trace mineral intakes were expressed as an amount per kilogram of bodyweight and declined during later lactations. These results suggest that feeding sows organic trace minerals may improve sow reproductive performance, but there were minimal effects on other reproductive measurements.

WHJ comment: It is becoming clear that over the sow's life, trace mineral levels

become depleted and this problem can be at least partially avoided by using organic sources of minerals rather than inorganic ones. The differences in litter size across the parity range are large and so this is a very worthwhile effect. However, quite why the higher trace mineral levels combined with additional calcium and phosphorus resulted in slightly lower litter size is not clear.

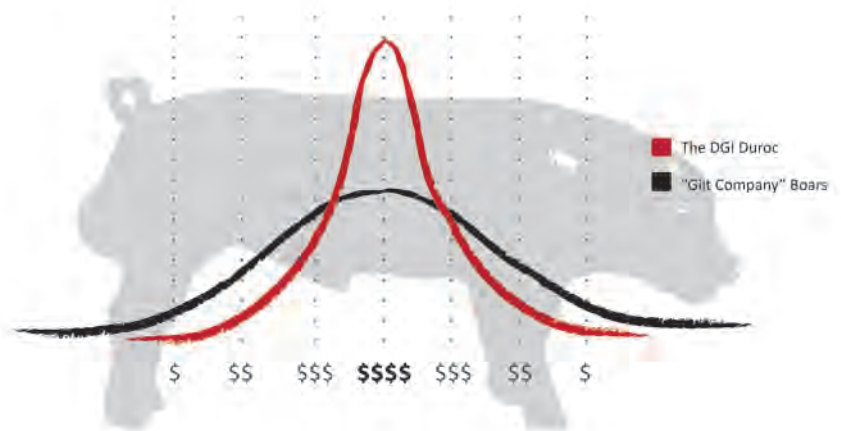
Reference: J. C. Peters and D. C. Mahan - Effects of dietary organic and inorganic trace mineral levels on sow reproductive performances and daily mineral intakes over six parities.

J. Anim Sci. 2008. 86:2247-2260. doi:10.2527/jas.2007-0431

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• Industry Crisis



Canadian hog numbers keep falling

Although the worst of the attrition in numbers of hogs and farms with pigs seems to have passed, both breeding pigs and total hogs showed large year-on-year drops over the 12 months to October 1st, 2008 (see table). The Canadian breeding herd fell by 8.3%, and total hogs were 10.9% lower. Over the last three years, total pig numbers have fallen by 16%, while breeding pig numbers have dropped 12.5%. Even more striking is the major reductions in the number of farms with pigs, down a massive 28% over the same period.

Large regional differences are apparent in the data, with Quebec losing only 0.4% of total hog numbers in the 12 months to October 1st, while Saskatchewan numbers fell by 28.9%, reflecting increased export of pigs to the USA and the reduction in sow numbers of nearly 15%. Continued liquidation in Ontario finally showed up in the statistics, with breeding pig numbers falling by 11.7% and total pigs by 17.1%, a very significant change from the July figures.

The Cull Breeding Swine Program reached a total of 120,000 animals, short of the 150,000 target, or 10% of the national herd. The Canadian Pork Council called on the federal government to include more slaughtered animals retrospectively because sow liquidation started before the scheme was introduced.

Hog inventories at October 1st, 2008

	Breeding pigs		Total pigs	
	1000 head	2007 to 2008	1000 head	2007 to 2008
Canada	1,416	-8.3	12,795	-10.9
Atlantic	26	-14.7	169	-41.1
Quebec	383	-3.5	4,035	-0.4
Ontario	361	-11.7	3,176	-17.1
Manitoba	347	-6.3	2,750	-5.5
Saskatchewan	113	-14.7	900	-28.9
Alberta	170	-9.1	1,650	-12.7
British Columbia	17	-8.7	115	-9.4

COOL implementation causes uncertainty

Mandatory country-of-origin labelling (COOL), which came into effect at the end of September 2008, has created considerable uncertainty and hardship among producers exporting market hogs, isowears and feeder pigs to the USA. With the 6 month phase-in period already well under way, some processors, notably Smithfield Foods and its subsidiaries John Morrell and Farmland, have said that they will not purchase any pigs of Canadian origin. It seems likely that some of the other major processors, such as Tyson Foods, Hormel Foods, Excel and Swift, will slaughter pigs of Canadian origin, although only Tyson has said it will slaughter market hogs coming directly from Canada.

So far, the negative effects have been seen mainly in the number of market hogs shipped to the US for slaughter. Economist Steve Meyer estimates that this will be around 2 million in 2008 compared with 3.28 million in 2007. "The weekly numbers have been falling all year, but they have moved sharply lower since October 1, when the rules went into effect, he says. "Further, the drop in market hog imports has coincided with a noticeable increase in Canadian hog slaughter." In the first 5 weeks after COOL implementation, the increase has been 11,504 per week more than a year ago, he says.

If this trend continues, capacity could be a problem, with the Maple Leaf plant at Brandon having reached its full capacity of 86,000 per week and uncertainty over its Burlington plant remaining. While the Olymel plant at Red Deer has increased throughput recently and has been sourcing some pigs from Manitoba that had previously been slaughtered in the US, capacity is an issue due to a shortage of labour. Theoretically, the 2 million market hogs per year currently going to the US could be handled at Red Deer by double-shifting, although practically this would not be possible as about half of these are produced in Ontario. Additional capacity will also be added to the Springhill Farms plant owned by Hytek Ltd, which is undergoing a 2-year development program with an eventual throughput of 1.4 million hogs per year.

Although there have been disruptions to trade of weaned pigs and feeder pigs and in some cases severe discounting, it seems likely that the situation will sort itself out as US processors develop systems for tracking pork from pigs of Canadian origin. With 10% of the US kill being Canadian pigs and a forecast drop in slaughter number as we head into the spring of 2009, processors will have to take

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Canadian pigs or face a shortage of supply. Whether this leads to price discounting in the long term remains to be seen. Although there could well be an eventual reduction in the number of pigs heading south for finishing, there are no signs of that yet. The most damaging outcome of COOL seems to be the unwillingness of many US packers to kill Canadian market hogs, most of which will have to find shackle space in Canada.

Danish industry in turmoil

Denmark, a major player in international export markets, has suffered from the decline in the US dollar, which has seen exports from the USA increase dramatically. This led to lower prices, which coupled with high feed costs, resulted in a financial crisis for the pork industry. The latest statistics show that the Danish pig herd was nearly 8% smaller than in October 2007, a slightly lower figure than the previous census published in the summer, which indicated a 10% reduction year-on-year. Finishing pig numbers were down by 9.3%, due to increased numbers of weaners being exported to Germany for finishing.

Exports of weaners to Germany have been posing a threat to Danish Crown, with numbers increasing by 563,000 to a record 2.94 million pigs. There are two reasons why more producers are doing this - to get better prices and to bypass Denmark's increasingly onerous environmental regulations. It is easier for producers to get permission to expand weaner production than to expand finisher production. According to Bent Claudi Lassen, chairman of Danish Bacon and Meat Council, if weaner exports continue to increase, it will be

difficult for Danish slaughterhouses to remain efficient. He has called on the Danish government to stop over-egging European legislation.

Earlier in 2008, Denmark's five largest pig producers quit selling pigs to Danish Crown in a very public row about the poor prices paid by the cooperative to its members. They formed Danpork and promised to pay 25 cents/kg more than Danish Crown by shipping market hogs to Germany for slaughter, where prices are better. Having delivered on the promises made to its members, it went on to look for 20 more shareholders to grow the company, with a goal of achieving 10% market share.

In addition to Danpork, another new competitor in the market is Moesgaard Meat which has a slaughterhouse in Jutland. Like Danpork, Moesgaard Meat was set up by producers who previously supplied Danish Crown. Other recent challengers to Danish Crown's dominance include Jutland Meat Company and German meat processor Tönnies. The extra competition is expected to mean further cut-backs in Danish Crown's slaughtering and processing capacity.

Meanwhile, Danish Crown put on a brave face when releasing its end of year figures, which showed an increase in revenue of 6%. However, a considerable amount of this was due to profits from overseas acquisitions. The cooperative faced capacity problems early in the year due to fires at its plants, followed by surplus capacity as pig supplies dried up. Nevertheless, it paid members an average of about 8 cents/kg bonus for the year.

EU pig herd contracts

An unprecedented drop in EU pig numbers was revealed in summer 2008 census data for 15 member states representing 90% of production. This showed a reduction of nearly 6%, with an 8% fall in the number of sows to 9.1 million, with the biggest contraction in Spain, Poland and Germany. While this did not have an effect on pig prices, by the final quarter of the year, tighter supplies began to be reflected in higher prices.

In the Netherlands, an August 2008 census showed sow numbers down by 4.1%, although total pig numbers were little changed. Of particular concern was the huge decrease in unserved gilts, down by 25.7%, which indicates further reductions in the breeding herd.

The English pig herd continues its decline, with a reduction of 7.8% in breeding pig numbers to 410,000 indicated by the June, 2008 census. Total pig numbers were down by 2.3%. The data also showed that 41% of the breeding herd is now kept outdoors.

Some relief has been provided to European producers from the increase in grain production, which went up by 50 million tonnes to 306.7 million tonnes. Despite poor weather conditions in northern Europe, the most recent estimate is 11 million tonnes higher than the last forecast published in June 2008. As a result, grain prices have plummeted, similar to many other parts of the world.

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Maximizing piglet survival

By Ciaran Ormond and Jeri McMaster, Partners in Pork, Rimbey, Alberta

Introduction

Partners in Pork operates three 1200-sow barns in the Rimbey area producing 23kg weaners which are finished under contract and marketed to Olymel. The County Line barn, where the *Maximizing Piglet Survival* video was shot, was built 10 years ago and uses Hypor genetics. There are 5 staff, two in farrowing, two in breeding and a manager who also takes care of the nursery.

Working together with the staff in breeding and gestation

A successful farrowing room depends on the staff in the breeding and gestation areas and good communication between staff in these areas. Important aspects are sow condition at entry to the farrowing room, backfat level, vaccinations and feedback, also cleanliness of sows. Backfat testing and an estimation of weight using a girth tape is carried out during gestation and used as the basis for feed adjustments to ensure that sows enter the farrowing room in the correct condition and with the required backfat level.

The gestation staff writes on the sow's card if the sow has been lame or if there have been any other health problems, so that farrowing staff can take the appropriate actions.

Room preparation

After piglets have been moved to the nursery at weaning and sows have been moved to the breeding area, the farrowing room is washed and disinfected. Weaning takes place twice per week, on Mondays and Thursdays. The routine is as follows:

- Remove excess feed from feeders
- Remove all solid manure
- Set fans for washing
- Spray with an acid foaming degreaser
- Wash everything except alarm sensor, including bowls, mats and creep feeders from outside the room
- Disinfect and leave to dry
- Move sows to crates

Sow entry to farrowing

- Sows are moved into the farrowing rooms after lunch on Mondays and Thursdays
- Any sow in poor condition is given a shot of Vitamin A and D (2ml)
- The sow card is hung and the due date written on the back board of the crate (more easy to see than writing on the cards)

- Important information about previous history (stillbirths, savaging, farrowing problems, early farrowing, health problems etc.) is written on the back board in large letters
- The sows' locations are entered into the computer and checked against the sows that the computer says are due to farrow to double check that there are no sows that have been missed
- Feed cards are hung up
- Sows are not fed on the day they move from gestation as they have already been fed, but from the next day, they receive 5lb per day until the day of farrowing (in one feed)
- Sows are induced on day 114 after their last mating (check product and injection method)
- Sows that tend to farrow early will have been flagged and are observed closely prior to their due date
- Just prior to the expected farrowing date, two heat lamps are placed on each side of the sow (only one is switched on until the sow starts farrowing), with rubber or carpet comfort mats underneath. This is done sooner for sows with a history of early farrowing

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Management of farrowing

- Manure is scraped out from behind the sow daily prior to farrowing to ensure a clean environment for the newborn piglets
- On the day of expected farrowing, 3.5lb feed is given, whether the sow is farrowing or not
- Farrowing sows are checked every half-hour and a note made on the back of the crate of the time, number of piglets and any other comments
- As soon as sows start farrowing, they are given 0.5ml of Oxytocin into the vulva
- If a sow produces a stillbirth, she is assisted
- If a sow has not had a piglet for an hour or a sow is straining without producing piglets, she is assisted
- Sows are given 0.5ml of Oxytocin every half-hour until they finish farrowing
- Older sows are assisted more frequently, but we don't assist many more than 6 sows per room of 25
- Notes about farrowing progress are always written on the back board
- If a sow has not had a piglet for a while, she is made to stand and then when she lies down in a different position, she will often produce another pig
- With older sows that have a history of stillbirths, we may intervene half way through farrowing and remove as many pigs as we can
- Sows that are assisted are given a saline flush and antibiotics are only given if there is a discharge, indicating an infection. Good hygiene procedures when assisting mean that routine antibiotic treatment is not needed
- When farrowing is complete, one lamp is removed and one left in place on the side of the crate with the heat mat, then mats and afterbirth are removed
- While the sow is farrowing, if she has a large litter, split suckling may be carried out

Maximizing piglet survival

- At the start of farrowing, the number of functional teats is assessed. It is important to know the sow's rearing ability when litter size is high



A litter of piglets is weaned into a Piggy Deck at 12 days, to provide udder space for fostering

- Colostrum management is very important. In large litters, the smallest 5-6 pigs are placed under the lamp to dry off for up to one hour, then the biggest 8 pigs (assuming a litter of 16) are locked away. The little ones are left to suckle on the sow for 2 hours before releasing the large piglets
- Piglets are not fostered until 6 hours after farrowing to allow the maximum colostrum intake. This rule was implemented when circovirus was a problem but it is still good policy as piglets need immunity from many other diseases
- Piglets are fostered to leave 12 per sow where possible. Ideally the biggest piglets are moved, but if there are 10 big piglets and two small ones, we will move the small ones. All sows available for fostering are looked at before making fostering decisions
- A sow with a good udder is selected to suckle the smallest pigs
- Overall, we try to minimize movements, while evening up the numbers and sizes of piglets in litters
 - Cascade fostering or shunt fostering is used when there are many surplus piglets. A sow is weaned at 12 days and the piglets placed in a Piggy-Deck (there is one in each farrowing room.) The sow stays where she is and has a litter of 5-7 day old pigs put on her, then that sow is used to suckle surplus piglets once they have had colostrum from their own mother. The biggest and best pigs for their age are always used when using this technique
 - For litters of small pigs, the extra lamp is left on for the first night and even the second if necessary
 - Good observation of the sow and piglets is essential to ensure the piglet's

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environment and milk supply are good and that the sow is healthy. We make sure sows get up after farrowing and that they eat and drink. She should get up several times on the day of farrowing. Sows that are not eating are taken out of the crate for a walk. They may be given starter feed to improve their appetite and are given treatments as necessary

- Piglets are constantly watched to check if they are healthy and to see if they are falling behind and have to be moved. They are not moved unless it's absolutely necessary and we do very little one-for-one swapping. It's important to get things right early on
- Sows are fed 3.5lb on the day after farrowing (day 1) and increased by 3.5lb per day until day 5, when they receive feed ad lib from a self feeder. All feed given is noted on the feed card. For the last week of lactation, sows are fed twice per day as the feeders don't hold enough feed for 24 hours.
- Feed intake has increased significantly since using a more aggressive feed curve and weaning weight has increased by 0.5kg
- Pigs are weaned at 19-20 days. Piggy Decks are also used to take some piglets off gilts at 12 days, which helps them be weaned in better condition, leading to a higher second litter size

Results

Table 1 shows the performance results for the barn over a one-month and 6-month period:

Table 1: Breeding herd performance at Partners in Pork's County Line Farm

	Feb 08 to July 2008	July 01 - July 31 2008
Av. # pigs born alive/litter	11.9	12.1
Av. # pigs born dead/litter	0.5	0.4
Pre-wean mortality (%)	7.4	8.0
# Pigs weaned/litter	10.9	10.9
# Pigs weaned/sow/year	27.2	28.8

Maximizing piglet survival video

The video used during this presentation, which covers all the points outlined above, is now available in DVD format. Copies are available from Pork Chain Consulting Ltd., 37, Coventry Lane, Lacombe, AB, T4L 1T6 Phone: (403) 782-3776, Fax: (403) 782-4161. They cost \$30 each and cheques should be made payable to Swine Technology Workshop

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Optimizing feed efficiency in the grow-finish barn

By Jim Gowans, B.Sc. (Agr.) Windrock Farms Ltd.

Introduction

The largest cost of pork production is feed. Depending on ingredient markets, the range varies from 60-75% of the total variable input costs. Any management steps that can decrease the amount of feed required to reach the market weight will usually decrease the feed cost per pig through improved feed conversion. This involves many factors and decisions. This short summary will review some of the major inputs and their effect.

Feeder adjustment

The goal of the grow-finish manager is to optimize the pigs' feed intake and limit wastage. The feeder is the main tool in achieving this goal. The feeder design must provide easy feed access and adequate space, wide enough to allow head and shoulder protection from other pigs while eating. Feeders should be easily adjusted to maximize feed intake while minimizing feed wastage and not be prone to mechanical failure.

Providing water within the feeder has been shown to increase feed intake and gain by up to 5% compared with dry feeders, especially in the summer months. Also, water use is reduced by 25 to 30% with wet/dry feeders. Typical feeder capacity recommendations are included in Table 1.

Table 1: Capacity of feeders

	Pen size (pigs/feeder)	
	Small	Large
Wet Dry Mash	12	9-10
Dry Mash	10	7-8
Dry Pellet	14	10-12

The wet-dry feeder pan should have 20-40% of it covered with feed. Dry feeders should have slightly less feed covering the pan. When the feeding pan is full, pigs can waste up to 6-8% of the feed budget. If feed is stale it is rooted out of the feeder by the pig seeking fresh feed.

Feed dispensers (or trays) that the pig operates with its nose to drop feed onto the pan must be kept clean so feed can move freely by the pigs' initiative to eat. Often, feed will build-up on the dispenser lip and obstruct feed dropping onto the pan.

The use of laminated pictures showing the correct amount of feed in the pan, placed in every room in the grow-finish barns, is a very effective tool to communicate what the proper feeder adjustment should look like. The pictures serve as a constant reminder to help reduce feed wastage and improve feed:gain.

Feed delivery systems

Feed delivery systems need to be designed so feed is available to the pig at all times. Feeders must be checked daily to ensure feed is being delivered to all feeders by the delivery system. Preferably, early morning checks and a late afternoon walk-through will ensure feed is available to the pig and result in the best feed:gain performance. The use of feeders that have some storage capacity provides assurance that feed is available if feed supply is interrupted for a short period of time. Feed availability problems range from feed bridging in bins (incorrect particle size, fat levels too high, moisture in bins, etc.), faulty augers or motors, plugged header drops (lumps) and poor feeder maintenance. Ensure the heaviest pigs eating the most feed are in the pen where the feed delivery sensor is located.

In addition to poor feed:gain as a result of feed delivery interruption, feed supply stoppage appears to be the major contributing factor to ulcer formation and twisted gut. Mortality as a result of ulcers is estimated to rise from about 0.5% in the winter to 2.5% in summer months (Deen, 1993).

