Western Hog Journal

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COVER PHOTO

Gary Hofer (left) and Reuben Hofer process piglet at Plain Lake Colony, Two Hills, Alberta.

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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• Editor's Notes

The issue of group sow housing is one that the industry will have to face sooner or later. Although there is no immediate political pressure, or indeed widespread demand from food retailers or consumers, it's wise not to ignore it completely. In Europe, the move away from stalls was brought about by legislation, to some degree in response to pressure groups, but also reflecting the intense public interest in animal welfare. It would have been better for producers if the change had been driven by the industry itself and the marketplace, giving a longer period to adapt. The trend was already in place 20 years ago and, even without legislation, European producers would be well down the road by now.

In North America, we are seeing the same signs that started the exodus from confined systems in Europe, with high profile announcements by several production companies. Clearly, these companies see potential marketing advantages in the future. The marketplace is driving change, which is good. If this trend continues, over a period of perhaps 20 years, the industry will change over to group housing, without any political intervention. The danger of not responding to consumer demand is that, if pressure from lobby groups increases considerably as it has in parts of the USA, governments may be forced to respond with legislation, which has already happened in several States.

The reality is that issues such as sow housing are likely to increase in profile, rather than go away, so the industry must respond in a positive way and be proactive. However, the general lack of experience and knowledge of group housing in North America, at least compared to Europe, is a challenge and a hurdle, which prevents change. Therefore, while the current state of the industry prevents investment in new facilities, it's a good idea to start learning about the principles involved, types of group systems, housing design and management methods. The learning curve was a steep one in Europe and there are 20 years of experience to draw on, in addition to the research and commercial experience in North America.

This issue of WHJ contains several articles about group sow housing, including two from Europe, which will hopefully start readers along this path. We will continue to bring you information on this topic in future issues in order to stimulate thought and improve your knowledge. I hope you find the articles of interest.

Bernie Peet

WHJ

Enzyme technology improves DDGS digestibility

Pig producers looking to reduce feed costs by including DDGS in their feed formulations can use the latest developments in enzyme technology to improve nutrient digestibility, says Danisco Animal Nutrition. Its research shows that although DDGS is highly fibrous and can be highly variable in nutrient availability, it can be useful in diet inclusions if they are managed carefully.

A trial conducted by the University of Illinois showed that adding both a new-generation phytase (Phyzyme® XP) together with xylanase (Porzyme® 9300) to a corn-soy pig diet containing 20 percent corn DDGS significantly improved digestible energy by 5.6 percent (175 kcal/kg). Ileal amino acid digestibility increased by around 4.5 percent and phosphorus digestibility improved from 22 percent to 51 percent.

"While DDGS is potentially a cost-effective and valuable feed ingredient, there are certain anti-nutritional factors which can limit its use in pig feed. We have a wealth of data to show that adding our specific xylanase to pig feeds containing highly fibrous grain by-products improves energy and nutrient digestibility and subsequent pig performance," explains Dr Gary Partridge, Technical Services Director, Danisco Animal Nutrition.

In the Illinois trial, adding xylanase together with a new generation phytase further improved nutrient digestibility compared to adding either xylanase or phytase individually.

"With feed prices at an all time high, pig producers need to exploit technologies available to them to maximize margins," said Dr Partridge.

Genesus sends swine genetics to Russia

Canadian breeding company Genesus has just completed the successful delivery of a four plane shipment of swine genetics to Kuban AgroHolding of Krasnodar, Russia. Kuban AgroHolding is a large agricultural complex with 70,000 hectares (173,000 acres) and over 5,000 employees. It has10 agrarian enterprises which include swine production and pork processing.

"Genesus thanks Kuban AgroHolding for its confidence in our genetics and people," says Jim Long the company's president. "We look forward to many years of cooperation. Russia is rapidly expanding its domestic pork production; Kuban AgroHolding will be a major producer and leader in technology adoption."

Fast Genetics adds molecular geneticist to its team

Saskatchewan-based Fast Genetics, a leading international swine genetics company, has announced the appointment of molecular geneticist Dr. Benny Mote.

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Dr. Mote will complement a strong team of existing geneticists at Fast Genetics and will be focusing on molecular genetics and the novel use of that technology as Fast Genetics continues to further evolve this piece of its genetic program.

Originally from a mixed livestock farm in Texas, Dr. Mote obtained a B.S. in Animal Science from the University of Nebraska before going on to complete a Ph.D. in Animal Breeding and Genetics at Iowa State University. Dr. Mote's research focused on identifying candidate genes associated with sow longevity under well known geneticist Dr. Max Rothschild. His education along with his background in livestock and judging bring a balanced and practical approach to genetics, says a company news release.

Manitoba hog industry supplier declares bankruptcy

By Myron Love

The crisis in the Canadian hog industry has claimed a rising star in the industry. In mid-April, the Nutri Health Group Inc. declared bankruptcy. The hog industry service and supply company reportedly lost $18 million last year. Nutri Health was formed only four years ago, in 2004, by a merger of Spectrum Feeds - a hog nutrition and consulting company started in 1992 by Harv Toews and Lorne Voth - and Pinnacle Nutrition, a poultry nutritional service and product provider which was formed by Cal Funk and partner Orville Friesen in 2001. The latter sold producers pre-mixes, base mixes, complete feed and supplements.

The merged company added to its holdings the same year through the acquisition of Maxima Feeds - a micro pre-mix plant in Morden, and Keystone Hatcheries which markets Bovan and DeKalb genetics and stocks day old Leghorn chicks. The company was based in Niverville just east of Winnipeg and had 55 employees. Nutri Health was involved in wholesaling feeding, brokering weanlings and operating hog barns.

Rob McMahon, a partner in Ernst & Young's bankruptcy and receivership practice, was quoted in the Winnipeg Free Press as saying that the company was hurt by a combination of the higher Canadian dollar, high feed prices and declining hog prices because of oversupply. When some of its American customers started breaking their contracts because of concern over the coming U.S. Country of Origin Labelling, Nutri Health kept some of the weanlings in the vain hope that prices would improve.