Pellets vs. mash

Producers often question the value of pellets versus mash diets for grow-finish pigs. Much of the older literature indicated that pelleted diets would improve feed:gain over mash diets by 5-8%. However, with the development of



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wet/dry feeder technology, similar results have not been observed. Rantanen et al. (1995) and Froese (1994) reported no improved feed efficiency with pellets over mash when using wet/dry feeders. Recent commercial results using improved feeder design have shown better performance of mash diets over pellets.

Particle size

The purpose of feed processing through grinding or rolling is to increase the surface area of ingredients to improve digestibility. Feed processing has a direct effect on how well feed is converted to available nutrients. If the particle size is large, the amount of surface area is lower and the digestive enzymes' ability to break down ingredients is lower. However, feed that is ground too fine will bridge in bins/feeders and decrease feed intake resulting in poorer feed efficiency. A target for optimum particle size is between 600-700 microns for grains that are being ground. For every 100 micron decrease in particle size from 1200 to 400 there is an improvement in feed conversion of 1%. As an example, if our current feed conversion is 3.20 with an 1000 micron particle size and we are able to decrease the micron size to 600, the new feed conversion will be 3.07 (3.2 X 0.96). The decrease in particle size by 400 microns will drop feed cost by \$2.60/pig (\$65 X 4%) using current ingredient costs.

Frequent particle size analysis is required to ensure optimum feed:gain. Some commercial labs use the 13 screen analysis. However, this analysis is expensive (the equipment costs \$18,000) and most often requires off-site measurement and time delays for best screen and hammer management. A simple and accurate 3 screen test developed by Kansas State University can be done in less than 10 minutes and very cost effectively (equipment costs less than \$700).

Record keeping for hammer and screen replacement schedules is essential for optimum particle size in order to reach feed efficiency targets. Each mill's schedule will vary depending on the ingredients in the diet and foreign matter (sand, small rocks, etc.). In addition, some hammers and screens are more durable than others and can be compared through this collection of data. You can only manage what you measure.

Pig market weight

As a pig grows, the amount of feed required for daily maintenance increases. Bigger pigs require more feed to maintain their weight. The formula used to calculate the digestible energy (DE) used for maintenance is (Body Weight)^{0.75} X 110kcal (NRC). If we use a finisher diet example that contains 3.2Mcal/kg of DE, the feed required for maintenance is 1.25kg for a 120kg pig and 1.00kg for a 90kg pig. Feed:gain targets increase with heavier carcasses as shown in Table 2.

Table 2: Shipping weight effect on feed:gain.

Shipping Weight	Carcass Weight	Feed:Gain
114	90.1	3.07
116	91.6	3.10
118	93.2	3.14
120	94.8	3.19
122	96.4	3.23
124	98.0	3.28
126	99.5	3.33

Energy level in the diet

Pigs have been genetically selected for efficient lean growth for many years. A result of this selection process has been the slow decline in voluntary feed intake of the pig. The pigs' ability to grow well in the grower stage is restricted by its capacity to eat. Diets that provide higher nutrients to the grower pig will improve daily gain and feed efficiency. This was first observed by Campbell and Taverner in 1986. (Table 3)

Table 3: Energy effect on ADG (22-50kg)

DE Mcal/kg	3.25	3.47	3.61
Intake kg/d	2.19	2.17	2.05
ADG	847	898	913
Feed:gain	2.61	2.39	2.25

The weight range over which pigs respond to higher energy diets through increased ADG varies somewhat between genotypes and gender but the pig's improved gain response to higher energy diets has continued into heavier pig weights (Table 4).

continued on page 28

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Table 4: Effect of increasing diet NE content

Item	Diet NE, Mcal/kg			
	2.25	2.35	2.45	2.55
34-63kg				
ADG, kg/d	1.041a	1.065b	1.085b	1.083b
ADFI, kg/d	2.30a	2.33a	2.29a	2.18b
Feed/gain	2.21a	2.19a	2.11b	2.01c
63-91kg				
ADG, kg/d	0.989	0.985	1.006	1.004
ADFI, kg/d	2.94a	2.89a	2.84b	2.77c
Feed/gain	2.98a	2.93a	2.82b	2.76c
IOFC D0-56, \$/pig	43.2a	42.9a	42.5a	41.3b

As shown in Table 4, finisher pigs do not grow faster with high energy diets as they are able to consume more of a lower energy diet. Although feed:gain may be negatively affected, the larger gut capacity of the finisher pig allows the use of low cost ingredients in finisher diets, which is essential for optimum income over feed cost (IOFC).

Feed intake

Feed intake is the ultimate driver of efficient growth. However, feed intake in commercial barns has been shown to

vary by as much as 20% between barns. The more pigs eat, the faster they will grow. When pigs have an optimum daily gain, they spend fewer days in the barn and the amount of feed required for maintenance is reduced. For example, if a pig requires 290kg of feed to grow from 30-120kg and we can improve the feed intake and reduce the days to market by 10 days, the feed saved from fewer days of maintenance is calculated as follows: $(75\text{kg}) \cdot 0.75 \cdot 110 \cdot 10 \text{ days} / 3200\text{kcal/kg} = 9\text{kg}$. This means that the feed conversion could be improved to $3.12 - [(290-9) / 290] \cdot 3.2$ - from 3.2 when we decrease the days to market by 10 days.

Many factors affect feed intake including feeder design and feed delivery systems as discussed earlier. Other factors include the following:

1. Barn temperature

Pigs increase feed intake in response to cold temperatures and reduce intake in response to hot conditions. When barn temperature falls below the pigs' comfort zone feed is used to maintain body temperature and feed efficiency is reduced. Pigs will use about 5 g of feed per kg live weight for each °C below their lower critical temperature. The lower critical temperature of a pig (40-130kg) will vary between 10°C and 16°C depending on how dry the pig is and the type of flooring. When groups of pigs are kept in a draft-free environment, room temperature should be maintained at approximately 18-20°C when pigs enter the grow-finish barn (approximately 25 kg) and it can be reduced to 15°C as pigs approach market weight. Too often barn temperatures are too warm for finishing pigs. As barn temperature increases, feed intake will decrease at a rate of 35g/day/°C between 15 and 20°C and 75g/day/°C between 20 and 30°C. The effect of increasing barn temperature is more pronounced as pigs get older and their space requirement is higher.

2. Moving and mixing

In general any management practice that disrupts the social hierarchy of a pen will depress feed intake (ADFI) by as much as 50% for 4 or 5 days and may influence overall performance as shown in Table 5.

Table 5: Influence of moving and mixing pigs on performance (95-115 kg)

	Control	Relocated	Relocated/mixed
ADG, g/day	940	850	770
ADFI, kg/day	3.40	3.17	3.10
FCR	3.62	3.73	4.03

Iowa State University 1995

Not all pigs are affected equally so variation in growth rate is also increased when pigs are mixed. Keeping social groups intact as long as possible is essential for efficient growth. Studies at the University of Alberta using an electronic feeding system (FIRE) indicated that weekly weighing did not influence ADFI on the day of weighing or on subsequent days.

3. Space allowance

Crowded pigs are more prone to disease and leg problems. Feed intake and growth rate are reduced when pigs are crowded.

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Prairie Swine Centre recommended space allowances as adopted from the Canadian Code of Practice for grow-finish pigs are shown in Table 6.

Table 6: Recommended pen floor space allowance for growing finishing pigs

Weight, kg	Fully slatted		Partial slatted		Solid bedded	
	m ^{2b}	ft ^{2c}	m ^{2c}	ft ^{2c}	m ^{2d}	ft ^{2e}
20	0.34	3.6	0.38	4.1	0.43	4.7
50	0.48	5.1	0.53	5.7	0.61	6.6
70	0.60	6.4	0.66	7.1	0.77	8.2
90	0.70	7.6	0.78	8.4	0.91	9.7
110	0.80	8.7	0.90	9.7	1.03	11.1

^b Floor space to maximize growth rate and feed intake = 0.034 m² x BW^{0.0667}

^c Floor space to maximize growth rate and feed intake = 0.039 m² x BW^{0.0667}

^d Floor space to maximize growth rate and feed intake = 0.045 m² x BW^{0.0667}

^e Convert from m² to ft² multiply by 10.764

These space allowances do not maximize kg of pork or revenue per square foot, these will be system dependent. For pens containing large numbers of pigs, space allowance can be reduced by up to 10%.

4. Water availability

One of the most important factors affecting feed intake is having a consistent supply of water at all times. Water flow rate should be at a minimum of 1.5 litres/min for growing pigs and 1.5 - 2 l/min for finishing pigs, especially in the summer months when consumption increases by up to 40% due to warmer temperatures. Water nipples need to be adjusted to pig shoulder height, to provide easy access. For drinkers the recommendation is 15 pigs per nipple drinker and 20 per cup drinker.

Grain moisture

All ingredients contain some moisture. However, the amount of moisture varies between suppliers and from year to year.



Jim Gowans, one of the founders of the workshop, demonstrates a 3-screen device for measuring feed particle size

What are higher levels of moisture worth when buying ingredients? If we use wheat as the example ingredient and assume that 14% moisture is considered dry and acceptable for all ingredients in grow/finish diets. If we assume a feed conversion of 3.2 and use a decrease of 4% moisture, the expected feed conversion using drier grain will be 3.2 X 86/90 = 3.06. If we use the above \$65/pig ingredient cost with 14% moisture grain, the lower moisture grain will reduce this cost to \$62.15/pig – a \$2.85 reduction. All grain should be moisture tested before unloading. Dry grain is easier to grind and more cost effective in improving feed conversion efficiency.

Conclusions

Factors, such as feeder adjustment, feed delivery, ingredient processing, nutrient density, adequate water, barn temperature, social group management etc. all have a major impact on the pig's ability to use feed efficiently. Maximizing feed intake in the growing-finishing period is the key to maximizing ADG and improving feed:gain.

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Top ten ventilation design issues

With energy costs ranging from \$1 to \$8 per pig and the high cost of heating fuels and electricity adding to production costs, producers should pay special attention to the design of ventilation systems in their barns, advises engineer Ron MacDonald of Agviro Inc. Poorly designed systems will not only increase energy costs but may reduce pig performance, increasing costs of production significantly. He lists the ten most common problems seen in ventilation systems and explains how they can be avoided through correct design.

1. Winter fans

Winter ventilation fans are critical as they have to provide the minimum air flow, thereby retaining heat in the barn, while still removing contaminant gases such as CO₂ and H₂S.

If the fans that provide minimum ventilation are too large, they will over-ventilate and energy will be wasted, however, if they are too small contaminant gases may be unacceptably high.

“Designers tend to trust the fan volume data from the manufacturers, but that doesn’t take into account the dirty environment in the pig barn,” he says. “Many smaller fans are over-rated and only the BESS Labs manual (www.bess.uiuc.edu) should be used when selecting fans.” He says that it’s essential to purchase fans that have BESS certification so you know the actual throughput because fans of the same size vary considerably in their output and energy efficiency.

“Choose first stage fans that have a high Air Flow Ratio (AFR) because they are more stable under windy conditions,” MacDonald suggests. “Always ensure that the AFR is over 80. AFR is the air flow at 0.20” water pressure.” He notes that fans with a high AFR are not necessarily the most energy efficient but says that stability is much more important at low ventilation rates.

At low ventilation rates, wind effects are a potential problem. The “Venturi effect” of wind passing over the building can literally suck air through roof mounted fans, giving 5 -10 times as much air flow than required. “This can be overcome by fitting dampers on the fans and back draft shutters should always be fitted to secondary fans,” MacDonald explains. “Another

approach is to fit fans that have an air flow measuring device that automatically adjusts the speed of the fan to achieve a constant air flow.”

Fan position is also important in achieving a constant air flow in the building. “We used to think that fan position didn’t matter with negative pressure systems but now we advise that they should be sited no more than 50 feet from the nearest inlet,” he says. “The vacuum (negative pressure) drops off as you move away from the fan and that may lead to less air entering from the inlets furthest away from the fans.”

Energy efficiency of fans is important and must be taken into consideration during selection. “Efficiency is measured as cubic feet per watt at a water pressure of 0.2” and a figure of 7 is poor, 9 is OK and 11 is good,” MacDonald notes. “You need to have a high air flow but also good energy efficiency.”

2. Staging of fans

Stage one and two fans are commonly variable speed, but after that, fans tend to be operated on an on/off basis, with increasing numbers switched on as the room warms up. “We have used the ‘doubling’ rule for many years, which says that each new stage should not more than double the preceding total,” MacDonald explains. “However, this tends to be excessive for stage 3 and usually stage 4 fans and it’s only really effective for warm to hot weather fans. If there is too much air coming in at one go in the medium ventilation range, it creates temperature variation.”

To avoid this problem he suggests making the middle range fans operate on variable speed if the controller is able to do it or installing a damper to reduce the flow of stage 3 and 4 fans in spring and fall.

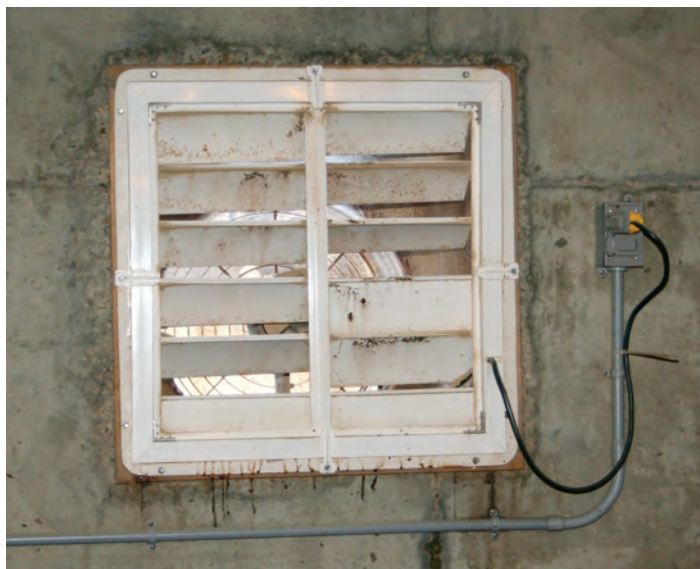
3. Inlet type and quality

Inlets are available in three main designs: the I-shape, which means the baffle is parallel to the ceiling when fully closed; the V-shape, which means that the baffle is at about 45° to the ceiling and a hybrid of the two, usually a curved baffle. “I-shapes result in the air flow pattern in the barn changing as it opens, which is undesirable,” says MacDonald. “This may lead to drafts in the lying area and result in poor dunging behaviour.” He recommends V-shaped inlets because they keep air flowing along the ceiling, allowing cold incoming air to warm up before it reaches pig level. “Also, some models of V-shaped inlet will drop wide open to deliberately create a draft in the lying area during hot weather,” he adds.

All inlets require a gap between the housing and the baffle, but if this is too large it leads to excess leakage, MacDonald warns. “Some inlets are really awful in this respect,” he says. “When the baffle is closed in cold weather, virtually all the air comes in at the gap, straight into the pen and sometimes in the opposite direction to that desired!”

4. Inlet location and control

Location of air inlets is critical to ensure the correct air flow pattern. “Wherever possible, inlets should direct air across the ceiling and then down a wall to create a ‘figure 8’ pattern across the room or a ‘half 8’ pattern in the case of a single row of inlets,” MacDonald advises.



Backdraft shutters should always be fitted to secondary fans

Obstruction of air flowing from the inlet is a common problem, he notes. "Builders put in all the equipment, plumbing, electricians and feed conveyors and then think about where to place the inlets," he says. "If incoming air flow is obstructed, it will block air flow and create an undesirable air distribution," he says. "Ribbed roof sheets will affect air flow, but this can be overcome by fitting a sheet of plywood downstream of the inlet. Also air obstruction by feed pipes is a common problem and they should be located no more than 8 feet from an inlet."

In gestation, MacDonald recommends having one pair of inlets for each double row of sows so that every sow has the same environment. "Also, don't site inlets above farrowing crates, because that may lead to condensation and dripping in cold weather," he says. "If inlets are placed above the creep area and are incorrectly set or they leak, this can create drafts."

5. Heating

Many heaters are oversized, usually because the designer wants to avoid calls about "not enough heat", believes MacDonald. "Some heaters can be downsized by purchasing a smaller nozzle," he notes. "Check with the manufacturer because usually the sales rep will be unaware of this or not be able to deal with it."

Forced air heating is low cost but creates problems because the heaters consume oxygen in the barn and produce CO₂ and water, exactly the same products that the ventilation system is trying to remove. "The minimum ventilation rate needs to be three times higher to compensate for this so box heaters can come back to bite you!"

Maintaining the correct temperature in the creep area is essential, stresses MacDonald. "You need to achieve 37°C at birth and the only way to measure this is with an infra-red thermometer," he explains. "If it's too cold, piglets move nearer the sow and this increases the risk of overlaying, but if it's too hot they move away from the heat source and this also leads to more overlays." He suggests that the temperature at piglet level is measured regularly and adjustments made manually to the heat level as piglets grow. Also, he says, the room temperature needs to be stable in order to maintain a constant temperature in the creep area.

"Infra red lamps can be adjusted in height using the pigs' lying behaviour as a guide," he says. "There is also a lamp – the

Retrolite Comfort Zone 20 – that maintains a temperature of 37°C at a height of 20 inches."

MacDonald advises the use of heat pads because they use one-third the power of lamps. However, he warns, failure rates are high. "Don't stand on them, because that is harmful. Also keep an eye on surface temperature if you use a heat lamp over the pad, because overheating can damage them," he says. Hot water systems are worth considering, especially on larger units where the capital cost is similar to other alternatives.

6. Pre-heating

Many pre-heat systems result in a loss of warm air into the attic, MacDonald warns. "You need to have a static pressure in order to avoid leakage," he says. "I advise installing a static pressure gauge from the attic to the preheat duct to ensure it is set properly."

Preheat settings are almost always too warm, and are often set that way to prevent condensation in the ducts. The ducts should be insulated to enable the temperature to be reduced, MacDonald says. Mixing in the preheat system is also a problem and a mixing chamber can be built to eliminate this problem.

7. Cooling

The first stage of cooling is by flowing air over the pigs. "Air inlets that can drop open are essential for low cost wind chill effect cooling," says MacDonald. "Circulation fans can also be used but these come with an energy and capital cost."

Further cooling can be provided by installing sprinklers for penned animals and drippers for stalls and crates, he suggests. "They are very effective, easy to install and manage, use minimal water and require virtually no maintenance," he explains. "Many producers are installing high pressure mist cooling but this is not necessary and is expensive to install and operate."

8. Controls

A ventilation controller should be able to deal with the number of fan and heater stages required, but it never hurts to have one or two extra stages to give flexibility for future use, says MacDonald. It should be able to control the first two stages of fans at variable speed and cope with two stages of heat. Also, control for inlet adjustment, maybe two for large gestation barns, is required, he

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says. However, he warns against overcomplicated controllers. "Control technology is sky rocketing," he says. "It is easy to buy a controller that will do everything but you wind up with features that you never use and these tend to complicate the management."

People need to understand how the fans, heaters and coolers work to create the right environment, he believes. "I've never seen the same controller set up the same, but they should be. A set of standard operating procedures should be used to ensure this happens."

9. Soffits and attics

Any warm and wet air getting into the attic space will cause deterioration of the structure, such as insulation, rafters and especially metal fixings and gusset plates. This may occur because ceiling mounted inlets are not properly sealed, so regular checks and replacement of silicone sealer is recommended. Another possible source of "dirty" air getting in is when wall mounted fans exhaust warm air, which is then drawn up through the soffit into the attic. This can be a particular problem during cold weather due to condensation and can be avoided by having doors on the soffit and closing the ones close to the fans.

In hot weather, insulating under the roof sheets, which is usually done in North America except on the Prairies, will help to reduce condensation but, more importantly, keeps the interior of the building cooler in hot weather. Roofs should also include ridge-mounted vents to allow "dirty" air to escape if it enters the

attic space. Solar gain – the heating effect of the sun – can be reduced by using white roof sheets or painting the roof white, which again helps to keep the barn cooler.

10. Barn leakage

Leakage of air into the barn in a variety of ways can result in undesirable air patterns and drafts. Some possible sources of leaks are:

- The air inlet not being sealed at the joint from the ceiling to the inlet housing
 - The air inlet leaking out of the sides when air flow is low. When minimum ventilation occurs, air inlets are closed quite a bit. In some cases, the side air leakage can exceed the air emitted from the front of the inlet
 - The joint from the stud wall to the sill plate and ceiling/wall sheathing joints leaks. This can be as much as 50% of the total air flow into a room considered "tight". Clearly leaky ones can have an even greater impact
 - The door to the common service hallway has a poor seal around the jamb and no sweep seal on the floor opening
 - Backflow occurs via leaky shutters on fans. Summer fans should have insulated covers placed as soon as practical in the fall. Stage 2 fans will benefit from a winter back draft shutter
- MacDonald recommends that all possible leakage areas are evaluated using smoke pencils and sealed as well as possible. Regular inspection of the joint sealant is also important due to the wear and tear from pressure washing, he says. **≡WHJ≡**

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Individual sow feeding stalls offer simple but effective system

One of the major benefits of sow stalls is the ability to feed each sow individually, according to body condition and stage of pregnancy. Group housing systems have varying capabilities for individual feeding and this factor needs to be considered when choosing which method to use. Perhaps the simplest approach to controlling feed intake and protecting sows from bullying while feeding is to use individual feeding stalls with a locking rear gate. These have been used in traditional straw yard systems in Europe for at least 50 years, typically with a group size of 5-10 sows. The system comprises a bedded lying area providing about 15 ft²/sow, a solid floored scrape-through dunging area and then the feeding stalls. Pen dimensions are primarily determined by the width of the feeding stall, which is usually 20ins. so that for a group of six sows the pen width would be 10ft, making the lying area 9ft deep. Overall space requirement relative to other systems is high, at 36 to 40 ft²/sow, making the capital cost of a building quite high. Also, feeding is usually by hand, making it rather labour intensive. However, the system can be easily constructed using farm labour, which made it very popular in the 1960s and 1970s. Then, as average unit size grew, this labour-intensive method started to be replaced with new methods of more automated group housing.

constrained by the feeder dimensions. It also reduces the cost significantly by utilizing one feeder for up to 8 groups of sows. The building design is simple, with straw bedded yards, usually holding sows bred within a week of each other, a scrape-through dunging area and then the row of feeders. Producers using the system say that it is easy to operate, has no complicated equipment and requires little maintenance.

The major drawback in some people's eyes is the higher labour input compared to other methods. Although automatically filled feed dispensers are used, the same amount of feed has to be dispensed to each sow in the group because sows often use a different feeder at each feeding session. Therefore, the operator may have to give additional feed by hand to individual sows according to body condition. Also, because there are multiple groups of sows using the same feeders, the operator must be present over an extended period of time to feed all the sows. If locking rear gates are used, he must unlock the gates to release the sows after feeding, then place the sows back in their pen before

continued on page 34

Cafeteria feeding popular in Denmark

Despite the advent of new methods, such as electronic sow feeding (ESF) and trickle feeding, many Danish producers have opted for a system adapted from the old sow yards in order to benefit from the simplicity and reliability at the expense of some extra labour input and the relatively high initial cost. They developed the "Cafeteria" system, which has a row of individual feeders that is used by each pen of sows in turn. This design allows sows to be housed in larger groups because the layout is not



A bedded free access stall system in Denmark



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letting another group out to feed. The dispensers are filled while one group of sows is feeding, ready for the next group.

Klaxon signals eating time

Another apparent disadvantage of the cafeteria system is the stress caused by making sows wait for feed while they watch other groups go to the trough. However, having watched this system in action, it is clear that sows become conditioned to feeding at a particular time and don't get excited until very close to the time they are released. This conditioning is quickly developed providing the operator follows a specific routine. At one farm I visited, the operator used a klaxon to signal feeding times for each group – one blast for the first group, two for the second group and so on. It was amazing to watch the reactions of the sows; those that were not due to be fed didn't respond at all. Certainly, if there is any stress, it isn't reflected in the performance results, which appear to be similar to other types of sow housing.

Handling of solid manure and straw requires a significant labour input, but hard manual work is avoided by the use of machinery. In addition, using straw adds cost, too. Notwithstanding the list of disadvantages, the system is now widely used in Denmark because of its simplicity and reliability, although much less so in other European countries.

Slatted floors save space

Another method involves combining individual feeding stalls with a slatted exercise and dunging area, a system that has been adopted by producers in Denmark and a number of other countries. Generally termed "free access stalls", this method saves space by utilizing the feeding stall as a lying area. It requires each sow to have its own stall, which makes the system rather expensive, despite the lower overall space requirement compared to the cafeteria system. The free access stalls must have a mechanism that locks the rear gate when the sow is in the stall but allows her to release it as she backs out, otherwise sows may attempt to enter another sow's stall at feeding time. Layouts for free access stall systems usually involve two rows of stalls backing onto a common dunging area. Group size may range from 10-30 sows per pen.

Slatted free access stalls reduce labour requirement dramatically, but have some disadvantages for the sow. First, although free to leave the stall and roam in the dunging area, sows



A slatted free access stall system (photo courtesy Chore Time)

often spend the majority of their time locked in the stall, because there is no bedding to root in. While supporters of sow stalls always suggest this is because the sow feels protected in the stall and is happier there, the real reason is the sterile outside environment with a lack of things to do. The second drawback is the potential for foot and leg injuries in slatted pens, especially after sows are mixed. Very high quality slats with rounded edges can help to minimize this problem, but there is no doubt that injuries are significantly higher than in bedded systems.

Both dry feed and liquid feed can be used in free access stalls, usually dispensed automatically. Where dry feed is given, sow body condition can be controlled by adding additional feed by hand, but this is not possible with wet feeding. Alternatively, sows can be grouped by condition at the time of mixing and the feed level adjusted for the group as a whole.

Other aspects of management vary between the cafeteria system and free access stalls. In the latter system, where sows spend a lot of their time in the stalls, jobs such as scanning and vaccination are easier. Because each sow has its own stall, they can be locked in at feeding time and the particular task carried out when convenient. In a cafeteria system, where several groups use each set of feeding stalls, the tasks have to be carried out on sows while they are in the lying area, which is less easy.

Conclusions

These two systems using individual feeding stalls offer very straightforward options for housing groups of sows that are easy to understand by producers and have a low maintenance requirement. Those with a phobia about electronics are especially drawn to them! The systems can be built with either solid or bedded floors and can accommodate a range of group sizes, with about 40 being the practical maximum in most cases. They are especially suitable for small-to medium sized units, typically up to 1000 sows. Their primary disadvantages compared to other alternatives are the higher labour input and relatively high capital cost.

WHJ

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Keep an eye on wean-to-estrus intervals, advises US expert

Attention to the management factors that influence weaning to estrus interval can help to improve farrowing rate and litter size, according to a US expert in swine reproductive physiology. If a herd has an extended rebreeding interval, then there are several areas associated with lactation management that should be examined, including lactation feed intake, lactation length and split weaning procedures, says Professor Billy Flowers at North Carolina State University.

“During the lactation period, the reproductive organs have a chance to recover from their previous pregnancy,” he explains. “It is well established that levels of reproductive hormones in the brain that stimulate estrus and ovulation are very low immediately after farrowing. Most research studies have shown that between 12 and 16 days are required for the levels of these hormones to be replenished.” Lactation plays a critical role in this recovery process because the suckling action of the piglets serves to keep the sow’s brain in a state of quiescence and the secretion of the reproductive hormones at very low levels, Flowers notes.

“At weaning, the suckling-induced inhibition of these hormones is gone; if they have been replenished sufficiently, then estrus and ovulation should occur within four to eight days,” he continues. “If they haven’t, then the rebreeding interval will be extended or, perhaps, a post-weaning estrus may not occur at all.”

From a management perspective, weaning-to-estrus intervals present the first opportunity for producers to evaluate how well sows have recovered from their previous pregnancy. It also is a good opportunity to determine how well management during lactation has aided this process. “The general assumption is that if sows return to estrus within eight days after weaning, then their recovery is complete,” Flowers suggests. “If the rebreeding interval is longer, then their recovery wasn’t quite finished when weaning occurred and their subsequent reproductive performance may be compromised.”

A recent analysis of adjusted farrowing rates and number of pigs born alive based on a farm’s average weaning-to-estrus interval seems to support this assertion (Table 1). Farms with weaning-to-estrus intervals of less than eight days averaged between 10.9 and 11.0 pigs born alive. In contrast, farms with weaning-to-estrus intervals of eight days or more averaged about 0.5 pigs less per litter.

“The relationship between weaning-to-estrus intervals and farrowing rate was less clear,” adds Flowers. “However, there was a general trend for farrowing rates to decrease as the weaning-to-estrus intervals increased.”

If a herd has an extended rebreeding interval, then there are several areas associated with lactation management that should be examined, he advises. The most obvious is feed intake during lactation. It has been well documented that nutritional management during lactation has a significant impact on subsequent reproductive performance of sows.

“Lactation is a period in which the sow is under an enormous amount of metabolic stress,” Flowers points out. “It has been estimated that about 75% of the nutrients that a sow consumes during peak lactation goes to support production of milk for her

litter. Consequently, it is quite common and actually normal for sows to have to mobilize protein and fat to meet the metabolic demands of lactation.” When this happens, the sow loses weight and body tissues. If she loses too much body condition during lactation, her subsequent reproductive performance can suffer. As a result, rebreeding intervals, subsequent farrowing rate and litter size can all be affected. “Anything that can be done to increase feed intake during lactation should help improve weaning-to-estrus intervals,” Flowers stresses.

Another area that can influence the weaning-to-estrus interval is lactation length. As mentioned earlier, the brain needs time to replenish reproductive hormones after farrowing. “If sows are weaned before these levels are established, then suboptimal amounts are released,” explains Flowers. “This creates a situation in which sows would probably show a delayed estrus and ovulate a lower-than-normal number of eggs.” Recovery of the brain and replenishment of these hormones is also sensitive to the metabolic demands of lactation, he says. Consequently, if excessive amounts of body tissue are lost during lactation, then recovery can take longer than the normal 12 to 16 days. Collectively, lactation lengths of less than 16 days often are not conducive for optimizing the subsequent reproductive performance of sows.

Finally, split or partial weaning strategies can contribute to problems with extended rebreeding intervals, Flowers believes. “It is important to remember that whenever pigs are removed, the suckling stimulation is reduced. If enough pigs are removed, there could be a high enough reduction in the suckling intensity that the suppression of the endocrine system caused by suckling is removed and the sow may begin normal reproductive activity.” He says that what happens in many situations with split weaning is that the largest pigs in the litter are weaned two to three days before the rest of the litter. If enough piglets are removed from the sow at this time, then from a physiological perspective, she thinks the entire litter has been weaned. If this occurred on Day 16, then the reproductive consequences are similar to those that occur with early weaning.

Management is the key to maximizing wean-to-estrus intervals, concludes Flowers. “Keeping the needs of the sow herd as a top priority will help you make the necessary changes to improve this important production parameter.”

Table 1: The effect of weaning to estrus interval on subsequent reproductive performance

Weaning-to-estrus interval (days)	Farrowing rate (%)	Number of pigs born alive
< 5.9 (21 farms)	84.0	11.0
6.0 – 6.9 (40 farms)	83.9	10.9
7.0 – 7.9 (18 farms)	82.0	10.9
8.0 – 8.9 (13 farms)	80.8	10.4
9.0 – 9.9 (6 farms)	79.3	10.3
> 10.0 (8 farms)	74.7	10.4

Antibiotic-free pork production can be profitable

As the market for pork becomes more and more differentiated, retailers and processors are looking for opportunities to meet the demand from consumers for products which meet their aspirations in terms of welfare, food safety and the environment. This trend is well-developed in Europe where there is a wide range of pork categories such as outdoor reared, antibiotic free and organic. Now antibiotic-free pork production is increasing significantly in the USA. The question for producers is whether any loss in production efficiency and the additional costs involved are offset by the price premium received. European experience suggests that the additional cost per pig is in the region of \$5.24. However, a paper presented at the recent American Association of Swine Veterinarians by Darwin Kohler, James Schneider, and Chad Bierman demonstrated that removal of antibiotics on one farm did not lead to a significant loss of performance.

“The use of antibiotics in livestock feeds is meeting with increasing opposition,” note the authors. “The controversy revolves around the level of antibiotic fed to livestock for non-therapeutic use, which in turn causes an increase in bacterial resistance in humans and known allergic reactions or toxicity.” The consumers of meat products today are asking for a more ‘natural’ food product.

European opposition has been stronger than in the US. A ban of over-the-counter antibiotics was implemented in Sweden in 1986, Norway in 1992, Finland in 1996, Denmark in 1998, and Poland and Switzerland in 1999. Current EU regulations state that antimicrobials used in either human or in veterinary therapeutic medicine are prohibited from use as feed-additive growth promoters in livestock.

Based on experience in Sweden and expert opinions, the likely performance effects of removing antibiotics and the cost implications are shown in Table 1.

Table 1: Technical assumptions of antibiotic ban

Trait	Most likely change
PSY	Decreased 1 pig
Weaning age	Increased 1 week
Wean to 25kg	Increased 5 days
FCR 25-114kg	Increased 1.5%
Pre-wean mortality	Increased 1.5%
Grow/finish mortality	Increased 0.49%
Net additives cost	Increased \$0.25/pig
Total cost/pig	Increased \$5.24/pig

Today, one form of antibiotic free (ABF) pork production is beginning to be used in the United States, note the authors. It is based on no birth-to-market antibiotic use of any kind, no growth promotants, no natural or artificial hormones, no ionophores, no animal proteins and no animal by-products.

“Can antibiotic free (ABF) pork production be more successful in the United States than indicated in Table 1?” they ask.

Case study farm shows little effect on performance

The case study reported in the paper is a 1,000-sow farrow to finish conventional confinement system. This system has been closed to live animal introduction since 1996. Management was interested in pursuing ABF pork production. Small amounts of antibiotic had been used or needed in their herd, and a premium was being offered for antibiotic free pork. Pigs are vaccinated for *Mycoplasma hyopneumoniae* and the herd is PRRS stable. Gilts are raised internally and there is an off-site boar stud. Since December 2004 no antibiotics, growth promotants, or animal by-products have been used in pigs from birth to market. The farm maintains records of inoculations, illnesses and injuries, treatments, etc. Very few pigs require treatment. If prohibited medication is used in treatment, the pigs are marked for identification and are sent to conventional markets. “Products such as zinc, copper, probiotics, enzymes, botanicals, enzymes, mannan oligosaccharides, egg antibodies, oil of oregano, and organic acids are allowed to be used in place of antibiotics in the ABF program,” explain the authors. “However, these products are not necessary in this herd and are not in use as replacements for antibiotics.”

Table 2 shows the sow herd performance before and after ABF. The ABF program does allow for antibiotic usage in the sow herd. Antibiotic usage in the sow herd changed little over the six-year period. Comparisons of traits between the ‘before ABF’ and ‘after ABF’ periods are both positive and negative and show no consistent advantage to the use of antibiotics. Pigs had received an antibiotic at birth before ABF. The expectation would be an increase in pre-weaning mortality. An increase from 8.2% to 9.9% did occur but was not reflected in pigs weaned per mated female per year. Adjusted 21-day litter weaning weight is 13 pounds (5.9kg) heavier after ABF with an increase in pounds weaned per sow per year of 8%. Only pre-weaning mortality was in agreement with the negative predictions shown in Table 1.

Table 2: Sow herd performance before and after ABF production

	Before ABF	After ABF
	Jul 02 – Dec 04	Jan 05 – Jun 07
Average total pigs/litter	11.4	11.4
Average pigs born alive /litter	10.4	10.6
Pre-wean mortality (%)	8.2	9.9
Average age at weaning	18.2	20.5
Farrowing rate	93	91.6
Litters/mated female/year	2.56	2.52
Pig wnd/mated female/year	23.8	23.8

Table 3 shows the herd's finishing performance before and after ABF. Although previous reports show poorer performance with ABF production, few differences are noted here. Only feed conversion showed a noticeable drop in performance.

Table 3: Finishing performance before and after ABF

Grow finish trait	2002 – 2004	2005 – 2007
Av. Lwt. of pigs entered (kg)	18.2	21.1
Av. Lwt of pigs sold (kg)	114.5	118.4
Av. days to market	114.6	115.2
Av. daily feed intake (kg/day)	2.22	2.36
Av. daily gain (g/day)	839	839
Feed conversion ratio	2.65	2.69*

*Feed conversion adjusted to common entry and sale weight

The only significant difference is in FCR and the authors calculated this to add \$0.68 to production cost. Finisher death loss was slightly higher after ABF 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 saving after ABF. Pigs were no longer sold grade and yield during the last three years therefore carcass yield and percent lean were assumed to be unchanged.

ABF premium gives bigger margins

Additional ABF premium was calculated as the difference received in harvest price by this herd versus other similar herds and selling grade and yield to the same market that this herd had been selling to before ABF. Using this method, the additional ABF premium was estimated to be \$4.26 per head in 2005 and 2006. "The ABF premium tends to inversely fluctuate with the base grade and yield price and is much higher today when market prices are lower than in the previous two years, note the authors. "Current additional ABF premium for November 2007 is \$16.62 per head." Overall, taking the differences in performance and costs into account, there was a net average benefit of \$7.89 for ABF production compared to the period when antibiotics were used.