McMahon was quoted as saying that Nutri Health's bankruptcy was not the company's fault but rather the combination of circumstances. He held out no hope that the company will be able to bounce back should economic conditions improve.

The receiver is in the process of selling off Nutri Health's assets. McMahon is quoted as saying that there won't be enough money to pay off creditors other than the bank.

Livestock Care Conference attracts record attendance

New trends, latest research and leading strategies on farm animal welfare attracted record numbers to the Livestock Care Conference, held on April 4 in Red Deer. The annual conference is hosted by Alberta Farm Animal Care (AFAC), a partnership of Alberta's major livestock groups, with a mandate to promote responsible, humane animal care within the livestock industry. More than 230 livestock producers, students and other industry representatives were in attendance.

The main conference session was highlighted by a presentation by Dr. Temple Grandin of Colorado State University on "Are we there yet?" in livestock care. Grandin, one of the world's leading authorities on animal welfare issues and a designer of handling systems used widely in North America, delivered a presentation jam-packed with proven

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rules of thumb on how to handle livestock humanely and effectively. Throughout, she hammered on the need for simple, practical and measurable approaches to livestock care.

In a compelling talk, punctuated with nuggets of wisdom such as "Scoring prevents bad from becoming normal," and "See things from the animal's point of view," Grandin provided a comprehensive overview of what has worked and what still needs attention to improve livestock well being.

She emphasized the need for all involved with the issue, including policy makers, regulators and food company executives, to get an on-the-ground perspective of what happens on the farm to make sure all solutions make practical sense. "Eyes need to be opened up," says Grandin. "When things get abstract, that's when you get problems."

Providing an overview of international developments and trends in animal welfare was another leading international authority, Dr. John Webster of the University of Bristol in England. Webster was a founding member of the UK Farm Animal Welfare Council and is the original proponent of the "five freedoms" concept that has become central to emerging animal welfare policy and strategies worldwide. The concept states that farm animals should enjoy freedom from thirst, hunger and malnutrition; freedom from discomfort; freedom from pain, injury and disease; freedom to express normal behavior; and freedom from fear and distress.

Webster portrayed new expectations as moving toward a "virtuous cycle" model, where incorporating welfare standards as part of food quality assurance can deliver benefits to all parts of a "fork-to-farm" market-driven chain, including animals, producers and consumers. "This includes profit-generating opportunities for farmers related to producing a value added product, which are critical to their survival in a competitive environment."

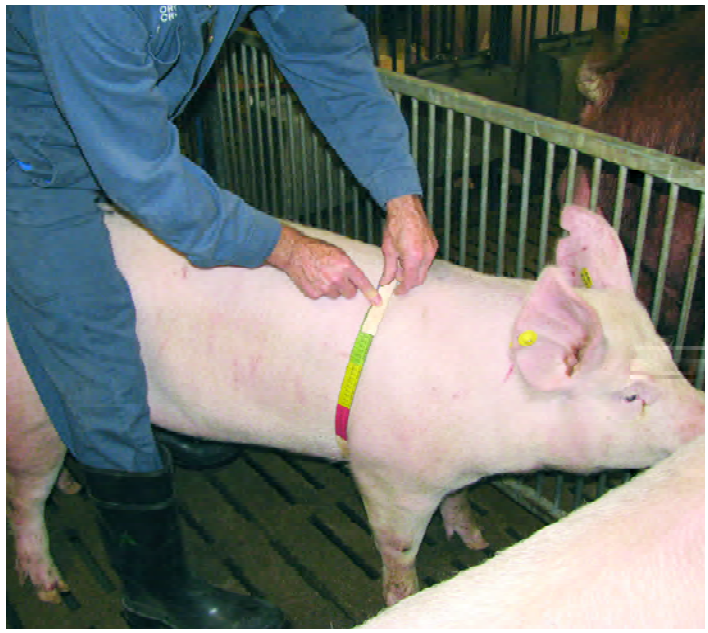
Dr. Ed Pajor from Purdue University in Indiana noted that emerging animal welfare policy from powerful world bodies such as the World Organization for Animal Health (OIE) is set to have a major influence on policy on North America and that the free market is already having a major impact, with major food companies increasingly preferring to work with suppliers who can provide proof of responsible animal welfare practices. "This means higher expectations for the livestock industry, but it can also mean a great opportunity for those who can provide this assurance," says Pajor.

Dr. John Church, Livestock Welfare Specialist with Alberta Agriculture and Rural Development, reported recent progress in providing livestock care assurance at meat plants in the province. Alberta has 50 licensed red meat plants, all of which have been audited for livestock handling and stunning practices.

Measuring tape checks gilt weight

Weight at first breeding for gilts has a major influence on first and subsequent litter size, in addition to lifetime productivity. However, few producers monitor gilt weight so that they can breed gilts within the optimal 135-150kg range. Recently published work at the University of Alberta has shown that weight is closely correlated with heart girth, measured just behind the front legs and in front of the udder. As a result a gilt measuring tape has been developed, which indicates when gilts should be bred. When the gilt is in the correct weight range, this is indicated by a green section in the tape, but when she is too light to breed, this is shown by a red section.

The measuring tape is available from the University: call Jenny Patterson on (780) 492-0063



The gilt measuring tape developed by the University of Alberta

Manitoba Pork launches ad campaign protesting proposed legislation

By Myron Love

The NDP Government of Manitoba's efforts to pass legislation permanently banning hog production expansion in most areas of the province is stirring up a hornet's nest of opposition. The Manitoba Pork Council, for one, has launched a $200,000 ad campaign opposing the initiative while more than 100 individuals and groups have registered to speak on the proposed Bill 17 in the Legislature.

The MPC ad campaign, which was launched in mid-May, included 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?" "We are getting a lot of hits on our website, too," says Andrew Dickson, the MPC's general manager.