Little or no differences in production numbers were observed on this farm. The increase in cost of production has been shown to be \$0.32 per head. "Success is attributed to the use of appropriate genetics, maintaining a closed herd and maintaining a high level of biosecurity to keep pathogens out," say the authors. "Good management in areas of proper husbandry, nutrition management, environmental control, prompt treatment or removal of sick pigs and attention to detail is essential." Not only does this case study illustrate the feasibility of ABF production, but it demonstrates significant profit potential in today's niche markets, they conclude. **≡WHJ≡**

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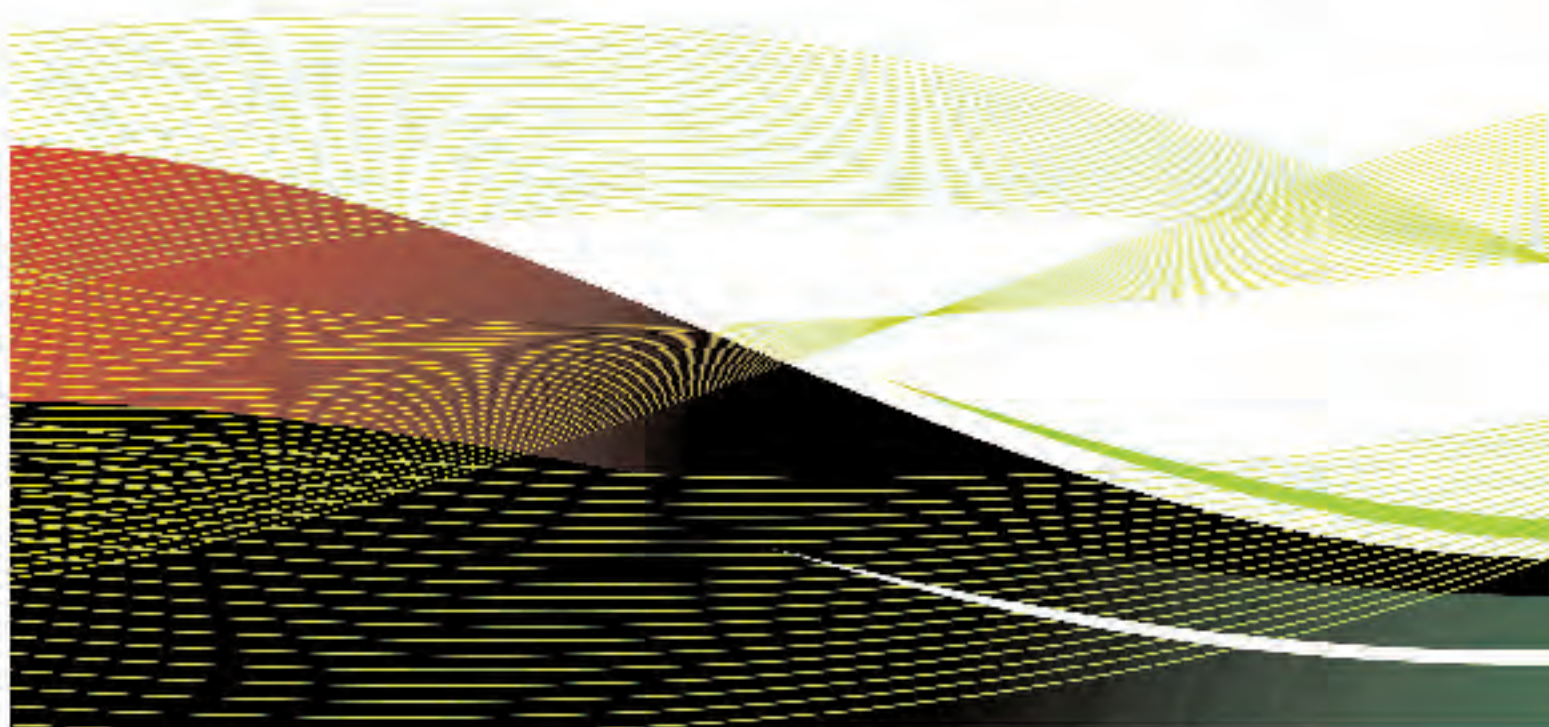
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Danes reduce environmental impact of pig production

Danish pig producers are reducing the impact of pig production and processing on the environment in a range of ways which reduce pollution, make better use of inputs and cut greenhouse gas emissions, according to a recent report from the Danish Association. With a land area of just 43,000km², which is about one-fifteenth the size of Alberta, and a population of 5.5 million, the country is also home to 13.5 million pigs. It's hardly surprising, then, that pig production has been under pressure from an environmental viewpoint and that it has to contend with some of the most stringent legislation in the world.

Alternative energy sources

Denmark is one of the world leaders in alternative, renewable energy sources, notably wind power and bio-digesters. Wind turbines from the Danish company Vestas produce 40 percent of the world's wind energy.

Recycling of by-products from the food industry is also increasing. Animal slurry and other waste food products are collected and converted into energy at biogas plants. In 2008, the cooperative company, Daka Biodiesel, started producing environmentally friendly biodiesel based on waste fat from meat processing plants. Biodiesel can be satisfactorily incorporated into transport fuels and oil for heating. The company has the capacity to produce 55 million litres of biodiesel annually.

In 2005, energy from renewable sources accounted for 17% of Denmark's overall energy consumption and the target for 2025 is 30 percent. Biomass from agriculture, forestry, the food industry and household waste fuels 70 percent of alternative energy production. Bio-digester technology is well advanced and the world's largest biogas pilot plant has recently been built at Foulum in Jutland.

Ten years ago, the Danish island of Samsø, home to 4,300 inhabitants and famous for its tasty potatoes, set the ambitious goal of relying 100 percent on renewable energy. Today this has been achieved.

Making better use of manure

Crop producers in Denmark have progressively substituted significant amounts of artificial fertilizer by increasing their utilization of slurry from pig farms on arable land. Through this more natural recycling of nutrients, the loss of nitrogen from Danish crop farming to the aquatic environment has fallen by almost 50 percent in recent years. Likewise, phosphorous losses have been reduced by 42 percent since 1985. Also, a 30 percent reduction in ammonia evaporation has been achieved over the same period.

Danish farmers have to adhere to rigorous national legislation concerning the environment. Every farmer has to prepare annual accounts, documenting the number of animal units, farm area and amount of slurry produced. These accounts must be formally approved by the authorities. Following the Danish tradition for openness, this information is publicly available on the Internet.



Biogas digesters are helping to reduce greenhouse gas emissions from Danish livestock production

In addition, Danish crop producers may only spread a maximum of 140 kg of nitrogen in the form of pig slurry per hectare of land, compared to 170 kg in other European countries.

The Danish authorities employ one of the world's strictest agricultural control systems.

In the environmental area, unannounced inspections are carried out to check land use, feed mixtures, fertilizer accounts, distance to watercourses, management of slurry and chemicals, as well as health and safety conditions.

Greenhouse gas emissions reduced

Overall, the Danish pig industry's 'green' balance sheet shows a net reduction in emissions of 17 percent per kg pork produced since 1992. Producing pork, like any industrial or agricultural production, has an environmental impact including the emission of greenhouse gases. The production of feed crops in particular, when nitrogen is transformed by microorganisms in the soil, is a significant source of emissions. In addition, the handling, storage and utilization of slurry and energy consumption during processing at the slaughterhouse are also contributors to greenhouse gas emission. On the other hand, replacing artificial fertilizer in crop production with slurry from pigs helps balance the account, as it actually reduces the net level of emissions. This is because artificial fertilizer is produced using significant amounts of fossil fuels. Thus, through improvements in the utilization of pig slurry at the expense of artificial fertilizer in Danish crop production, the pig industry is helping in counterbalancing emissions from the other stages of the production chain.

There has been recent public debate in Europe about the level of greenhouse gas emissions caused by the transport of food products across borders. The term 'food miles' is sometimes used

to describe the climate impact of different foods. However, it has been shown that the distance travelled by particular foods is usually a very unreliable indicator of their overall environmental impact. For example, when pork is exported from Denmark to England, it can be demonstrated that less than one percent of greenhouse gas emissions are attributable to the transport of the meat between the two countries.

Part of the contribution towards reduced greenhouse gas emissions has come from improving the efficiency of feed utilization through genetics and nutritional changes. In Denmark, it takes an average of 2.69kg of feed to produce 1kg of pork, compared to 2.79 in the UK, 2.88 in Brazil and 2.93 in the USA. Less feed used means less greenhouse gas production. A reduction in protein (nitrogen) levels in the feed and the use of more synthetic amino acids has also helped in this respect. Similarly phosphorus levels have been reduced, which has contributed to the large reduction in phosphorus discharges achieved and improved the aquatic environment.

Manure treatment raises crop yields

Mogens Jensen finishes over 14,000 pigs each year and also has 500 sows with piglets on a separate farm. He grows winter wheat, winter barley, winter rape and perennial rye grass for seed on his farm, which totals 700 hectares (1,730 acres). Neighbouring Mogens' farm in fertile eastern Jutland is a vulnerable but protected area of forest with orchids and a famous 300-year-old oak tree attracting many visitors. Recently, he made a considerable investment in a slurry-acidification system, patented by a Danish company; Infarm. The system reduces levels of ammonia evaporation and odour and it increases the fertilizing properties of the slurry to the benefit of the environment.

"Of course I'm happy that I'm contributing to a better environment. But it is also sound economic sense, because the improved quality of the slurry helps raise crop yields. I see only advantages from this investment," explains Jensen. Every year, he also supplies 1,500 tonnes of straw to be converted to energy at the district heating facility, and his own pig housing is heated using bio-products from his fields.

Meat industry initiatives

The Danish meat industry was a pioneer in improving energy efficiency during the 1990s, introducing new technology and making concerted efforts to save energy. These endeavours continue today. Energy consumption by the Danish pig meat industry has been reduced by more than one-third in recent decades; significantly lowering emission of greenhouse gases. In the same period, the industry has also managed to reduce its water consumption by almost two-thirds.

The Danish pork industry, and indeed other sectors of the livestock and food industry, has ambitious plans to continue reducing its environmental impact, through extensive government funded research, commercial development of new techniques and application on the farm and in the processing plant.



Mogens Jensen installed a slurry acidification system, which has reduced pollution and increased the fertilizer value of the manure

Environmental progress in Danish pig production

Since 1985:

- 30% less nitrogen discharged per kg of pork
- 42% less phosphorus discharged per pig produced
- The level of excess phosphorus in Danish fields has been reduce by 59%
- 50% reduction in ammonia evaporation per kg of pork produced
- A five-fold improvement in the utilization of pig slurry as a fertilizer
- leading to a 50 decrease in the use of artificial fertilizers

Also:

- Since 1990, nitrogen leaching and run-off has been reduced by almost 50%
- Greenhouse gas emissions have been reduced by 17% per kg of pork since 1992

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Ageing improves pork eating quality

Ageing pork for a period after slaughter has been shown to improve meat tenderness, flavour, colour and juiciness, according to a recently published series of fact sheets on pork quality published by the British Pig Executive (BPEX), the industry’s producer-funded research and extension organization.

Ageing is the natural process of meat tenderization that occurs after rigor mortis. This is due to the action of muscle enzymes which break down some of the protein structures that “hold the meat together”, explains BPEX. Over the first 48 hours after slaughter, ageing causes tenderness to improve rapidly. The process of ageing is one of the main factors that affect variation in tenderness and can be improved further by ageing for up to 12 days.

Ageing pork has been shown to enhance pork flavour and overall acceptability to the consumer and, for pork loins, flavour and overall liking peak at about 9 days, according to BPEX. Ageing is also associated with improved water holding capacity of the muscle, which increases juiciness. However, muscles that are higher in connective tissue do not tenderize as well as those with low levels of connective tissue such as the loin. This is because the connective tissue proteins are not broken down by the enzymes after slaughter.

BPEX recommends that bone-in loins should be aged for a minimum of 7 days, or 14 days if they are bone-out. Ageing of legs is recommended for a minimum of 4 days. The ageing rate of meat increases at high temperatures; however to ensure meat safety, ageing is normally carried out at low temperatures (between -1.5°C and 4°C). Meat normally aged in vacuum packs should be carried out at, or below, 3°C to prevent *Clostridium botulinum* growth and toxin production, says BPEX.

A range of other post-slaughter treatments have been shown to affect pork eating quality. One method, pelvic (aitch bone) suspension dramatically increases tenderness, particularly of the high value leg muscles, compared to hanging carcasses from the achilles tendon (Figure 1). By hanging from the aitch bone the muscles of the leg are held in tension; this reduces any possible shortening and seems to accelerate the effect of ageing.

Pork is normally aged in vacuum packs, which not only controls bacterial growth but also reduces surface drying; this helps to reduce weight losses when compared to dry ageing (meat aged on the carcass or unwrapped pork). In addition, ageing in vacuum packs reduces trim losses and space requirements. Extended ageing (more than 12-15 weeks) in vacuum or modified atmosphere packaging (MAP) has been found to result in the development of unpleasant flavours and should be avoided, BPEX advises.

Dry ageing has some positive attributes, because dried aged pork seems to display enhanced flavour. However, this practice may be linked to shorter shelf-life, because of bacterial growth, and higher shrink and drying out losses, says BPEX.

In Europe, modified atmosphere packaging (MAP) is widely used in retail packs and this practice may impact pork eating quality. MAP is a technique used for prolonging the shelf-life of fresh or minimally processed foods. The air surrounding the food in the package is changed to another composition, usually

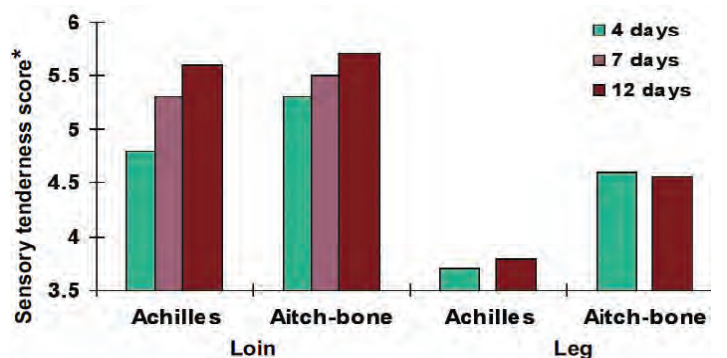
by replacing oxygen with nitrogen and/or carbon dioxide, which slows down deterioration of the product. However, for meat, high oxygen packaging is often used to help initiate “blooming”, the process whereby the colour of the surface of the meat changes after being cut up. The oxygen improves the colour of the meat by keeping the red pigment proteins (myoglobins) stable, making it more attractive to the purchaser for a longer period.

BPEX says that there is growing evidence that high oxygen packaging of meat results in tougher meat with poorer flavour. It is possible that this effect is related to oxidation taking place in the high-oxygen environment. While it has not been verified in pork, it is likely that the same effect will be apparent. BPEX therefore recommends that ageing for enhanced quality is carried out prior to MAP and that the time in MAP is minimized as far as possible.

The method used to chill the carcass also has a major effect on pork quality. Fast chilling systems, most widely used in North America, are designed to reduce the chilling time and the evaporative weight loss that occurs but they may have a serious detrimental effect in terms of meat quality, particularly texture. Rapid chilling can result in muscle contraction during rigor mortis, which gives rise to tougher meat. In addition, cold-shortened meat does not appear to benefit from ageing to the same degree so the meat remains tougher. However, high voltage electrical stimulation, in combination with rapid chilling, is an effective means of enhancing tenderness. The ageing rate is faster in electrically stimulated carcasses than in non-stimulated carcasses, resulting in optimum tenderness being achieved sooner.

Pork texture, and more specifically, tenderness, is one of the key characteristics determining consumers’ overall liking of pork. Measures to maintain or improve pork tenderness, such as electrical stimulation, pelvic suspension and aging will help to enhance the consumer’s eating experience and help to maintain pork as the world’s favourite meat.

Figure 1: The effect of post-slaughter treatment on muscle tenderness



* Increasing sensory tenderness score indicates increased tenderness

Colour detection system newest advancement in auto-sorting

By Jeffrey Mah BSc Ag., Envirotech Ag Systems, Ltd., Winnipeg, MB

Increasingly, pork producers are realizing the potential of large pen auto-sort technology to improve the overall profitability and efficiency of their grow/finish operations. While large pen auto sort systems have provided producers with the ability to reduce sort loss and labour requirements, and improve feed efficiencies and animal welfare, there have also been some inherent production obstacles.

Unlike conventional operations, routine animal husbandry practices - such as "walking the pens" looking for lame and sick animals, then having to sort these animals out - becomes increasingly difficult with large pen populations of 400 to 600 animals. Identifying these animals is the first chore, but removing or sorting them becomes an even bigger challenge.

A new colour detection system, CD-1, developed specifically for auto-sorting, now allows the producer to select specific animals by simply spray painting the back of the pig. The system uses inexpensive, readily available blue animal marking paint. The next time the blue-spray painted pig walks through the scale to eat and drink it will automatically be sorted

in a pre-determined direction to a holding pen.

The CD-1 technology has been developed with the commercial hog environment in mind; the enclosures are corrosion and water resistant and mounted with a protective steel cover.

Once the animals have been identified by the producer and enter the scale, the colour detection unit mounted above the pig looks for the blue colour contrasting off the natural skin tone. When the colour has been detected, the scale will sort the animals into the

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The CD-1 detects and sorts marked animals painted by the producer

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appropriate direction based on the programmed settings and will send the data back to the main computer. The sorting program will keep track of the number of specially sorted pigs across multiple scales and display the information for users back at the barn office. This new feature integrates seamlessly with the existing functionality of the auto sort system and will not interrupt the daily routine of sorting by weight for phase feeding or market sorting.

Larry Maendel of Blue Clay Hog Farms in Manitoba has recently installed six colour detection units, one for each of his auto-sort scales. The optional units are a must, indicates Larry. "I use it to select my gilts. I simply walk the room looking for animals of the right conformation and structure and paint their back. I set the computer to capture the first set of ten gilts weighing from 230 lbs to 250lbs and the second group of ten from 210 to 230 lbs." This ensures that the gilt pool is properly maintained.

Another practical application of the new system is selecting animals that require treatment and need to be placed in a sick pen. Levi Waldner of Blumengart Colony in Manitoba says nothing is 100%, especially in a hog barn, but the CD-1's he uses are accurate 98% of the time. "Within four to six hours we have all of our pre-selected sick pigs (lamers, ruptures, tail bites, or runty pigs) sorted. It saves us a lot of labour and provides us time to do our other chores".



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As in small pen production systems, removing or "cutting out" animals from large pens can be very stressful on the animals and physically demanding and dangerous work for the workers. The CD-1 technology helps to alleviate these concerns in large pen auto sort barns and will quickly become a staple, helping to improve on the current benefits of this type of production system.

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The nutritional value of expeller-pressed canola meal for grower-finisher pigs

R. W. Seneviratne, M. G. Young, N. Campbell, E. Beltranena, L. A. Goonewardene, R. W. Newkirk, and R. T. Zijlstra

Take Home Messages

Current feed costs stimulate efforts to incorporate alternative feedstuffs into swine diets. Expeller-pressed canola meal (EPCM) contains more residual oil than regular, solvent-extracted canola meal. As a result, EPCM contains much more digestible and net energy (NE) and less standardized ileal digestible (SID) amino acids than regular canola meal, and might be such an alternative feedstuff to consider for feed formulation. In western Canada, some EPCM is produced, but the majority of canola processing is conducted using solvent-extraction. In a commercial-scale study, growth was reduced slightly (3 g/d per 1% inclusion of EPCM inclusion) in diets formulated to equal NE and SID amino acids. Thus, inclusion levels of EPCM in swine diets should be targeted to ensure an expected growth performance. Depending on feedstuff prices, EPCM might be an attractive feedstuff for swine.

Introduction

Expeller-pressed canola meal (EPCM) is produced by conditioning canola seed with steam, followed by pressing the seed in an expeller to extract canola oil. Expeller-pressing canola seed is intermediate to solvent extraction and cold pressing in oil extraction efficiency. On a dry matter basis, EPCM contains 13% residual oil, whereas regular, solvent-extracted canola meal contains 2% residual oil and cold-pressed canola meal may contain around 20% residual oil.

The low energy content of regular canola meal has been well defined, and EPCM, to some extent, might fill a market need for a canola meal with a higher energy density. But for clarity, the main driver for canola seed production will be the oil market for human consumption, followed by market for biodiesel production, and finally, and last, markets for canola meal. But, with the gradual expansion of canola production and canola processing capacity in Western Canada, co-products from this value-chain deserve a closer look.

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Feeding expeller-press canola meal

To date, regular, solvent-extracted canola meal is considered a commodity feedstuff for swine. Depending on price to value and risk ratios, canola meal would be considered for feed formulation, although most formulators must place an upper limit on inclusion rate. For expeller-press canola meal, the information on digestible nutrient profile and potential effects on growth performance is lacking so that a proper price to value and risk ratio is hard to establish.

Nutrient profile

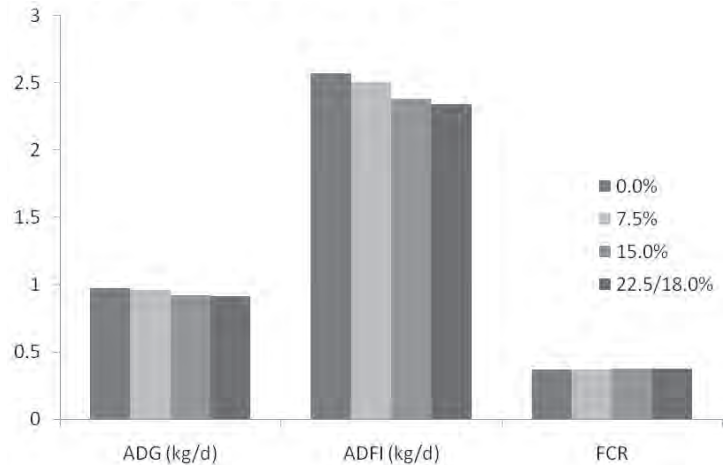
The specific sample of EPCM was sourced from Associated Proteins from St. Agathe, MB. The EPCM contained (in the dry matter) 38.5% crude protein, 13.3% ether extract, 2.24% lysine, 1.54% threonine, and 0.71% methionine. The EPCM was fed to ileal-cannulated grower-finisher pigs at the Swine Research and Technology Centre of the University of Alberta to measure energy and amino acid digestibility and calculate digestible energy and NE content and SID amino acid content. Apparent total tract energy digestibility was 75.0% and DE and NE content were 3.77 and 2.55 Mcal/kg (in DM), respectively. The SID amino acid content (in DM) was 1.77% lysine, 1.09% threonine, and 0.52% methionine. Bottom line, the measured nutrient values confirmed that the energy content of EPCM is higher than in regular canola meal and that the digestible amino acid content is slightly lower.

Feeding trial

A commercial feeding trial was conducted to determine the impact of feeding increasing levels of EPCM on the performance of grower-finisher pigs. The trial was conducted at the Drumloche Farms facility near Irma, Alberta.

In total, 880 pigs (25 kg bodyweight) housed in 40 pens with 22 pigs per pen were fed 4 dietary regimes with 0, 7.5, 15, and 22.5% EPCM. The feed was distributed using an automated feeding system. The 4 diets were formulated to equal SID Lys:NE and NE content during 4 growth phases (g/Mcal and Mcal/kg; phase 1 – days 0 to 25, 4.04 and 2.40; phase 2 – days 26 to 50, 3.63 and 2.40; phase 3 – days 51 to 77, 3.23 and 2.35, and phase 4 – days 78 to 90, 2.83 and 2.30). For phases 3 & 4, days 51 to 90, the 22.5% inclusion of EPCM was reduced to 18% due to decreased ADFI earlier. The diets contained wheat, barley, corn, wheat/corn DDGS and canola meal as other feedstuffs. Phytase was included in all diets.

Figure 1: Performance data



In all phases, feed intake was reduced by including EPCM into the diets, resulting in a reduction in feed intake for the entire period (Figure 1). For example, feed intake was 2.77 kg/d for 0% EPCM and 2.60 kg/d for 15% EPCM. Pigs fed 22.5% EPCM in the first 2 phases had their diets reformulated down to 18% EPCM during phases 3 and 4. In other words, even though the diets were formulated to equal energy content, pigs reduced their feed intake following high inclusion of EPCM in the diet. The cause for the reduced feed intake could not be established from the current data set.

In all phases, growth rate was reduced slightly by including up to 15% EPCM in the diet, resulting in a reduction in growth rate for the entire period. For example, growth rate was 978 g/d for 0% EPCM and 934 g/d for 15% EPCM. The reduced growth rate resulted in pigs taking longer to reach market weight; for example, pigs fed 15% EPCM reached slaughter weight 3 days after pigs fed 0% EPCM.

Feed efficiency or conversion was less affected by dietary inclusion of EPCM. For example, feed to gain was overall 2.73 for 0% EPCM and 2.68 for 15% EPCM, equivalent to a gain to feed of 0.366 for 0% EPCM and 0.373 for 15% EPCM. Carcass back fat thickness and loin depth did not change due to feeding EPCM.

Based on the growth performance data from this trial, growth was reduced slightly (3 g/d per 1% inclusion of EPCM inclusion) in diets formulated to equal NE and SID AA. Thus, inclusion levels of EPCM in swine diets should be targeted to ensure an expected growth performance.

Economics

At the time of the trial, feed costs per kg gain decreased by including EPCM into swine diets. Income over feed costs was \$2.00 per pig higher with 15% EPCM included into swine diets. This income does not consider the extra time in the barn, but does consider all feed costs and carcass data.

Overall recommendations

Expeller-pressed canola meal should be considered in a feedstuff matrix for grower finisher pigs. Handling issues were not observed inside the feed mill. Based on collected data, 15% EPCM can be included into swine diets with marginal reductions in growth performance but with a positive impact on the bottom line.

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Vehicle design impact on the transportation of hogs

By Harold W. Gonyou and Stephanie M. Hayne, Prairie Swine Centre; Trever Crowe, University of Saskatchewan; Nora Lewis, University of Manitoba; Emily Tamminga, Renee Bergeron, Tina Widowski and Cate Dewey, University of Guelph; Luigi Faucitano and Stephanie Torrey, AAFC Lennoxville; Jorge Andres Correa, University of Laval

Death losses during transportation in Canada may be low (0.10%), but the total loss amounts to approximately 16,000 pigs per year. In addition, other pigs arrive at the processing plant as 'suspect' animals due to fatigue, and may need to be euthanized at the plant. We know that the rate of loss is higher during the summer months, and it differs with farm of origin, and transporters. It is generally acknowledged that some compartments on trucks are worse than others in terms of death losses, but there is no universal agreement on which compartments these are or the magnitude of the differences.

Besides the loss of pigs, there may also be an economic loss due to poor meat quality arising from stressful handling and transportation, and this could be more substantial than the death losses. Little is known about the quality of meat coming from different compartments in a vehicle, nor about differences in environmental conditions among compartments.

We have organized a collaborative project with researchers at several universities and research stations to study the effect of handling and transport on the physiological and behavioural responses of pigs, and on



meat quality. Our collaborators include Drs. Trever Crowe (Saskatchewan), Nora Lewis (Manitoba), Renee Bergeron, Tina Widowski, Cate Dewey (Guelph), Stephanie Torrey and Luigi Faucitano (AAFC, Lennoxville). Currently, two graduate students, Jorge Andres Correa and Emily Tamminga, are working on the project under the supervision of Drs. Faucitano and Widowski, respectively.

The initial phase of the project involved collecting information under standard transportation conditions in both Quebec and western Canada, in both summer and winter. We have followed 36 truck loads of pigs. Our data include the behaviour of pigs during loading, on the truck, at unloading and in lairage, the thermal conditions within each compartment of the truck at each stage of the process, the core

body temperature of pigs from barn to lairage, the heart rate of pigs from the barn to unloading or to lairage (in Quebec), certain blood parameters indicative of stress, and meat quality up to 24 hr after slaughter.

During the project we modified and validated new methods for monitoring heart rate and core body temperature. Heart rate was recorded using Polar heart rate monitors, similar to those used by athletes, held in place with saddle cinches. The monitors were programmed and placed on the pigs several hours before loading at the farm. We were able to collect recordings for up to 11 hours of handling and transport. We placed heart rate monitors on approximately 15% of the pigs, with at least two animals equipped within each compartment.

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i-button temperature sensor after recovery from digestive tract of a pig

We measured core body temperature by bolusing the pigs with temperature loggers and recovered these from the digestive tracts after slaughter. These loggers have previously been used in poultry transport work at the University of Saskatchewan. The loggers are about 1.2 cm in diameter and can be programmed to record temperature for several days. Again, these were administered to the same 15% of the pigs that were equipped with heart rate monitors

several hours before loading. We collected the grey offal from these pigs at the plant and searched the stomach, caecum and intestines for the temperature loggers. The majority of the loggers were found in the stomach, others in the caecum, and a few in the intestines. We recovered approximately 85% of the devices.

To date, our analysis has been limited to the summer trials in Quebec. The pigs were market weight (approx. 120 kg), and had been fed Paylean during the final three weeks of the growth period. Loading density on the vehicles was 0.41 m²/pig, equivalent to a k value of 0.017 m²/kg^{0.667}. Pigs were loaded using paddles and herding boards only. No electric prods were used at the farm, on the truck, or at the plant. We used both a three-deck pot-belly trailer with internal ramps (six loads of 228 pigs) and a double-deck trailer without ramps (top deck lifted by hydraulics; six loads of 85 pigs). The pot-belly trailer was specifically designed to transport pigs. The ramp to the upper deck had a less severe slope than a typical dual-purpose (cattle and pigs) pot-belly, and the front compartment of the middle deck was reached without first climbing up to the top deck, as is the case in many dual-purpose trailers. Pigs were loaded early in the morning and transported for two hours to the plant where they were promptly unloaded. After two hours of lairage, which included sprinkling, the pigs were slaughtered.

The temperature within the truck compartments reached its highest level during either the wait at the farm after loading and before departure (averaging between 24 and 30°C), or at the plant after arrival prior to unloading (averaging between 26 and 30°C). During the actual transport the temperatures in all compartments averaged between 24 and 27°C. In the pot-belly trailer, the hottest compartment while waiting at the farm was the front of the middle level. After the vehicles arrived at the processing plant, the temperatures in the upper level of compartments increased by 3 degrees within a few minutes.

Core body temperatures for pigs were highest when the truck was waiting to leave the farm. Because the pot-belly trailer was always loaded first, core temperatures during the on-farm waiting period were higher in the pot-belly (40.62°C) than the double-deck (40.15°C) pigs. The highest core temperatures were found in pigs on the upper deck of the pot-belly while still at the farm. Core temperatures dropped somewhat during transport (40.18°C), and fell below pre-loading temperatures (to 39.82°C) once they were sprinkled with water in lairage. It is not clear if the higher core body temperatures in pigs on the top deck are due to the greater exertion required to climb to that deck, or to the high environmental temperatures encountered there during the long stationary period.

Pigs were unloaded by compartment at the abattoir and driven into lairage pens segregated by truck compartment. Behaviour during unloading (slips and falls), time to unload each compartment (adjusted for number of pigs per compartment), latency to rest (75% of pen lying) and total time lying during the first hour of lairage were observed. Accounting for the number of pigs, unloading from the pot-belly took longer than from the double-deck (2.9±0.1 vs 2.1±0.2 sec/pig), but there was no difference in the number of slips and falls during unloading. During lairage, there was no difference between trucks in the time taken for 75% of the pigs to lie down, approximately 35 minutes for both vehicles, but pigs from the double-deck tended to spend more time lying than pigs from the pot-belly trailer (51 vs 45% of time lying). Although trailer design



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did not influence latency to rest, pigs from the pot-belly took longer to unload and spent less time lying in lairage. The higher activity in the lairage pen tended to result in higher levels of CPK and lactate, indicators of physical stress, at slaughter. Further analyses will determine the effect of location within the truck on behaviour.

On arrival at the plant, the number of dead-on-arrival (DOA), downers (NANI) and pigs with rectal prolapse was noted. A higher incidence of DOA (0.44 vs 0.20 %) and NANI (0.51 vs 0.20 %), and pigs showing rectal prolapse on arrival (0.29 vs 0.20 %) was observed in the pot-belly trailer. However, insufficient animals were involved in the study to determine differences among compartments for these low-incidence parameters.

The quality of the longissimus dorsi muscle was classified as pale, soft and exudative (PSE); moderate PSE, red, firm and non-exudative (RFN or normal); pale, firm and non-exudative (PFN); red, soft and exudative (RSE); moderate DFD and dark, firm and dry (DFD); based on muscle pH, light reflectance (colour), and drip loss measured at 24 hours post-mortem. Meat quality was good overall, with most loins falling into the RFN class. Meat quality did not differ between the two vehicles, but within the pot-belly trailer, the incidence of DFD pork, indicative of chronic stress, was seen in the loins of pigs from the upper and lower decks (19%).

The summer Quebec trials involved the hottest conditions we encountered in the study. Although we have yet to conduct conclusive correlation analyses, high temperatures within the

compartment, high core body temperatures, and poorer meat quality were all most common in the upper deck of the pot-belly vehicle. Factors that affect meat quality may differ in summer and winter, and between the short hauls in Quebec (2 hr) and longer hauls in western Canada (8 hr). Our analysis of the data continues, and we will shortly begin the second phase of the study to find ways of alleviating the stressors we observed.

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Control of Salmonella in the pork production chain

Salmonella remains an important food-borne pathogen of concern to public health and therefore, the swine industry, says Dr. Julie Funk, Associate Professor, Large Animal Clinical Sciences, Michigan State University. Speaking at the 2008 London Swine Conference she noted that significant strides have been made in decreasing Salmonella contamination during slaughter and processing. Standards at this stage will become more stringent, she feels, creating pressure from processors to reduce the prevalence of Salmonella-positive pigs through on-farm interventions. In spite of the widely acknowledged value of controlling Salmonella in live animals there is still much to learn about the control of Salmonella pre-slaughter, as well as discerning the most cost-effective approaches to control in the pork chain, she says.

In the United States, during 1998-2002, *Salmonella* represented the most commonly reported bacterial cause of food-borne outbreaks and illnesses, as well as the second largest cause of death among bacterial food-borne pathogens, Dr. Funk explains. "Although significant strides have been made in reducing the incidence of bacterial food-borne illnesses, with reductions of 20-50% relative to 1996-1998 rates, incidence of human salmonellosis has had a modest decrease of only 9% in that same period in the US," she notes. "In Canada, the number of reported cases of *Salmonella* for 2004 was 4,953, which represents a decrease from 1998 of more than 50%, but *Salmonella* remains the second most common bacterial food-borne pathogen after *Campylobacter*. There is therefore a need to further pursue effective interventions for salmonellosis."

Significant strides have been made at decreasing *Salmonella* contamination during slaughter and processing. The Pathogen Reduction: Hazard Analysis and Critical Control Point (HACCP) System in the US established performance standards at slaughter and processing plants, which has resulted in decreased contamination of product with salmonella. It is now expected that standards at slaughter and processing will become more stringent, creating pressure from packers and processors to reduce prevalence of *Salmonella*-positive swine through on-farm interventions.

"In spite of the widely acknowledged value of controlling *Salmonella* in the live animal reservoir there has been little progress in

identifying cost-effective interventions for *Salmonella* pre-slaughter, feels Dr. Funk. "Of the potential interventions that have shown evidence of consistent effects in various studies, they predominantly require the producer to incur costs without identifiable direct economic incentive." In addition to effectiveness, she says, there is a real need to identify cost-effectiveness of interventions across all phases of pork production. An integrated approach will hopefully result in cost-effective reduction throughout the chain.

Potential control points in the pork chain

Humans and other animals as vectors

Biosecurity related practices regarding swine farm personnel and visitors have been associated with decreased *Salmonella* risk for swine explains Dr. Funk. "Researchers have found that hand washing, access to toilets and hand washing facilities and the presence of spaces where clothes and footwear could be changed prior to entry into pig areas were associated with reduced *Salmonella* prevalence in Danish market hogs but were not identified as being associated with *Salmonella* prevalence in Dutch herds," she says. "It has also been reported that herds with relatively more humans on site daily were at increased risk of having high *Salmonella* fecal shedding." Research suggests that improved personnel hygiene may be an important intervention for the reduction of *Salmonella* levels. The relatively small cost incurred may be offset by decreased transfer of other performance impairing pathogens.

The literature is mixed regarding the risk of other domestic species on sight, with few studies finding a positive association. Rodents, birds and invertebrate animals are all known to be potential carriers of *Salmonella*, but their actual risk posed to swine is unclear.

Environmental contamination

"*Salmonella* is capable of surviving at least 6 years or more in the environment," notes Dr. Funk. "It has been found that enhanced cleaning and disinfection protocols over standard protocols decreased the contamination of buildings but was not associated with decreased *Salmonella* shedding by pigs at the end of the finishing phase." It has also been reported recently that high prevalence farms tended to have more residual contamination of feeders and equipment after barn cleaning than low prevalence farms, suggesting more stringent cleaning would be associated with decreased prevalence.

Pig flow

Pig flow practices that are well recognized as important for reduction of diseases in swine (all-in/all-out pig flow) are often suggested for *Salmonella* control, yet there are few studies that identify that this practice is associated with decreased *Salmonella* prevalence. "The biological premise is that the combination of cleaning and disinfecting between groups with age group segregation decreases the potential of *Salmonella* exposure and infection," Dr Funk explains. "However, Danish studies of farms practicing all-in

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all-out production along with other precautions such as changing areas, have shown inconsistent results.”

In a study of US swine farms that were three-site production systems, managed all-in/all-out, the *Salmonella* prevalence in finishers ranged from 0% to more than 70%. A recent survey of Alberta swine finishers reported that farrow to finish farms with on-site finishing had lower *Salmonella* prevalence than farms with multiple site production. Furthermore, there was no difference in prevalence between those farms that practiced all-in/all-out flow as compared to those that had continuous flow production. “The limited and contradictory evidence in the literature for all-in/all-out pig flow as a means of *Salmonella* control warrants further investigation,” feels Dr. Funk.

Feed

Animal feeds and feedstuffs can be contaminated with *Salmonella*. Appropriate decontamination steps are needed during feed processing to reduce contamination of feedstuffs in order to avoid dissemination of contaminated feed to herds. However, the role of contaminated feed in the epidemiology of *Salmonella* on swine farms is questionable. “In a multi-country survey in Europe, *Salmonella* was isolated from feedstuffs in 17.6% of herds and 6.9% of all samples,” says Dr. Funk. “Yet, the *Salmonella* serotypes isolated from the feeds were not the same serotypes isolated from pigs on those farms.”