Dickson believes that Bill 17 - which would specifically ban any hog barn expansion or building of new hog barns in the areas covered by the legislation - is merely a political gesture to a wing of the provincial NDP. "The bill would have no effect in restricting the flow of nutrients into Lake Winnipeg which the legislation is supposed to be addressing," he 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."

Dan Overall, director of policy with the Manitoba Chambers of Commerce, says that the Chamber members can't see the logic in Bill 17 either. "We are very disappointed with this proposed legislation. The government cites a recent Clean Environment Commission report on the industry, but the Commission report said nothing about imposing a moratorium on the hog industry. Passing legislation like this, that is not based on science or reason, sets a dangerous precedent. This issue resonates strongly with our members. We will be speaking against the bill."

Overall points out that Bill 17 will cost lots of people their jobs in rural areas. The MPC estimates that the hog industry in the province accounts for 15,000 direct and indirect jobs and contributes $1 billion a year to the provincial economy.

Hearings on Bill 17 were scheduled to take place prior to second reading as WHJ went to press.

Workshop will focus on practical management

Speakers at the forthcoming Red Deer Swine Technology Workshop will be focussing on practical management related topics aimed at increasing productivity and profitability. Topics include "Achieving a 90% farrowing rate", "Optimizing feed efficiency", "Practical feed budgeting" and "Calibrating, monitoring and managing ventilation systems". Workshop Coordinator Bernie Peet says that the workshop's focus reflects the need in the industry for good practical advice. "After the events of the last year, it's very important to implement management techniques that result in high performance and our panel of speakers are all people with hands-on experience and a proven track record."

The event moves to a one-day format and will be held on Wednesday, October 22nd at the Harvest Centre, Westerner Park, Red Deer. Registration costs $75, with a special "5 for the price of 4" package available. Contact Kate or Kyla of ConvenionAll Management at (403) 244-7821 or 1-800 267-9180 or email swinetech@conventionall.com

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US Farm Bill clarifies M-COOL

Adapted from Farmscape

The final passage of the 2008 US Farm Bill will end much of the uncertainty surrounding the pending introduction of US Mandatory Country of Origin Labelling, believes Steve Meyer, the president of Paragon Economics. This establishes the final basic framework for M-COOL and clears the way for the US Department of Agriculture to draft rules. Meyer notes that the 2008 version moves implementation from September 2008 to March 2009 and reduces the number of potential labels from five to four.

The first of these would be "Product of Country X" which would include imported meat products from Canada. Such product currently has to be labelled when crossing the border into the US, but it will now have to be identified as such at retail level. "The second category will be 'Product of the US' which is pigs born, raised and slaughtered in the U.S. and then there will be 'Product of Canada and the US' which would really apply to any pig that has anything to do with Canada," Meyer explains. "If it was born in Canada, raised and slaughtered here or born and raised in Canada and imported for slaughter that label would apply."

Although there are four categories, in the case of pork it is effectively three, since the US does not import pigs from countries other than Canada, Meyer adds. He says previous experience indicates that, once Mandatory COOL takes effect, industry will be given plenty of time to adjust and to clear product that does not comply through the channels of commerce.

Canadian Swine exporters sign deal with China

A Memorandum of Understanding (MOU) has been signed between the Canadian Swine Exporters Association (CSEA) and their counterparts in China, the National Swine Industry Association.

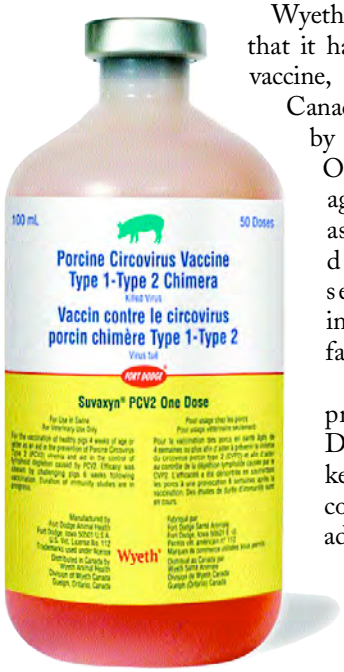
The MOU aims to identify areas of common interest upon which a business alliance will be developed. Chinese swine breeders' primary interest is to improve meat quality. The majority of Chinese operations are under 50 sows. Canada is recognized for having expertise in improvement and production technology and personnel training and has the strongest, healthiest genetics in the world to supply the Chinese herds. These needs and strengths, coupled with Canadian breeding stock available for export, have the potential to benefit producers in both countries, says a news release from CSEA.

"China is a very important market for Canadian exporters," notes Rosemary Smart, International Marketing Program Coordinator (CSEA). "Forty-six percent of the world protein consumption is pork. Sixty-five percent of the total meat consumed in China is pork."

As a next step, the CSEA will be opening an office in Beijing by November of 2008 and will have a Canadian trained, Chinese national swine expert who has already worked, representing Canada, in the Chinese swine industry for many years.

• New Product Showcase

Wyeth circovirus vaccine now available in Canada



Wyeth Animal Health has announced that it has begun to distribute its newest vaccine, Suvaxyn® PCV2 One Dose, to Canadian pork producers. Widely used by US producers, Suvaxyn PCV2 One Dose is proven to protect pigs against porcine circovirus associated disease (PCVAD), a devastating disease that causes severe and long-lasting economic impact on Canadian producers' farms.

With only one dose required for protection, Suvaxyn PCV2 One Dose offers producers a number of key advantages. In addition to the convenience of single-dose administration and a short 21-day withdrawal time, trials performed with Suvaxyn PCV2 One Dose by independent researchers in the USA demonstrate significant prevention of viremia and lymphoid depletion, even in pigs co-infected with PRRS virus. Additional studies show significant reduction in mortality and treatment costs as well as improvements in average daily gain compared to non-vaccinated pigs.

More importantly, due to dedicated manufacturing processes, Wyeth is able to produce this vaccine in abundance, ensuring an adequate supply of product for Canadian pork producers. Suvaxyn PCV2 One Dose is currently available in 50-dose (100 mL) vial presentations.

Wyeth has also recently launched www.stopcircovirus.com, a new website to support Suvaxyn PCV2 One Dose and to provide information on PCVAD to producers and veterinarians. "We are really excited about this new site," commented Dr. Carol Jakel, Canadian swine product manager for Wyeth. "With information on the virus, the disease process, control strategies and great links to other PCVAD information sources, www.stopcircovirus.com has something for everyone involved in the pork industry."

Suvaxyn PCV2 One Dose is available exclusively from your veterinarian. For more information, ask your veterinarian, visit www.stopcircovirus.com or contact Dr. Carol Jakel at 519-837-2040, ext. 4767.

Bio-Mos® receives approval from CFIA

Global animal health company, Alltech announced that one of their signature products, Bio-Mos®, has recently received approval from the Canadian Food Inspection Agency for its product description in swine and poultry feeds.

According to the agency, Alltech is now allowed to make the following statement in Canada: "Bio-Mos is a yeast cell wall supplement for swine, broiler and turkey feeds, improving efficiency of gain and average daily gain in these species."

"The approved statement on Bio-Mos in Canada represents a major step forward for Alltech and the animal feed industry," said Dr. Pearse Lyons, President of Alltech. "This approval now allows Alltech, as an all-natural animal health company, to explain the benefits of Bio-Mos to the Canadian feed industry."

This product's approval follows in the footsteps of Ecocert Canada's allowance of Bio-Mos for organic use in animal feeds.

With market presence of 15 years, Bio-Mos distinguishes itself from imitation products on the market, says the company. The product is supported by over 700 research trials (university, peer reviewed, practical) and currently 88 of these trials exist as peer review publications and several others are pending this status.

For more information on Bio-Mos or Alltech, visit www.alltech.com.

Feed and water system affects performance of lactating sows

A recent experiment carried out at Michigan State University looked at the effects of two ad libitum feeding and watering methods on the performance of lactating sows. The first was a self-fed wet/dry feeder and the second a hand-fed feed system with a separate water source. In the wet/dry feeder, feed and water were dropped into a trough, with the sow deciding how much feed and water to release. Because feed and water became mixed together in the trough, the sow also determined the wetness of the feed consumed. In the hand-fed system, sows were given dry feed twice daily in a J-shaped feeder that was independent of the sow's water source. Total feed disappearance per sow during a 20-day lactation was greater with the wet/dry system than with the hand-fed system (120 vs. 110 kg, respectively). The sows fed with the wet/dry feeder also had greater body weight gains during lactation than hand-fed sows (6.2 vs. 1.85 kg, respectively). Backfat depth change during lactation did not differ between treatments, nor did the percentage of sows displaying estrus by day 11 post-weaning. Piglet weaning weight was greater (6.63kg) with the wet/dry system than with the hand-fed system (6.12kg). The sows' average daily water intake and total feed wastage during lactation did not differ between treatments. However, sows using the wet/dry feeders wasted less water than those with the hand-fed system (15 vs. 232 L, respectively). The authors noted that the difference in waste water volume would result in a significant variation in costs associated with manure storage and distribution. In conclusion, use of a sow-operated wet/dry feed-water system in lactation, which provides sows choices of when to eat, how much to eat, and if dry feed should be mixed with water during consumption, enhances sow appetite, improves litter growth performance, and wastes less water than a hand-fed feed-water system.

WHJ comment: With the vastly increased nutritional demands on todays sows, any means of improving the amount of feed consumed during lactation will be beneficial because there is a direct relationship between body weight loss during the suckling period and subsequent litter size. The 10kg difference in total lactation feed intake is considerable, even though it did not result in a difference in backfat at weaning or wean to estrus interval. However, the biggest benefit was in weaning weight, which increased by over 0.5 kg. Bearing in mind the effect of weaning weight on subsequent growth rate, this is an extremely valuable improvement. The difference in water wastage between a drinker over the trough and a regular crate-mounted nipple is quite staggering and is another reason for considering a wet/dry type feeder. Overall, this trial indicates the big impact of lactation feed intake on sow performance and suggests that producers should be paying more attention to this crucial area.

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Reference: J. J. Peng, S. A. Somes and D. W. Rozeboom - Effect of system of feeding and watering on performance of lactating sows, J. Anim Sci. 2007. 85:853-860. doi:10.2527/jas.2006-474

The use of hormone treatment for single-AI gilt matings

Optimal timing of artificial insemination (AI) in gilt breeding programs is crucial to ensure successful fertilization and improve reproductive efficiency. Heat detection is a key component of the effective use of AI, but is time consuming and labour intensive. The use of hormone treatment to control the timing of ovulation can eliminate the need for heat detection and facilitates the use of fixed-time AI procedures. Recent research has demonstrated that porcine luteinizing hormone (pLH) can reliably synchronize ovulation in weaned sows as a part of fixed time AI protocols, but its application in gilts for this purpose has not been studied.

In a study carried out at the University of Alberta, 45 cyclic gilts received altrenogest (Regumate, Intervet) treatment for 14-18 days, followed by 600 IU of equine chorionic gonadotropin (eCG), given 24 hours after the last altrenogest. They were then treated with either 5 mg pLH, 750 IU human chorionic gonadotropin (hCG), or with saline (controls), 80 hours after the eCG treatment. Injection with pLH or hCG will induce ovulation.

Estrus detection and ultrasound scanning was performed every 8 hours, beginning 8 hours before the pLH/hCG/saline treatment to determine the time of onset of estrus and ovulation. The pLH and hCG treated animals were inseminated at 32 hours and, if ovulation was not yet confirmed, again at 40 hours after the pLH/hCG treatment. Control animals were inseminated 16 hours following the initial detection of standing estrus and then every 24 hours until ovulation was confirmed.