Many epidemiological studies have found that pigs fed pelleted rations were at increased risk of high *Salmonella* prevalence compared to those fed diets in meal form. Additionally, diets that are acidified, either as a result of the addition of whey, organic acids, or are fermented have been associated with reduced *Salmonella* prevalence. Conversely, wet, but not fermented, diets have been associated with increased *Salmonella* prevalence.

Vaccination

Vaccination is associated with reduced *Salmonella* prevalence in swine at slaughter. Unfortunately there are few quality published studies sufficient to assess the value of the intervention.

Thermal environment

Cases of human salmonellosis are strongly associated with high ambient temperature in a period ranging from 1-5 weeks prior to the onset of the human case. This suggests that “upstream” factors in the food chain are impacted by high ambient temperature resulting in an increased risk of salmonellosis. Although these upstream factors may include failure in maintaining temperature in the cold chain during processing, shipping and handling by retailers and consumers, it may also reflect risk associated with high ambient temperature on farms that result in increased risk of *Salmonella* transmission and shedding by animals. “Previous work by our group and others has indicated that there is an association between season and/or environmental temperature and *Salmonella* prevalence in finishing swine,” explains Dr. Funk. “Our recent work has demonstrated that 10-12 week old pigs that are cold-stressed and market-age pigs that are heat stressed (18-22 weeks old) are at higher risk of being *Salmonella* positive.”

Antimicrobial use

Field investigations have shown variable results with antimicrobials on controlling *Salmonella* prevalence on farms. The impact on shedding may be associated with the antimicrobial resistance profile.

Cost-effectiveness

There is minimal data regarding the evaluation of cost-efficacy of different interventions on *Salmonella* control. In a Danish study, the variables with the maximum effect on *Salmonella* prevalence on carcasses were:

- the number of herds with a high prevalence of *Salmonella*,
- singeing efficiency,
- contamination and cross-contamination at degutting and
- cross-contamination during handling.

Interestingly, improvement in any one intervention had no effect, suggesting that both on-farm and in-abattoir interventions may be required to achieve reduced carcass contamination.

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Tackling sow infertility problems

By Western Swine Health Associates: Drs. Frank Marshall, Chris Misutka, Pete Pawluk, Shawn Davidson, Chris Byra, Gail Cunningham and Egan Brockhoff

My sows are not breeding well!

So, starts several conversations with producers during the late summer and early fall. For both the veterinarian and the farmer, infertility represents one of the most difficult problems to diagnose and to resolve. Infertility seldom if ever has a single cause and it is unusual for it to be infectious. This article presents a framework to work through some of the most important factors that contribute to the poor breeding.

Defining the problems

First, we need to define the problem. Is it primarily a problem where females are:

- taking longer to come into heat or not showing estrus
- not conceiving (regular return to estrus 21 or 42 days later)
- or conceiving but subsequently losing litters (returning at irregular intervals or aborting)?

Often all three are observed by the breeder at the same time. Sows that are not observed in good heats are less likely to conceive and may be thought to be losing litters.

A second question must be asked. Is there a parity pattern to infertility: mainly in gilts, parity one sows, older sows or no pattern?



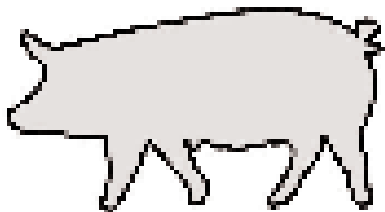
Gilts need good boar contact and generous floor space in order to stimulate oestrus

Problems with displaying estrus

- **First consider seasonal effects** - infertility usually becomes more obvious in the autumn. The seasonal effect has several components:
 - sows eating less during the hot weather resulting in more weight loss and poorer returns to estrus therefore less frequent conception
 - sows are naturally less fertile when day length is decreasing
- **Parity effects**
 - Gilts: if infertility is predominantly in this group consider the following: proper nose to nose boar exposure, not overcrowded (>12 sq ft per gilt), bright lighting for 16 hours, energy intake (should be gaining weight), weight (should be about 300 lbs) and age (puberty has occurred – over 200 days of age), estrus is occurring and is observed. Low parity 1 litter size often implies that gilts were bred on their first estrus
 - Parity 1 sows: factors to consider are females too thin entering the farrowing house and/or inadequate lactating feed intake resulting in too much weight loss
 - All parities: Inadequate lactating feed intake, especially in summer, adequate vitamin D, improper boar exposure and observation (walking the sow herd with a boar, sows organized and identified by breeding week, recognizing subtle signs of estrus)

Conception problems

- **Pre-service** - semen related problems including boar fertility and production and handling of semen when using AI:
 - semen age – best breeding for semen stored less than 72 hours
 - poorly stored semen – temperature should be constant at 17 to 18°C and be agitated gently twice a day
 - semen processing – water quality, extender quality, dilution rate, morphology, and hygiene in lab are a few important areas



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- individual boar fertility – due to diseases, reduced fertility in the summer after hot weather, individual boar variation
- **Service** - heat detection and timing of mating: This is the area where we see the greatest variation amongst breeding staff. On one farm with two 1500 sow units, moving one specific staff member from one barn to the other will repeatedly and consistently improve reproductive parameters by more than 10%. Farrowing rates improve from the mid to low 80% to the mid 90% level. Litter size also improves significantly. The difference between breeders from an outside observation are subtle:
 - They tend to be very organized and methodical in terms of tasks, placement of sows in gestation, record keeping, and in anticipating which sows might return.
 - They detect subtle signs of estrus allowing them to time their services with confidence. This, in my opinion, is the most critical skill that can be added to a breeding team. Usually they record (on the back of the sow) when the first signs of heat were detected and they often breed sows a little later than the other breeders. This breeder also had about 5% fewer multiple mated sows as he does not breed a sow until she is firmly in heat with ‘tacky’ vulvar mucous. That is not to say that one should advocate fewer multiple matings but that this measure should not necessarily be maximized.
 - Breeders differ in their assessment of sows in heat due to differing levels and quality of stimulation (gentle but gradually increasing pressure on back, flanks, udder and vulva in the presence of nose to nose contact with a mature boar). Interpretation of the signs of ‘locking up’ or the consistency of vulvar secretions (sticky, not wet, at breeding time) also vary between breeders.
 - They anticipate when the ideal timing for mating is depending on days from weaning to the beginning of heat signs (Wean to Service Interval or WSI). Sows with a short WSI have a longer heat so they would delay breeding by 12 to 24 hours whereas sows with a WSI of 7 or 8 days will have a short heat and should be bred early.
- Boar exposure – start at weaning but restrict exposure on breeding day until breeding, nose to nose, for at least 15 minutes twice a day.



The operator's skills and behavior have a large effect on the outcome from insemination

- Low number of inseminations – fertility and litter size improves with two (and in some cases more) inseminations while the sow is in estrus. Too many services resulting in sows bred late in their estrus cycle however increases vaginal discharges.
- Suboptimal timing of matings – inseminate within 15 minutes of exposure to boar (watch the sows in adjacent stalls).
- Technique could be problem although this is less common:
 - Empathic, gentle breeders are desired, never causing pain to the sow.
 - Poor hygiene, especially sows with manure “high-water lines” across the vulva.
 - Low volume or sperm numbers due to variation in semen doses or due to leakage during service can be an issue. Do not hurry the insemination by squeezing the tube.
- **Post service** - movement and mixing of sows between 4 and 30 days after service may cause fetal loss resulting in smaller litters, re-absorptions and returns or abortions.

Pregnancy failure

Pregnancy failure would include re-absorptions (empty sows or off-cycle returns) and abortions.

- Only about 50% of abortions are detected; many are either thought to be returns or empty sows.
- A normal abortion rate ranges from 0.5 to 2.5%. At 1%, a 500 sow herd targeting about 20 breedings a week would expect one abortion per month.
- Older parities have a higher risk of losses of piglets.
- Few of these have infectious causes. Most are attributed to hormonal insufficiencies (hormone levels maintaining pregnancy are lower during shortening day length) and/or stressors (such as chilling, especially in gilts). A higher percentage of abortions (both detected and undetected) occur during the fall months.
- Management factors certainly contribute, including:
 - Shortening day - control light – 12 to 16 hours per day.
 - Falling energy levels - maintain higher energy intakes in the autumn and winter – up $\frac{1}{2}$ to 1 lb.
 - Failure to maintain ambient temperatures, especially with cool nights after warm days.
 - Stresses occurring with large temperature fluctuations – avoid drafts by sealing doors, fan louvres, leaky inlets, watching where cold air drops, increasing set points.

This article does not encompass all factors that affect breeding but highlight some key issues that represent the common problems encountered. In virtually all cases it is a combination of factors that contribute to poorer fertility so run through the checklist and try to identify ones that may be problems on your farm.

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• International Round-up



First European launch for boar taint vaccine

Swiss pig farmers are the first in Europe to use a vaccine to prevent boar taint. The new technology, which has been approved by the Swiss licensing authority, means that they now have a commercially viable alternative to the physical castration of piglets.

Improvac®, from Pfizer Animal Health, uses the pig's own immune system to temporarily block the function of the testes, and thus reduce the level of boar taint compounds.

Although Switzerland is the first market in Europe to approve the new product, it is already being used by pig farmers in more than a dozen countries worldwide and has been used commercially in Australia for 10 years. The Swiss launch comes as the country prepares to ban the current practice of physical castration without anaesthesia, with legislation now due to take effect in January 2010.

The introduction of Improvac is likely to be welcomed on animal welfare grounds as a practical and humane alternative to the physical castration of piglets as a method of controlling boar taint.

However, from the producer's point of view there is another big benefit from switching to immunological control of boar taint, as Jim Allison, Technical Director, New Products Marketing for Pfizer Animal Health explained: "Physical castration not only carries the risk of losses from infection and hernias but more importantly it also robs producers of the benefits of natural boar growth patterns and metabolism. As a result, animals convert feed less efficiently and tend to have more fat."

"Many studies conducted under commercial conditions have shown that pigs given Improvac as an alternative to physical castration show improved feed conversion and have a leaner carcass, thanks to performance characteristics that are closer to those of natural, intact boars. With world feed prices continuing to increase, along with pressure from welfare groups to stop the practice of physical castration, Improvac represents a major advance for the swine industry."

Another effect of Improvac, as a consequence of the reduction in the levels of testosterone, is reduced male sexual and aggressive

behaviour in the late fattening period – making boars easier to manage and less likely to injure each other as a result of fighting or mounting behaviour.

Consumer taste panels conducted in a number of different countries have confirmed that the meat from pigs raised using Improvac is devoid of taint and has an eating quality equivalent to that of physical castrates and gilts.

Like other vaccines used in swine production, Improvac has a zero meat withdrawal period and has no safety issues for consumers. In 10 years of commercial use in Australia and shorter periods in other countries, consumers have readily accepted pork from Improvac treated animals.

It is thought that Pfizer will gain approval for use of the product in Canada at the end of this year or in early 2010.

Using genetics to boost piglet survival

EU-funded researchers have improved the survival rates of newborn piglets in just one generation by applying simple selective breeding techniques. The scientists hope their findings will lead to a reduction in use of the farrowing crate, which has been widely criticized by animal welfare groups. It is one of the issues being tackled by Welfare Quality®, an EU funded project focused on integration of animal welfare in the food quality chain: from public concern to improved welfare and transparent quality.

Neonatal mortality in pigs is a major welfare and economic concern. Farmers suffer an average of 20% mortality per litter of piglets, which represents both a significant animal welfare issue and economic loss to the farmer. On average, neonatal mortality can cost farmers 2.56 piglets per litter twice per year. With current prices a farmer with a herd of 250 sows could lose more than 50,000 per year due to early piglet deaths.

In this study, researchers turned to genetics to see if selective breeding could improve the survival of piglets in loose-housed or outdoor systems. Their investigations revealed that piglets that find the udder and suckle quickly have better survival rates. This early vitality combined with physical features such as the right body weight and shape all lead to improved survival rates. Piglets that were dead at birth were disproportionately long and thin while



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surviving piglets were more proportional with a greater fat covering.

The sow's characteristics also influence piglet survival. In the womb, piglets that are provided with an efficient placenta are more likely to have a good birth weight and survive. Once the piglets have been born, sows that show good maternal behaviour also boost the survival chances of their young. A good mother is one that remains calm during birth and lies down carefully to reduce the risk of crushing her young.

The researchers studied piglets and sows born to fathers with high survival rates and compared them to newborns fathered by average survival boars. They found that mortality in the litters fathered by high survival boars fell to 12%, compared to 18% in the other group.

The researchers studied piglets and sows that were sired from boars with high survival rates versus average survival rates. This showed that survival rates could be substantially improved when breeding from "high survival" boars. Mortality was only 12% in litters selected for high survival compared to 18% in litters selected for average survival. High survival sows were better mothers showing less crushing behaviour during farrowing than average survival sows.

Pigs to be farmed for transplants

Britain's Lord Winston, a fertility expert and pioneer in the fields of IVF and reproductive genetics, is to begin breeding genetically modified pigs to produce hearts, livers and kidneys for transplanting to humans, according to an article in weekly newspaper The Sunday Times.

Winston has pioneered a simplified technique to create pigs with "humanized" organs that will not be rejected by the patients' immune systems. He expects the technique to provide a solution to the shortage of donor organs within 10 years. Attempts to transplant animal organs were abandoned because the tissue was rejected and because of fears that animal viruses would spread to humans. Enthusiasm for the procedure waned in the late 1990s after patient deaths.

Winston and his colleague, Dr. Carol Readhead of the California Institute of Technology, believe pigs can be genetically modified to exclude the dangerous viruses. The pigs will be bred with about six human genes to prevent patients rejecting their organs. Winston's team will need to prove that the pig organs can be sufficiently modified to survive long-term in the human body.

He says his method could see hundreds of genetically modified pigs reared simultaneously for their organs. With a record number of almost 8,000 British patients waiting for an organ, he says that this is the best hope to tackle the shortage of organs. "Pigs organs are the right size for human transplantation and they work similarly to human organs."

Lord Winston is moving the research project from Britain to America after British regulations and a shortage of funding prevented experiments there. The pigs will be bred in Missouri.

Pigs learn faster in enriched environment

It's well known that enriching the pig's environment, typically by providing rooting materials such as straw or peat, helps to reduce aggressive behaviour and vices such as tail biting. Now, recent research work suggests that pigs living in an enriched environment are also quicker to learn. Drs. Violet Beattie and Ian Sneddon, of the Agricultural Institute of Northern Ireland compared the pigs learning ability when they were housed either in an enriched environment or in a barren pen with no rooting materials. The tests included an operant conditioning task, where the pigs had to learn to push a lever a set number of times to get food and a spatial memory task where they had to remember where food had been in a test area with seven possible options.

It took pigs from the enriched housing less than ten minutes to learn to push the lever and obtain food, whereas the pigs from barren housing took twice as long. In the spatial memory test, pigs from the enriched environment again mastered the task quicker than their counterparts from the barren environment.

"Anyone that works with pigs knows that they are smart," says Violet Beattie, writing in the UK magazine Pig World. "Just walk through a piggery and you can see safety catches on pen

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handles to keep them in and a range of complex feeders which pigs seem to have no trouble operating.”

Dr Beattie says that the best bit of it all was finding that female pigs learnt the operant conditioning task quicker than the males (pigs are not castrated in Ireland). “However, they were slightly slower at the spatial memory task,” she says. “It looks like female pigs, as well as female humans, have trouble reading maps!”



Pigs learn faster when their environment is enriched

Denmark leads Europe on low transport mortality

During 2007, mortality of Danish pigs during transport to slaughter was 0.07 per thousand, and 0.06 per thousand at the slaughterhouses. This is the lowest level in the 30 years the figures have been compiled. The improvement is thought to be the result of better fitted out trucks. Transport mortality is considerably higher in most other European countries. As a comparison, the national figure for dead on arrival (DOA) pigs during 2007 in the USA was 0.21% or 2.1 per thousand, thirty times higher.

Ethanol production aiding livestock feed supply

The US ethanol industry will continue to grow in 2009, thereby creating a substantial increase in the supply of dried distiller’s grains with solubles (DDGS), an ethanol co-product.

More than 500 attendees at the United States Grains Council’s (USGC) International Distillers Grains Conference (IDGC), held in Indianapolis, Indiana last October, heard that ethanol production increased in 2008 by approximately 3 billion gallons to 9.3 billion gallons compared to last year. Even more critically, production is projected by Informa Economics to reach 11.9 billion gallons in 2009. According to Ken Hobbie, USGC president and CEO, roughly 33 percent of the grain going into US ethanol production will come out as DDGS.

Senior Vice President of Informa Economics Scott Richman said as a result of the growth in the US ethanol industry seen this year, 22.8 million tons of DDGS were available for global use in 2007/2008 marketing year, marking nearly a 50 percent increase from the 2006/2007 marketing year. He said the 2008/2009 marketing year, which just began on October 1st, is likely to experience an additional 50 percent increase in the availability of DDGS, reaching 31.3 million tons.

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Gel extends the viability of boar sperm

Norwegian scientists have developed a way of extending the life of boar semen by enclosing sperm cells in an alginate gel. The technique was developed by Geno and Norsvin, the two national organizations involved in breeding and production of cattle, horses and pigs.

The two organizations contacted SINTEF, the country's largest independent commercial research company, in 2003 and with the assistance of funding from the Research Council of Norway a research project was commenced. Research scientists wanted to influence sperm cells to become capable of fertilizing over a longer period. In 2008, the latest situation is that the research scientists have developed a technique that moulds the sperm cells into an alginate gel. The cells can then be stored until the gel is inseminated into the animal.

"We have been trying to confirm a hypothesis that restricted tail movements of sperm cells, as is the case when they are in the animal's testicles, providing longer lasting qualities," says Geir Klinkenberg at SINTEF. "We achieve the restrictions by using the gel and the results to date are good. By achieving longer storage ability, it prolongs the lifespan of the sperm population in the uterus."

"The timeframe from when a sperm dose for pigs is extracted until it must be utilized is five days," explained reproduction research scientist, Ann Helen Gaustad at Norsvin. "Extending this by one to two days would be extremely significant." Norsvin produces up to 3000 doses of pig semen daily.

The next step will take place in the spring with insemination trials on more animals. Around 1000 animals will be inseminated using the new method to see if better results are achieved than with today's conventional methods.

California passes welfare legislation

Controversial animal welfare legislation was given the green light in California in November at the same time that Barack Obama was voted into office as the President of the USA.

Proposition 2, which lays down regulations for housing animals ensuring they have enough space to move, was one of a number of law changes that the California electorate had to decide on at the same time as they were choosing their new president.

It requires that calves raised for veal, egg-laying hens and pregnant sows should be confined only in ways that allow these animals to lie down, stand up, fully extend their limbs and turn around freely.

The legislation was introduced because of

rising concerns in California among the public over the way the state's 40 million farm animals were being treated. The legislature said that compared to current practices used by California farmers, the new law would mean they would have to find more space for their animals or provide other ways of housing pregnant sows, laying hens and veal calves. It added that this could raise production costs or reduce production and profitability and at the same time state and local taxes might also be reduced.