The results of the trial showed that the pLH and hCG treated gilts ovulated sooner after treatment compared to the control group (43.2, 47.6 and 59.5 h, respectively). Gilts treated with pLH exhibited significantly less variation in the timing of ovulation than the hCG or control groups. Ovulation rate and number of embryos recovered was highest in the pLH treated gilts and lowest in those treated with hCG. For gilts given pLH or hCG, the diameter of the largest follicle prior to the onset of ovulation (8.1mm and 8.1mm respectively) was smaller than control animals (8.6mm). Embryo quality, evaluated using total cell counts and embryo diameter, was not affected by hormone treatment.

WHJ comment: Fixed-time AI, with a single insemination, has been successfully used for sows following weaning. These results indicate that pLH can be used in cyclic gilts, and will reliably synchronize ovulation without detrimentally affecting ovulation rate, number of embryos or embryo quality. This suggest that pLH based fixed-time AI protocols could also be applied in gilts.

Reference: K.L. Degenstein, R. O'Donoghue, J. Patterson, E. Beltranena, D.J. Ambrose, G.R. Foxcroft and M.K. Dyck - Synchronization of ovulation in cyclic gilts with Porcine Luteinizing Hormone (pLH), Advances in Pork Production (2008) Volume 19, Abstract #26

The effect of space and group size on finisher performance

With the current shift in the industry toward housing pigs in groups of 100 to 1,000 per pen, questions have been raised as to whether pigs can perform as well in large groups as they do in small ones. Recent work at the Prairie Swine Centre examined how housing finishing pigs in two group sizes and at two floor space allocations affects production, health, behaviour, and physiological variables. The studies looked at the effects of small (18 pigs) vs. large (108 pigs) group sizes provided with 0.52 m^2/pig (crowded) or 0.78 m^2/pig (uncrowded) of space on production, health, behaviour, and physiological variables.

Large group finishing systems with auto-sort are becoming more popular in North America

Eight, 7-8 week-long blocks, each involving 288 pigs, were completed. The average liveweight at the beginning of the study was 37.4kg. Overall, average daily gain (ADG) was 1.032 kg/day and 1.077 kg/day for crowded and uncrowded pigs respectively, which was a highly significant difference. Differences between

the space allowance treatments were most evident during the final week of study.

Pigs in the crowded groups spent less time eating over the eight-week study than did pigs in non-crowded groups. However, average daily feed intake (ADFI) did not differ between treatments. Overall, ADG of large-group pigs was 1.035 kg/day, whereas small group pigs gained 1.073 kg/day. Average daily gain differences between the group sizes were most evident during the first two weeks of the study.

The investigation found that, over the entire study, large groups were less efficient than small groups. Although large-group pigs had poorer scores for lameness and leg scores throughout the eight-week period, morbidity levels did not differ between the group sizes. Minimal changes in postural behaviour and feeding patterns were noted in large groups.

An interaction of group size and space allowance for lameness indicated that pigs housed in large groups at restricted space allowances were more susceptible to lameness. Although some behavioural variables, such as lying postures, suggested that pigs in large groups were able to use space more efficiently, overall productivity and health variables indicate that pigs in large and small groups were similarly affected by the crowding imposed in this study.

The trial indicated no difference in the response to crowding by pigs in large and small groups. Little support was found for reducing space allowances for pigs in large groups.

WHJ comment: There is no doubt that the North American pork industry has enthusiastically embraced large group grow-finish systems in order to obtain the benefits of auto-sorting equipment, which leads to more optimal market weights and saves labour. However, little is known about the implications for pig performance and welfare. This study suggests that space allowance has a bigger effect on growth than group size, although ADG was better for the small groups. The suggestion that pigs in large groups make better use of space and therefore need less space per pig seems to be disproved by this work. Even though there are disadvantages in both performance and some measures of welfare, the trend towards large groups is likely to continue due to the magnitude of the benefits.

Reference: B. R. Street and H. W. Gonyou. - Effects of housing finishing pigs in two group sizes and at two floor space allocations on production, health, behaviour, and physiological variables. J. Anim Sci. 2008. 86:982-991. doi:10.2527/jas.2007-0449

Lactose inclusion levels in phase 3 nursery diets

A recently reported experiment, conducted at three universities in the USA, involving a total of 1,320 crossbred pigs, was carried out to assess the effects of various levels of lactose in diets during phase 3 (weeks 3 and 4 post-weaning) of a 4-phase starter

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The inclusion of milk products such as lactose in nursery diets leads to improved growth rate

program. Pigs were weaned at 15 to 20 days at an average of 6.2kg and allotted to 5 treatments. All pigs were fed a complex phase 1 diet containing 20% lactose for the first week post-weaning followed by a complex phase 2 diet (15% lactose) during the second week. Phase 3 diets containing 0, 2.5, 5.0, 7.5, or 10.0% lactose were fed for weeks 3 and 4, and then a regular, corn-soybean meal diet was fed for an additional 1 to 2 weeks (phase 4). The source of lactose was Dairylac 80, which contains 80% lactose. The phase 1, 2, and 3 diets were prepared at one site. Pigs were weighed and feed intake was determined at weekly intervals. There were 8 replications at each station for a total of 24 replications per treatment with 5 or 23 pigs per pen.

As expected, ADG, DFI, and feed efficiency (FCE) were not affected during the initial 2-wk period when all pigs received the same diet. During weeks 3 and 4 (phase 3) when the 5 levels of lactose were fed, ADG and ADFI increased linearly with increasing levels of lactose, but FCE was not affected. ADG and ADFI reached a numerical plateau at the 7.5% inclusion level of lactose during phase 3. Compared with pigs fed the diet without lactose, the 7.5% level of lactose resulted in 350g of additional weight gain coupled with 420g of additional feed consumed per pig during phase 3, and most of the additional weight gain (294g) was maintained through to the end of the 5- to 6-week study.

Table 1: The effect of varying lactose levels in phase 3 nursery diets

	Lactose (%)				
	0	**2.5**	**5**	**7.5**	**10**
Start weight (kg)	10.40	10.30	10.20	10.30	10.30
Intake (g/day)	723	724	735	753	752
Gain (g/day)	532	534	547	557	558
FCR	1.36	1.36	1.34	1.35	1.35

WHJ comment: Formulation of nursery diets is always a balance between the inclusion of highly digestible raw materials such as milk by-products, the cost of the diets and the performance achieved. Because increased growth in the nursery phase leads to faster growth right through to market, the benefits cannot be accurately quantified by carrying out just a trial in the nursery. However, these results suggest that pigs respond to dietary lactose during the mid to latter phase of the nursery period and that the response was obtained under different management and facility conditions. Cost-effectiveness was not commented on, but will vary depending on the cost of milk products.

Reference: G. L. Cromwell, G. L. Allee and D. C. Mahan - Assessment of lactose level in the mid- to late-nursery phase on performance of weanling pigs. J. Anim Sci. 2008. 86:127-133. doi:10.2527/jas.2006-831

WHJ

Census confirms producer devastation

The April census data showed the extent of the devastation being wreaked in the Canadian pork industry, with almost one-fifth fewer (19.3%) producers than in the same month of 2007. Total pig numbers for the country were down 11.7%, indicating that the exodus was mainly among the smaller producers. Atlantic Canada showed the biggest drop in total pig numbers, with a massive 25.5% drop and Alberta and Saskatchewan both showed a 16.8% reduction. Other than British Columbia's fall of 6.9%, the lowest drop in numbers was in Quebec, where the ASRA program helps to maintain hog prices.

Table 1: Percentage change in pig numbers – April 2007 to April 2008

	CAN	AB	SK	MB
Total pigs	-11.7	-16.8	-10.3	-2.0
Breeding stock	-4.6	-7.1	-3.3	-1.4
Other pigs				
< 20kg	-9.6	-15.4	-7.8	-5.3
>20kg	-17.2	-19.1	-22.1	-13.7

In the western provinces breeding pig numbers dropped most in Alberta, at 7.1%, while Manitoba had just a 1.4% reduction in sows, gilts and boars. However, in the East, Ontario fell 7.9% while, as might be expected, Quebec was the lowest with 2.9% fewer breeding animals. The under 20kg category showed substantial reduction in numbers in Alberta, BC and Ontario, with -15.4%, -25.2% and -14.4% respectively, while losses were lower in Manitoba (-5.3%), Saskatchewan (-7.8%) and Quebec (-5.0%). Reflecting the huge trend towards shipping young pigs south of the border, Saskatchewan's pigs in the over 20kg category fell by 22.1% and Alberta's by 19.1%, while Manitoba's numbers fell by 13.7%. During the first 3 months of 2008 an estimated 2.9 million pigs were exported, a 25.9% increase over the same period last year. At the same time, domestic slaughter of hogs slipped 1.1%, although this number is likely to increase sharply as supplies of market hogs dry up.

All eyes will be on the July census figures, which are likely to show further reductions. Although anecdotal evidence suggests that the number of producers making the decision to leave the industry is now far fewer, it will likely be another six months before pig numbers stabilize.

Prairie Swine Centre suspends operations at Elstow unit

Reflecting the current malaise in the pork industry, the Prairie Swine Centre announced on May 9th that its PSC Elstow Research Farm would be suspending operations due to the unprecedented losses in the pork business. The unit, a 600-sow farrow to finish barn, designed to support research work in a commercial-style barn, opened in April 2000. The mandate of

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the facility is to address the needs of the pork industry for research work using a size and scale typical of the commercial industry. Research to address these needs will continue to be the focal point at the remaining Prairie Swine Centre facilities.

Dr. John Patience, President and CEO of PSC Elstow Research Farm, acknowledges the magnitude of the disappointment and distress this decision has on its employees, as well as on the staff at Prairie Swine Centre, and indeed on the broader Canadian pork industry. "The fact that all pork farms in Canada and virtually every other pork producing nation in the world are being devastated by the current market conditions is little solace to the many people who have worked hard to operate the farm and have come to rely on the knowledge generated from the research conducted there". "We have long-term confidence in the future of the Canadian pork industry as a favoured supplier to meet the growing demand for the world's most popular meat protein; however the particular circumstances of this barn make it unviable in the short-term. From the beginning, the strength of this business was its mirroring of real commercial production conditions. In the end, these parameters such as debt structure, the devaluation of the US dollar upon which Canadian pork prices depend, unprecedented increases in grain and protein meal prices and underestimating the impact of research functions on an operating farm has resulted in this business decision to suspend operations until conditions improve."

In spite of this setback, a new initiative started over two years ago is now complete. The $2 million renovation at the original barns located at Prairie Swine Centre will reduce operating costs, making the farm a more competitive pork producer.

Alberta strategy focuses on added value and better marketing

The final draft report on the Alberta pork industry's revitalization strategy is now completed and details were presented to the province's pork producers at two open industry meetings at the end of May.

"This strategy is about leading our industry in a new way," says Herman Simons, Alberta Pork chairman and Tees, Alta. pork producer. "It's called 'The Way Forward' because our industry is in unprecedented distress and we believe that we need to develop new options if pork producers are to survive this distress and have sustained profitability in the future."

The strategy was developed by Toma and Bouma Management Consultants and the George Morris Centre, who in turn consulted with appropriate resources both nationally and internationally. The first pillar of this broad analysis, a state-of-the-union report, was completed in March and made available to producers. The report, entitled "The Way Forward, The

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Situation Assessment of the Alberta Pork Industry," outlined the situation the industry faces and reviews developments from around the world as a basis for evaluating new options.

"The second pillar report, which is just being released, is the actual strategy for moving ahead with repositioning our product in the marketplace," says Simons. "The Alberta Pork board has reviewed the draft document, but before we move through final approval, we wanted to give producers an opportunity for direct input. This will be important as we work together with industry stakeholders to implement this strategy."