The opponents, Californians for Safe Food, said that the Californian farmers protected consumers from disease through the

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Proposition 2 will ban the use of sow stalls in California from 2015

modern housing methods. They said it is an extreme measure that practically forces the hens outdoors for most of the time increasing the risk of bird flu and food-borne illnesses such as salmonella. It will also increase grocery prices of California eggs, cost thousands of jobs, put farmers out of business and cost California \$615 million in economic activity. Opponents also fear that eggs would be imported into California from Mexico, where food safety and welfare standards were not the same.

However, the proponents of the Proposition said that it is a “moderate measure that stops cruel and inhumane treatment of animals - ending the practice of cramming farm animals into cages so small that the animals can't even turn around or stretch their limbs”. They said it promotes food safety and supports family farmers as well as protecting the environment.

The proponents said that there is adequate time for farmers to make the changes as the law does not come into effect until 2015 and as states such as Arizona, Colorado, Florida and Oregon have already passed similar laws, it was time California joined them.

Wayne Pacelle, president of the Humane Society of the United States, which spent more than \$4 million on the campaign for the California measure, predicted the passage of Proposition 2 would usher in a new era in farm standards. “No state in the US and no agribusiness titan anywhere in the nation can overlook this mandate: People do not want their farm animals treated with wanton cruelty,” Pacelle wrote on his blog.

California is the sixth-largest egg producer in the USA, but has no significant hog industry, so the measure primarily affects egg operations.

New catheter improves results

A recent trial comparing the Absolute AMGTM Pipette with a conventional catheter for insemination has shown that the AMG Pipette, which extends through the cervix and deposits semen directly into the uterus, leads to improved performance.

The Trial was conducted by Carthage Veterinary Service, Carthage, Illinois at a 5650 farrow to wean unit. Half the sows were bred with each catheter and a total of 1347 animals bred. Conception rates were determined by recording returns to service and sows were scanned at 28032 days. Farrowing rate was also calculated once sows had farrowed.

Using the AMG Pipette led to an improvement in farrowing rate from 68.4% to 75.4% compared to the conventional catheter. Similarly, total number of pigs born improved from 11.9 to 12.9, while pigs born alive averaged 12.4 for the AMG Pipette and 11.6 for the conventional catheter. The report also suggested that there were large labour savings when using the AMG Pipette.

Half of UK herd now batch farrowing

Many producers in the UK have moved to batch farrowing sows, primarily for health reasons and also to improve labour efficiency. Now, a recent survey by Janssen Animal Health suggests that more than half of all producers batch farrow. The survey covered 48,500 sows or 11.5% of the UK breeding herd and showed that 53% of respondents batch farrowed. Of these 85% operated a three-week system, 9% farrowed every 2 weeks and 6% ran a five-week system. Of those producers that do not batch farrow, 71% said that they had considered making the change and half of these said they were likely to make the change.

Producers using Regumate (Matrix in Canada) as part of their batch farrowing management were asked to list which benefits they had gained. They considered tighter farrowing pattern to be the most important benefit, closely followed by improved service rate, better gilt farrowing rate and increased numbers born alive. They were also asked to state which features of batch farrowing they consider to be most important, with the following results:

1. Tighter farrowing spread
2. Improved number of pigs/sow/year
3. Larger batches of more uniform weaners and finishers
4. Better working practices, improved staff morale and improved herd health

Other features that scored high in individual votes were improved growth rates in finishers and reduced medication costs.

More than three-quarters of herds that batch farrow (77%) use Regumate to synchronize gilt oestrus and 11% of these also treat first parity sows for a number of days to help them recover from their first farrowing.

Producers in the UK moved towards batch farrowing in order to combat the disease challenges of PRRS and PMWS that hit producers hard until the advent of PCV2 vaccines. However, the other advantages also provide a significant economic benefit, concludes the report.



Batch farrowing is widely used on outdoor units in England



Improving sow longevity, part 2: Giving the gilt a good start

By John Gadd

In the last issue of WHJ, I described the large difference in sow profitability between producers in the top 10% of the world who manage to achieve 5.5 litters per sow productive lifetime (SPL) and a typical producer who only manages 3.1. In helping to improve sow productivity in the long-term for them, I find the reason why such a short productive life exists is that their gilts are being badly managed and fed. I'm sure it is because present management of the gilt all across the world has not kept pace with the development of the modern genetically improved gilt.

Now before we lay the blame at the farmer's door, the reason lies with us as advisors. We have insufficiently emphasized the following points:

1. Gilts are being bred too hastily and therefore too young.
2. Once selected they are being grown too fast.
3. The diets for developing and first-pregnancy gilts recommended over the past few years have been inadequate.
4. The first (and possibly even the second parity) lactation diets have been inadequate.
5. First litter females are exhausting themselves due to the larger first litters that genetics have made possible.
6. Producers and their veterinary advisors have not realized what a potential disease-shedding danger the gilt is to the rest of the herd.
7. And likewise what a danger the gilts' progeny are to the other weaners in the nurseries.

In fairness, the first 5 points are what we must attend to now while the last 2 are for discussion and further research as to how we can tackle the serious problem of "gilt contamination" which is coming to light. While it has only recently been recognized

that the gilt and first-litter sow can be a danger to the rest of the herd, it must have been affecting sow productive longevity and herd health for many years.

Sow longevity - start with the gilt

I list below the main factors which I have found to be significant in getting herds to produce at least 20 and sometimes 40 more weaners raised per sow lifetime. Correct nutrition is a vital part of the advice. I am not a nutritionist so will only briefly outline the situation here, see number 2.

1. Check the herd age profile. Are there too many old sows in the herd? (usually on economic grounds). I gave some guideline benchmarks and the 3 rules to follow in the last article. The modern gilt needs careful management to ensure a productive lifetime of 5 litters or more, so here are the essential ground rules (Figure 1).

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Figure 1: Modern targets for replacement gilts.

By first mating ...

- (a) She should have been on the farm for 6 to 8 weeks before selection. Thus preliminary selection should take place at 60-70 kg and final selection at 100 kg. The most critical selection factors are legs and feet, then udder and teat line, see below.
- (b) At first mating she should be 210 - 230 days old.
- (c) By that time she should be 125 - 140 kg bodyweight dependent on how lean her genetics are, so consult with the breeding supplier. Contrary to popular opinion I find that there are large differences between the excellent breeds on offer.
- (d) She should have 16 to 20 mm P2 backfat. A deep tissue scanner is useful - an expensive and delicate instrument to have on the larger farm - but valuable if finishing pigs are produced and these days replaces the tactile and visual Condition Score target of 3 (on the scale 1 to 5) for those breeders who do not have such a measuring instrument - except in lactation, also see below, point 18.
- (e) She should be mated at the 2nd or 3rd oestrus.

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5.5	33.87	53.26	100.03
6	43.40	63.77	100.13
6.5	47.12	75.53	118.23
7	50.74	81.40	127.33
7.5	54.37	87.22	136.43
Watts per M ² /hr	RETURN ON INVESTMENT IN MONTHS/YEARS		
4.5	1.7	1.1	0.7
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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IMPROVING SOW LONGEVITY, PART 2 CONTINUED

2. **Feeding:** Modern gilts need to be fed differently from multiparous sows and we have been feeding gilts inadequately in the past; her nutrient intake not keeping pace with her productive capacity and thus exhausting her once she has reared her first litter. For example two special diets are needed for the gilt - a special Gilt Developer Diet (fed also as routine in the first pregnancy and possibly also in the second gestation parity dependent on several factors) and a special Gilt Lactation Diet - which may occasionally be needed in the second lactation.

3. **Final selection at 100 kg:** As well as some 20 points to consider, including the primary ones of udder line, viable teat numbers, placement and shape, much more attention needs to be paid to legs, nearly always the second most important cause of enforced early culling after reproductive problems. In the primary area of reproductive disappointment, success will come from keeping to the ground rules in Figure 1, as well as checking out the points below - if disease isn't the cause, which it usually is not.

4. As to an excellent little photo-and-diagram guide on checking legs in gilts, try to get a copy of the "Pocket Guide on Leg Selection for Replacement Gilts" compiled by Iowa State University on www.ag.iastate.edu. Brilliant!

5. Keep gilts in groups, preferably no more than 8 together, always with enough space of 12 ft² (1.1m²) per gilt. Pen shape is also important. It should allow at least 12ft (3.66m) of 'fleeing space'. Using visual 'hides', solid or suspended, is a good idea if this is not possible.

6. Commence daily physical boar exposure (boar in with them under supervision) for at least 20 minutes/day from 23 weeks old.

7. Check for estrus but do not serve before the guidelines in Figure 1.

8. To help detect oestrus once it is imminent, provide fence-line boar exposure with different boars for 2 to 5 minutes each day.

9. Same time, same duration each day.

10. Meantime keep boars away from gilts.

11. Is AI effective for gilts? Yes, as long as...

- 2.5 billion fertile sperm per dose.
- 2 inseminations within the estrus period, 8 hours apart to avoid cell damage from the previous dose.
- One insemination to occur within 18 hours before ovulation. Study the timing diagrams which are available.
- Volumes of 60-100ml with no leakage.

12. The gilt especially needs to be gently stimulated/encouraged during insemination - with more care and time taken over this than with the sow. Of course she is young and excitable, not used to it and so can be nervous.

13. Do the stockpeople know how to handle the catheters, etc. for good sanitation, safe insertion and locking? If doubtful, arrange for training.

14. Gilts failing to show oestrus before 200 days should be treated with PG600 and bred. If a failure - cull.

15. Gilts especially must be kept quiet and contented during the 28-day post-service implantation period. Check space, floors, temperature, odours and especially heavier, 'bully' females. I see many gilts stressed in their early pregnancies which risks returns and possibly further breeding disappointment later on.

16. Keep troughs clean - no stale food. I suspect that gilts are susceptible to some mycotoxins as returns stopped when trough and bulk bin hygiene was improved.

17. From now on veterinarians must discuss with their clients the feasibility and theory behind keeping parity 0, 1 and occasionally parity 2 sows away from the rest of the herd. This is known as 'Parity Segregation', which I touched on in the last issue.

The sow - from 1st litter onwards

The key on which a long productive life depends is never to let the sow 'nose-dive' in body condition during lactation.

18. This is especially true of the gilt lactation, ie the first lactation. It is here that breeders are being caught out. Appetite can be a problem in these lean-gain 1st litter sows (high lean growth is negatively linked to a really



Feeding in lactation is critical for young females in order to avoid the nosedive phenomenon (photo courtesy Hypor)

good appetite) but that is not all - the nutrient make-up of the diet needs to be different to her requirements later in life. My own experience in following the nose-dive phenomenon among hundreds of farrowings suggests that a nose-dive episode in the first lactation has resulted in two fewer litters per productive lifetime and that in the established sow each lactation nose-dive can cost a future litter.

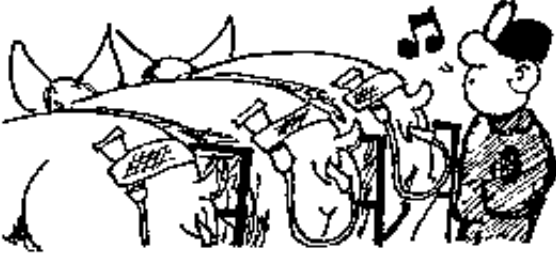
19. Any such loss must be detected quickly and measures taken. Despite dismissive comments from some academics, condition-scoring by hand and eye is a useful skill for the experienced stockperson or section-head to detect lactation condition loss early. For this purpose I find it better than the use of an electronic scanner (but condition scoring the traditional way is not as effective as using the scanner during pregnancy or for the heavier growing pig).
20. The counter-measures to take - especially in hot conditions - are:
 - Fostering if the litter is large and/or heavy, milk supply is suspect or if conditions are very hot.
 - Increasing feed intake (try feeding wet).
 - Altering and raising nutrition specifications.
 - Blowing air down gently over the feed trough (even hot air from the outside works well as it is fresh air), and generally reducing stuffiness and odours.
 - Keeping things cleaner in the farrowing house.
 - Ensuring water is easily accessible as well as adequacy (flow rate 2 L/minute at least - but a 6 litre dedicated water trough is best).
21. Attended farrowing using prostaglandins and judicious amounts of oxytocin helps take the strain of parturition off the sow.
22. Bigger litters mean longer farrowing times thus exhausted sows. I find 'Parturaid' (SCA Nutec) given by applicator just before farrowing shortens farrowing time by as much as 20 minutes or more.
23. Another new product, 'Progenos' (Nutreco) looks interesting, especially for gilts. It increases the blood flow to the embryo

and eases some of the productive effort in the young breeding female.


24. There is accumulating evidence that a partial or even complete substitution of organic trace minerals for the conventional, cheaper inorganic sources is cost-effective. This is another area of gilt nutrition which has fallen behind in the past but rectified in the special diets.
25. As sows age, watch herd age profile carefully and cull in a planned way so as not to overload the herd with too many young replacements. This lowers the immune status of the whole herd and shortens herd productive life. I think it is one of the most important tasks of the manager to study sow flow every six months and monitor his herd age profile as a factor in lengthening SPL.
26. Finally, the veterinarian's role is to ensure that gilt replacements are regularly monitored and appropriate induction action(s) taken in that vital 6 to 8 week period before the replacement females are merged with the herd. In years to come we may not be merging her into the main herd before the second parity anyway - but that possibility is for the future!

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Eurotier 2008 reports record number of visitors

By Neville Beynon

Some 130,000 livestock farmers from Europe, including 22,000 from all over the World, attended Eurotier in Hanover, Germany - 11 to 14 November, 2008. There were 1,764 exhibitors and nearly half of these were foreign exhibitors.

The trade fair also saw the establishment of BioEnergy Europe. About a quarter of the trade fair exhibition area is now given over to Biogas and related BioEnergy companies. The fair also included the World Poultry Show, cattle, pig and aquaculture, along with feed, pharmaceutical, animal health and support industries, with a heavy presence of the respective equipment and building manufacturers.

There were mixed messages from the German pig farmers and their suppliers...

In the past twelve months European pig producers saw the price of animal feed cereal grain reach prices close to €00 per ton and post harvest to fall to around €20. This had a devastating effect on the price paid by the specialist pig finisher sector for weaner and young growing pigs. In Germany, the national herd has a structure based on a large proportion of weaner producers who sell their pigs to specialist farms that finish these pigs. Poor weaner prices in the bordering pig exporting countries Holland, Denmark (and to some extent even France) over the past few years, resulted in large numbers of low priced weaner pigs flooding into Germany and exacerbating the situation. Apart from health checks, the borders are open to free trade within the European Community.

At Eurotier, the effect was clearly felt on the building trade stands, where the farmers who had been purchasing low priced weaners had cash to spend on equipment and new buildings. In contrast, the specialist weaner piglet producers, who had endured both high feed costs and low prices, were not in a position to invest for the future. This resulted in those equipment supply and building manufacturers with a heavy emphasis on the weaner producing sector looking very unhappy. The same applied to the breeding (seed-stock) companies. In fact the personnel from the German BHZP sow breeding program and those from the



neighbouring stand of the Dutch pig and poultry breeding company Hendrix Genetics (HYPOR) were gathered together on the first morning of Eurotier and informed that the two companies had merged. 'Rationalisation' will certainly follow.

The world economic climate will clearly add to the troubles of many farmers and their suppliers. Personnel from a number of other manufacturers also reported and/or feared mergers or rationalization measures in the near future. Exchange rate fluctuations will also have an impact on exported and imported products.

From the German pig farmers' perspective the prospects appeared more optimistic on the units that finish bought-in weaner pigs, whilst the weaner producers were a little less optimistic. The problem currently facing the German piglet producer is the need to ensure that they have group housing systems in place in time for the compulsory requirement for all gestating sows to be kept in group housing systems after the fourth week of pregnancy, i.e. within the next 3 to 4 years.

Notwithstanding the current international financial crisis, German pig farmers were reasonably optimistic, exhibited a positive mood and many wanted to invest for the future. Those that had the funds available were making firm commitments, whilst those that need to borrow were realistic that the potential for doing so is far from certain.

The next Eurotier on 16 - 19 November, 2010 in Hanover, Germany will surely provide a clear picture of how things will have evolved and show us the shape of things to come.

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Danish update

By Stuart Lumb

As Christmas approaches, the shops in Denmark are brightly lit, with windows full of traditional red and green decorations. Despite the Christmas festivities, sales are sluggish. Shopkeepers are gloomy and so are Danish farmers, which is not good for the Danish economy. "The credit crunch has affected Denmark just like any other country and farmers are finding it very difficult to borrow money, plus farmers can't change banks," commented Finn Udesen, department manager of Danish Pig Production. In-pig sow numbers have dropped by 7.4% in 2008 vs 2007 plus pork consumption is dropping, with pig prices this November 10% lower than expected. Pork prices, though, are forecast to rise in 2009 but not as soon as was forecast, due to the credit crunch. As far as exports are concerned the Yen follows the US Dollar which is good for pork exports, however the value of the British pound has dropped which is not good news for Denmark. Production is forecast to drop by 6-7% in 2009 and 10-15% of producers will quit the industry. Producers have to get rid of their sow stalls by Jan 1, 2013 and this date is looming fast for those producers still with stalls. Four years may seem a long time but planning applications for new buildings and farm expansion are taking ever longer to process. This worrying trend was highlighted by Peter Hansen, Chairman of the Agromek Exhibition Committee, when he officially opened the Agromek exhibition on Nov 25th, in the presence of Denmark's Minister of Food, Eva Kjer Hansen. Many planning applications are taking over two years to process and Mr Hansen stated that a key industry such as farming deserved much fairer treatment. Hansen added that municipal authorities lack the expertise, manpower and know-how to process these applications, plus municipal authorities interpret the regulations in a non-uniform manner. A flow of new legislation compounds the problems as well - the government has yet to issue precise regulations concerning Best Available Techniques regarding the reduction of ammonia emissions. Hansen further highlighted the fact that a small association of less than 1000 members and an annual income of

less than \$60,000 - the Danish Ecological Council - has the right to appeal against many planning consents, with these appeals taking a further year to be ruled on.

"Legislation and red tape are strangling Danish agriculture and if these anomalies are not sorted out very quickly then agriculture and the Danish economy will be irreparably damaged." Land prices have dropped by around 20% in Jutland which is very worrying as the land value is used as collateral for borrowing purposes, although the banks don't have cash to lend.

With regard to welfare issues, according to DPP's Trine Vig, a number of loose farrowing systems are being looked at, but no one system yet is as good as a conventional crate in terms of keeping piglets alive and research is continuing to find a better loose farrowing system. "Maybe if we used the term 'piglet protector' instead of 'crate' then welfarists might be less concerned about how we house the sow at farrowing." Vig added, "The new pen must not disadvantage the sow plus must be safe for the stockperson to work in." Castration is an increasingly topical issue throughout Europe as the consumer sees castration as being very painful for the piglet and alternatives are being looked at, in particular in the Netherlands, where hog farmers are anaesthetizing piglets with carbon dioxide before castration is carried out. The Danish Ministry of Justice recommended in June this year that Danish producers must use "pain relief" from January 2010 and that in the long term other strategies must be employed to reduce the risk of boar taint. Feeding chicory appears to be beneficial. Long term, sexed semen will be the answer but this technique will not be commercially available for another 5 years. The Improvac vaccine used in Australia might be an option but some Danish experts are not keen on this product.