The strategy vision, he says, is a highly connected pork industry capable of delivering differentiated, high quality, safe pork products in a sustained manner, with the flexibility to respond to continually changing markets and market conditions. The strategy seeks to move the industry out of the highly competitive and unprofitable production of low-cost bulk pork products. Instead, the industry focus will be on producing high-value pork products in demand by consumers in domestic and global niche markets.

The repositioning strategy basically covers four areas, says Simons. First is to establish system integrity in production, processing and marketing to create a highly connected industry through proactively managed supply chains between the processing sector and producers.

Second is to develop new product marketing capability, the establishment of new business-to-business skill sets that develop long-term supply relationships with a set of targeted markets and customers.

Third is to address cost challenges by developing strategies to reduce the two major cost items facing pork production: feed grains and labour.

Finally, the goal is to create a favourable business environment, ensuring that the industry has the necessary public and private services, tools and instruments to successfully compete in a global meat industry.

"We realize this is not an easy path to the future for pork producers and that there are no simple solutions to our challenges," says Simons. "However, the report has identified several strengths within our industry and we have confidence in the ability of our producers and processors to work toward capturing those in a realistic fashion.

USDA agrees to help US pork producers

The US National Pork Producers Council (NPPC) commended the Bush administration for its decision to lend assistance to US pork producers to help them weather the current economic crisis in the hog business and announced in May. The US Department of Agriculture (USDA) is purchasing up to US$50 million of pork products, which will be donated to child nutrition and other domestic food assistance programmes.

NPPC representatives had previously met with agriculture secretary Ed Schafer to urge him to take immediate action to address a crisis that over the past seven months has cost the pork industry more than $2.1 billion, says a news release from the producer organization.

Economists have estimated that the industry will need to reduce production by at least 10% - meaning a reduction of 600,000 sows - to restore profitability. Such a cutback, however, could result in less-efficient packing plants closing, less manure for crop fertiliser and correspondingly a need for more man-made, foreign-produced fertiliser, a hike in pork retail prices because of a smaller supply and lost jobs, says the NPPC.

"The action by USDA to buy additional pork will benefit America's pork producers, the US economy and the people who rely on the government's various food programs," said NPPC president Bryan Black. "It will help our industry reduce the herd and thereby bring supply and demand back into balance and allow producers to continue to provide consumers with economical, nutritious pork."

EU production falls and prices increase

There now seems to be some light at the end of the tunnel for European pig producers following a reduction in herd size in most countries. This has now led to strengthening prices, although industry leaders have pointed out that there is still a long way to go before producers are profitable again. Reports predict that pork production within the EU as a whole will be 4.1% lower in the final quarter of the year compared to 2007.

British pig production, with its high production costs, is still under major pressure and sow culling has been running at the highest level in Europe. In January the number of breeding stock slaughtered rose by 46%; in February, the increase in comparison to 2007 was 40% and March saw a growth of 18%. Having halved in size over the last 10 years, the industry looks set to shrink even more.

Prince Charles waded into the battle British producers are having with supermarkets to get a fair share of the retail price of pork. "My heart goes out to all those farmers who are facing such desperate problems as a result of the huge rise in feed costs," said Prince Charles in a message to the pig industry. "Thanks to the enormous efforts of BPEX (British Pig Industry Executive) and the National Pig Association, there is a growing awareness of the problem, and those retailers who are raising their prices as a result should be congratulated. However, little, if any, of the increase is being passed down the chain to the farmers and, unless urgent action is taken, this country's pig sector, which has never received subsidies, could be decimated.

This would be a tragedy for this country which produces some of the finest quality pigs and which operates according to the highest standards of husbandry and animal welfare," said the letter.

Spain, the second largest producer of pigs in the EU, is also feeling the pinch, according to pig industry association Anprogapor, which says its members are struggling with rising feed costs. It estimates that 15 per cent of the 70,000 pig producers in Spain have now ceased production. Production costs are currently around €1.20 per kilo of delivered weight, while market prices half-way through 2007 were reaching around €0.90, says a report.

Anprogapor says the situation is unsustainable and that around 200,000 sows have been taken out of production. The result has brought an increase in market prices, but it is not high enough for more farmers to reach profitable levels.

A four-year long drought is exacerbating the situation and provincial governments continue to press for water supplies to be drafted in from neighbouring countries such as France.

Danish producers have always taken a long-term view of the ups and downs of the hog cycle, but their confidence appears to have been shaken by events over the past year. Urged by their industry leaders to stick it out until prices improve, many have decided enough is enough and quit the business. Total pig numbers were down by 10.4% in April 2008 compared with the same month last year, with a similar drop in the number of sows.

Australian shock at lack of government support

Australia's pig farmers expressed shock when their hope of import safeguards and extra support for the industry were dashed with the publication of the final report to the Federal Government from the Productivity Commission (PC), which was looking into the effect of cheaper imports on the poor profitability of producers.

Australian Pork Limited (APL) CEO Andrew Spencer said that the industry is imploding due to cheap imports of frozen pig meat. Added to this situation is high grain prices that are making local production completely unviable, he said. "To continue to ignore the fact that all of Australia's pork imports come from countries that actively subsidise their pig farmers and their pork industry with tax payers funds, laughs in the face of fair trading conditions and a free trade environment." Mr Spencer said 70 per cent of bacon and ham are sourced from overseas countries. Despite the high levels of on-farm efficiencies gained by Australian pig farmers over the past five years, Mr Spencer said the industry cannot compete in "this distorted, totally unbalanced trading environment".

«WHJ»

Measures of lifetime sow performance

By Matt Culbertson, PhD, Smithfield Premium Genetics Group

A valuable focus area?