Because slurry disposal is such a problem many farmers just produce weaners and 5.2 million are exported to Germany annually, to be finished over the border. In addition many

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farmers are shipping slaughter pigs to Germany as they get a better price than that offered by Danish Crown.

This year there have been two Agromek shows, which may seem a little strange. The first one was held as normal in January. However, it suits farmers to buy new machinery at the end of the year and so the machinery companies lobbied to have Agromek held in November rather than in January, hence the show this November. This November the show was a mix of livestock equipment and field machinery, but the 2009 show will have a major livestock focus with the 2010 show featuring machinery. DanBred continue to do well, exporting 40,000 gilts this year, many of these to Russia. The company has reason to be pleased as it has just come out top in a breeding company comparison trial which took place in Nordrhein -Westfalen , Germany. DanBred stock were compared with stock from BHZP, Hulsenberger, JSR, LRS, PIC and Topigs, which are all found on German hog farms. Friland, which produces organic pork and is part of Danish Crown is not so pleased as the UK's Waitrose supermarket chain has stopped importing organic pork from Denmark. Friland is hoping to now export its organic products to France instead of the UK.

The November show had the usual variety of new products. Given the concerns about farrowing crates it's good to see companies continually modifying existing designs. Sdr. Vissing Staldinventar A/S had their 2008 Combisti model on show. A new design has eliminated the rear crate supports which means easier access for piglets to teats and hopefully increased milk intake. There are two creep areas, on either side of the sow, with a total area of 1sq metre. Only one creep is used initially. When the piglets are about 10 days old the piglets are allowed to lie in both creeps.



This new farrowing pen has two creep areas

Technology is being used ever increasingly in the industry and BoPil A/S has used it in their BoPil Pig Finder. With many gestation systems sows are kept in very large groups and finding individuals is a big headache. This new equipment simplifies the location of sows in big groups plus sows' movements can be tracked and any unusual behaviour is flagged up. Trimming sow's claws is always a tricky job and

Vitfoss were exhibiting a product that makes the job very easy. The FeetFirst® Trimming box is 2m x 50cm in area and has a false floor. The sow is moved into the box and as it's winched upwards the sow's legs protrude downwards, so the claws can be easily trimmed. The box can have wheels fitted for ease of movement around the barn. Not many things are new in our industry though – a UK company called Poldenvale made a similar box 30 years ago which rotated, turning the sow on her back.



The FeetFirst trimming box hoists sows off the ground allowing feet trimming to take place

Pigs are often ill and need treatment. Sometimes pigs need treating on a pen basis. Injecting all the pigs is a time consuming job and Danish Farm Design A/S has come up with its Medliq® dosing concept as an alternative. It's used with wet feeding systems, with medication being dispensed automatically from a container which is fixed to the down tube, with the container being moved from pen to pen as needed. Many times it's necessary to inject pigs. Broken needles are a big hazard and whilst producers are responsible for ensuring that broken needles are removed before slaughter, some pigs end up being slaughtered with a broken needle still in the carcase. To avoid this problem Grene A/S has developed its range of TOKU -E needles. These needles have a collar surrounding the needle barrel. In the event of a needle breaking, the collar remains attached to the needle barrel and can be easily seen and removed.

Slurry treatment and application equipment always feature at Agromek and this show was no exception. Slurry used to be considered a nuisance but is now a power source plus its manurial value has rocketed as the price of bag fertilizer has soared. Injection is used to reduce smell and evaporation but requires powerful equipment and is slow. An alternative system, Biocover, was launched by Thyregod A/S. Between 5 and 10% of the slurry is treated with sulphuric acid and a foaming agent. This combination is applied over slurry dispensed through another drag hose, acting as a seal. The acid reduces evaporation whilst the foam reduces smell.

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Targeting efficiency has produced 'greener' meat

By Jane Jordan

Pigs and poultry are efficient meat providers, and they are also ahead in the 'green stakes' according to genomics specialist Dr Huw Jones, Technology Translator with technology institute Genesis Faraday. Speaking at JSR Genetics' annual technical conference held at the university of Nottingham in the UK, he said that the quest to reduce costs and improve meat produced per tonne of feed has also helped these industries reduce their emissions per unit of product. However, the challenge now is to get policy makers to understand this concept and take account of this when drafting emissions and pollution control legislation.

Livestock systems account for 18 per cent of green house gas (GHG) emissions in CO2 equivalents, and are regarded as primary polluters so the livestock production industry is under intense scrutiny. It has become an easy target for legislative authorities but those drafting the regulations don't necessarily understand the specifics of each species and that needs to change, said Dr Jones. "As the world's population expands, the demand for livestock products is increasing - in line with affluence. Simply reducing meat consumption would not cut the environmental impact of livestock production," he explained.



Speakers at the JSR Technical Conference (left to right) Dr Grant Walling, Genetic Director JSR, Rob Cumine, FarmFirst Agribusiness Consultant, Prof. Diana Bowles, Wouter Seynaeve, Belgian pig producer, Tim Rymer, Chairman JSR Genetics and (at the back) Dr Huw Jones, Genesis Faraday

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Wrong track

Unfortunately, the measurements used by policy makers to assess the environmental impact of livestock production were not as accurate as they could be. Most calculations are based on GHG emissions generated per livestock unit (LSU), which distorts the picture. Measuring emissions per unit of product is more accurate, and it shows that pig and poultry production are heading in the right direction. For example, the GHG emissions from beef cattle, per kg meat product, are significantly higher than those generated by pigs and poultry. In general terms, the meat produced by these more intensive industries has far less of an environmental impact than ruminant production.

“Genetic development has also helped a great deal. Improvements to efficiency, in terms of productivity and feed conversion (FCR), means that pigs and poultry take less time to produce lean meat and yield more meat per tonne of feed - both of which are good ‘green’ concepts,” said Dr Jones. “FCR has been the key driver in terms of efficiency and that has also pushed down the impact of emissions. We’ve seen far less improvement with beef and sheep because FCR has not been the focus; these sectors have focused on growth rate,” he explained.

Year on year benefits

In pig production, the annual rate of genetic change at commercial level is very valuable. FCR improves by 0.02 kg/kg, growth rate over a lifespan increases by 6.4g and breeding performance benefits by 0.12 piglets per litter born alive on average every year. Genetic progress in poultry is even better with daily gain increasing by 0.8g, FCR better by 0.02kg/kg, improvement in killing out percentage of 0.1 per cent and a reduction in mortality by 0.07 per cent year on year. In laying hens output improves by 0.9 eggs/bird annually.

Research models suggest that the annual reduction in emissions from pigs as a result of FCR improvements is around one per cent. For broilers it is 1.2 per cent and for laying hens is about 1.3 per cent. These improvements are expected to continue, providing genetic progress is sustained. “Past genetic improvement has already helped to substantially reduce emissions per unit product. These results are probably an underestimate of the true overall benefits that genetic progress has given the pig industry,” said Dr Jones.

Both the pig and poultry sectors have demonstrated, perhaps indirectly, how breeding for greater efficiency can benefit green

credentials. These industries now need to build on these advances and promote the facts to consumers and policy makers. Breeding and genetic development is a valuable tool for reducing emissions from livestock production and both government and society must recognize its importance in terms of safe, efficient food production and environmental protection.

Bio-future will benefit farming

In another presentation, Professor Dianna Bowles CBE, Weston Chair of Biochemistry at the Centre for Novel Agricultural Products in York Farming said that farming has a bright and innovative future, because it’s integral to our survival. She told delegates at the JSR conference that agriculture was vitally important - it was just that global policy makers had not realized just how critical its biotechnical relevance and opportunities were for the entire planet. Professor Bowles has a real conviction for a bio-based economy. It could, and will, eventually replace the currently oil driven economy and its principles stack up, both theoretically and practically, she said.

“The sustainable production and effective use of plants is the key to the new bio-based economy, but a robust evidence base of science must underpin policy,” she reported to the fascinated audience of pig producers, scientists and industry representatives from Europe and North America. In her presentation, ‘Bioscience - the science of the 21st century’, Professor Bowles explained how biology could resolve many of the world’s energy and food shortages issue. With strategic, global vision a more sustainable future was achievable from a bioscience-led culture. Oil had taken millions of years to make and 200 years to consume. In essence, we were living on the past and finding new ways to reduce inputs and increase productivity was vital, said Professor Bowles. “We must move away from our reliance on oil, and the transition is now in progress. Bio-refineries do offer a way forward. They could produce all manner of resources - fuel, food, animal feeds, chemicals,” she said.

The chemical industry is based on petroleum feedstocks and now the major players are exploring bio-science as a means of supplying raw materials. Agriculture is now regarded as a resource industry because its products are more sustainable and will be vitally important. However, integrated strategies, between food and raw materials production would have to be implemented worldwide because there is only a finite amount of land available for farming. “Sustainable criteria must be applied equally to food and non-food crop production systems. Supply chains must be integrated for this to work effectively,” said Professor Bowles.

Many countries are already developing these strategies, but the EU, including the UK, has a long way to go. Professor Bowles said that Europe was currently operating one demonstration project, whereas the US is already running 200.

Nature’s way

She believed that the potential of lignocelluloses - the tough structure found within plant cell walls - as an energy source - was immense. Nature already proves this can be done - for example ruminants use enzymes to help break down and digest this vegetable matter, which eventually yields meat and milk. Employing enzyme technology to modify and open up the cell walls of forestry, agricultural co-products, energy crops and vegetable waste crops could open the door to all kinds of possibilities, said Professor Bowles.

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Pig producers smiling despite economic crisis

By John Riley

The worldwide economic crisis is having repercussions Down Under as markets for Australian products are under threat.

Despite the gloom and despondency and forecasts of a recession, Australian pork producers are smiling all the way to the bank. After two long years of high feed costs and low pig meat prices the last three months have seen high prices and reduced feed costs.

The pig meat price has risen from \$2.10 per kg for a 75 kg carcass in July 2007 to \$3.55 in late November 2008. The rapid increase is mainly due to the reduction in the size of the national sow breeding herd, which occurred 12 to 18 months ago. It is estimated that sow numbers have fallen from around 320,000 to about 250,000. In addition, the rapid fall in the value of the Australian dollar against the US dollar has discouraged imports of processed products. In July 2008 the Australian dollar stood at 90 cents against the US dollar but by late November had fallen to 63 cents.

The price received for pig meat is expected to remain firm for at least 10 months. It is difficult to forecast prices beyond that time since at least one major player is increasing sow numbers already. The drop in the value of the Australian dollar has increased export opportunities in both Singapore and Japan which had fallen to a mere trickle in the early part of the year.

Record summer grain yields and promising winter grain crops has resulted in a welcomed, but not anticipated, reduction in feed costs. Purchased feed, which was around \$500 per tonne (C\$400) in July 2008, has fallen to \$430 per tonne at the time of writing. For a small sample of clients, the movement in market returns and feed prices has resulted in the cost of production for the quarter ending September 2008, averaging \$2.25 per kg for an 80 kg carcass compared with an average market return of \$2.79. In June 2007 the cost of production for the same small sample of clients was \$2.58 when the market return was \$2.50.

The improvement in profit margins has come too late for many producers and it is confidently predicted that more will leave the industry as finance houses call in loans over the next 12 months.

In times of financial pressure, producers tighten their belts to survive. Expenditure on repairs and renewals has been drastically reduced over the last couple of years and staff levels have been cut. In many instances the lack of expenditure in both these areas has seen pig performance fall and therefore those producers have been unable to take full advantage of the new market conditions. It will require a significant investment to bring some units up to a standard comparable with best practice. Financial institutions will be miserly when considering applications for loans for improvements.

In addition, survival in many instances has only been possible by extending trade credit from feed companies usually from the normal 30 days to 90 days. Once outstanding debts are recouped further credit will be at a premium, resulting in those affected leaving the industry in due course. However, where businesses have been able to maintain a reasonable level of owner equity, the improvement in profit will see an upsurge in the adoption in new technologies to comply with legislation, particularly in dry sow housing and environmental management practices.

To see firsthand the structure and management of industries in other countries is a fascinating and stimulating experience. In November I spent some time in Papua New Guinea (PNG) visiting a 200 sow unit near Port Moresby and the site of a proposed unit on the island of Lihir which is part of the New Ireland group of islands in the Coral Sea. Despite the fact that all feed is imported, with the exception of locally sourced biscuit meal, the pig production is profitable due to the high price paid for the product. In addition, contributory factors are low investment in housing and in automation, coupled with low wages.

continued on page 70

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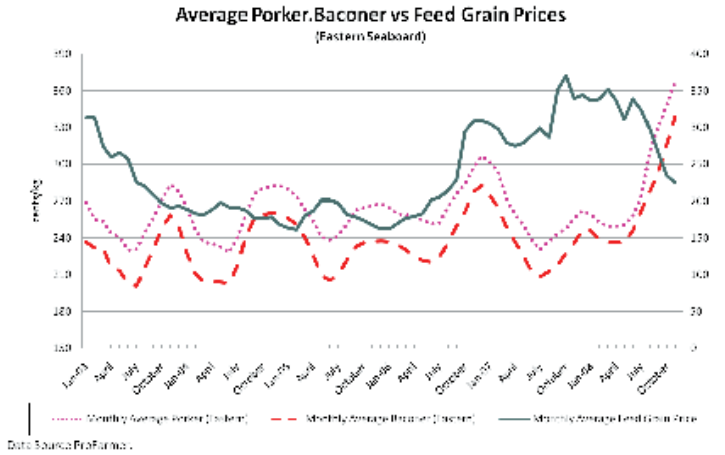


Pig transport in Papua New Guinea

The unit sells 85% of the production to the local abattoir and around 15% at the farm gate. The farm gate sale is often linked to a wedding, with the bride and bridegroom's family contributing to the selection and purchase of the animal. They arrive by taxi, car or truck in groups of 10-12 people all having an input into the purchase of a pig, which leaves the unit in the

taxi, car or truck with the purchasers. The pig is cooked for 24 hours on a bed of hot stones covered in banana leaves or soil. A 100 kg pig is worth about 1000 kina which is equal to \$US350. Pig feed costs about the same figure per tonne.

On Lihir the company which extracts 700,000 ounces of gold from the island each year is planning, through a special sustainable development fund, a 150 sow farrow to finish unit, a 6000 bird layer flock and facilities to accommodate 40,000 meat chickens plus an abattoir, feed mill and hatchery. The produce will be used to feed the company's 6,000 or so employees.



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Grilled Pork Fajitas

By Roy Kruse and Justin Chatlain, Alberta Pork



Yield: serves 4 ❖ Cooking time: 16 min

Ingredients

1 lb	(500 g)	pork shoulder blade steaks, boneless
1 tsp	(5 ml)	chili powder
1/2 tsp	(2 ml)	each ground cumin and coriander
2 tbsp	(25 ml)	fresh lime or lemon juice
1 tbsp	(15 ml)	each vegetable oil and water
1		each sweet red & green pepper, halved
1		large onion, halved
4		large flour tortillas
2		medium tomatoes, diced
1 cup	(250 ml)	finely shredded cabbage
1/2 cup	(125 ml)	shredded light cheddar cheese

Cooking Instructions

Place pork steaks in a plastic bag, non-metal bowl or sealable container. Combine chili powder, cumin, coriander, lime juice, oil and water. Pour over pork, seal or cover and refrigerate for 3 hours or overnight, turning meat occasionally.

Preheat barbecue on high, reduce temperature to medium. Discard marinade. Place pork steaks on the grill along with halved peppers and onion, cut side down. Close barbecue cover and grill pork for 8-10 minutes per side. Remove from barbecue, cut into thin strips and keep warm.

When softened and slightly charred, remove peppers and onion from barbecue. Slip skin off peppers and slice both vegetables.

Meanwhile, wrap tortillas in foil and warm on top rack of barbecue 5 minutes. Spoon pork strips, sliced onion and peppers evenly down centre of each tortilla. Sprinkle with tomatoes, shredded cabbage and cheese. Roll up to enclose. Serve with salsa, if desired.

Nutritional information

Grilled Pork Fajitas (Per 1 person serving)

Calories	430	Cholesterol	80mg
Fat	16g	Sodium	360mg
Saturated	4.5g	Carbohydrate	30g
Monounsaturated	8g	Fibre	4g
Polyunsaturated	2.5g	Protein	35g

• Events Diary



January

15-17th	Manitoba Ag Days	Brandon, Manitoba	www.aitc.mb.ca Contact Johanne Ross 1-866-487-4029
20-23rd	Banff Pork Seminar	Banff, Alberta	www.banffpork.ca Contact: Ruth Ball (780) 492-3651

February

4-5th	Manitoba Swine Seminar	Winnipeg, Manitoba	www.manitobaswineseminar.ca Contact: Dallas Balance (204) 475-8585
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March

7-10th	American Association of Swine Veterinarians 2009 Annual Meeting	Dallas, Texas	www.aasv.org Contact: (515) 465-5255
11-13th	VIV Asia	Bangkok, Thailand	www.viv.net Contact: +31 30 295 2772
18-19th	Alberta Pork Congress	Red Deer, Alberta	www.albertaporkcongress.com Contact: (403) 244-7821

April

1-2nd	London Swine Conference	London, Ontario	www.londonswineconference.ca Contact: (519) 482-3333
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May

31-June 4th	2009 International Conference on Pig Reproduction	Banff, Alberta	www.ICPR2009.com Contact: Sue Charlton (780) 492-0063
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June

3-5th	21st World Pork Expo	Des Moines, Iowa	www.worldpork.org
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September

15-18th	SPACE 2009 Animal Production Show	Rennes, France	www.space.fr Contact: +223 482890
19-22nd	Allan D Lemay Swine Conference	Minnesota, USA	www.cvm.umn.edu Contact: (800) 380-8636 or (612) 624-3434
30th- 2nd Oct.	PorkExpo and IV International Forum on Swine Production	Parana, Brazil	www.porkexpo.com.br Contact: +55 193252-1993

October

21st	Red Deer Swine Technology Workshop	Red Deer, Alberta	Contact: Bernie Peet (403) 782-3776
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November

24-28th	Agromek 2009	Herning, Denmark	www.agromek.dk Contact: +45 8675-4545
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Please let us know details of any events you would like to see listed above – call Bernie Peet on (403) 782-3776 or email whj@albertapork.com



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Yield %	75.13%	74.73%	+0.40
A.D.G. (lbs)	1.79	1.51	+0.28
Days in Finishing	107.24	126.76	-19.52
Mortality	3.30%	5.75%	-2.45

* Same auto sort barns - Same time frames - USA high health herd - Genesis females

This independent study indicated Genesis Durocs out grew, had better carcasses and had lower mortality than PIC 380's. PIC literature rates the 380 as better in carcass profitability and cost of production than PIC 408, PIC 280, PIC 327, Newsham XL, Dantred 771, Bahcock Duroc, Genetiporc Vivanda 300, Monsanto Choice Genetics EB5, Genetiporc 5000, Dantred 671, and Monsanto Choice Genetics EBX. Was it an error of omission that PIC did not show results of Genesis Durocs?

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