In an increasingly complex and competitive industry we must expect continually greater return and efficiency from all parts of our production system. Over the last cycle of industry improvement we have made great strides improving pigs weaned/mated female/year by increasing litter size and better managing and minimizing the impact of the non-productive females in inventory. The next cycle of reproductive enhancement should focus on the true underlying efficiency of full utilization of replacement gilts delivered, pigs produced per lifetime of the sow, and pigs produced in the targeted parities of optimum performance.

Many economics favour increased utilization of incoming gilts and retention of breeding females through early parities. Undoubtedly, the cost of continuously producing high quality, high health replacement gilts has continued to climb in recent years through the combined impacts of grain, facility, energy and genetic fees. The leverage reduction of increased pigs produced over a productive lifetime can help to off-set this cost inflation. Additionally, improving these dynamics helps to reduce the total multiplication demand, creating the opportunity for increased production capacity focused on low-cost, high quality commercial pig production. Increasing the percentage of pigs produced from mid-parity sows has also been identified as an opportunity to improve downstream pig health and performance.

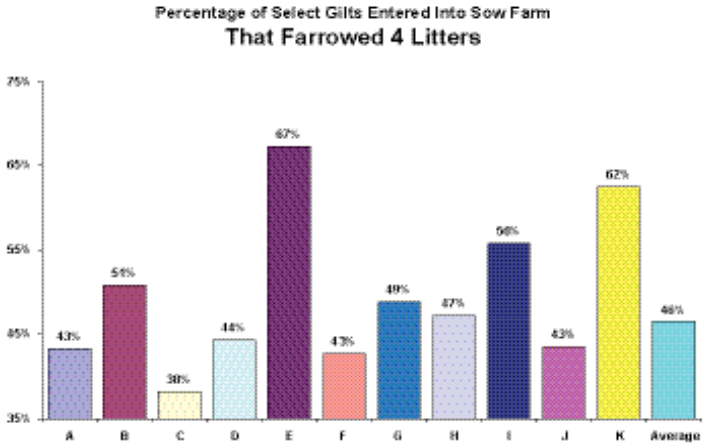
How should we measure?

Mention measuring a "lifetime" metric and the first thing that often comes to mind is annual birthday parties and chronological age in years. However, this measure does not accurately reflect our goals for this performance metric and is incomplete with respect to the efficiency of a breeding female's productive lifetime. Assuming that the ability of a production system to introduce and retain replacement gilts through the optimum parity structure is our key metric of success, it becomes critically important to align our measurement system with our end goal to allow for maximum awareness and improvement.

Within our system we have evaluated multiple potential metrics to try and allow razor-sharp focus on the delivery of improved performance. Initial studies were conducted to try and separate out the primary areas of difference between the higher-performing and lower-performing portions of our system. In an attempt to allow for further illustration of where underlying differences were present, performance was evaluated at each reproductive milestone that a breeding female achieves as she progresses through the herd - i.e. breeding and farrowing at each parity.

The findings of our initial reviews suggested that our system not only had great variation between the higher and lower-performing portions (Figure 1) but that the greatest source of this variation was found through early parities of gilt entry to Parity 2 (Figure 2). In fact, once breeding females farrowed their second parity the retention rate was very similar between all farms evaluated (Figure 3). This information was then utilized to develop a system report that highlights and illuminates the opportunities within our system to further enhance system improvement. This report creates the opportunity for our production system to not only track system-level dynamics but also to drill-down to specific segments or farms for more detailed understanding.

Figure 1: Observed variation for breeding female retention across several production facilities.



What should we expect?

Ultimately all of this information and system knowledge should be utilized to generate performance improvements. After reviewing information and gaining increased understanding, the following targets might be considered as production goals:

Percentage of select gilts delivered to achieve production milestone:

P0 Breeding Event - 93%
P1 Farrowing Event - 86%
P3 Farrowing Event - 65%

Figure 2: Retention variation between higher and lower retention facilities through the first 2 litters.

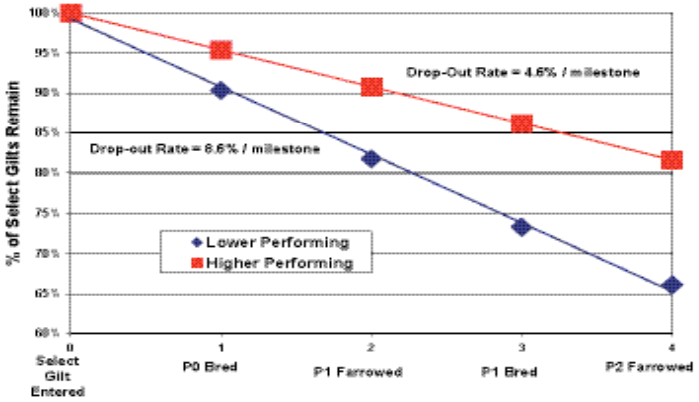
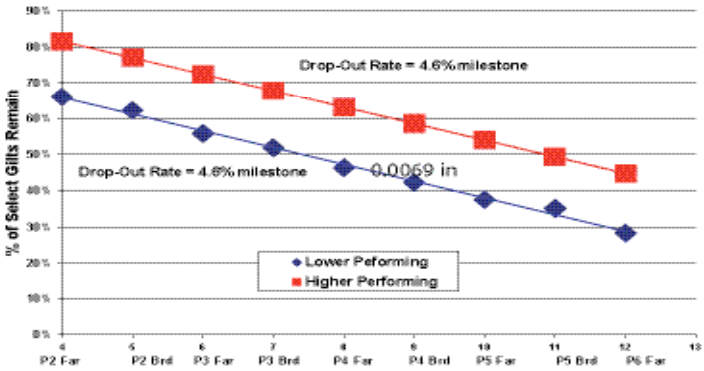


Figure 3: Retention variation between higher and lower retention facilities after farrowing 2nd parity litter record.



Summary

Successful introduction of replacement gilts and retention through their early parities is a tremendous opportunity to improve the performance and profitability of a pork production system. By accurately measuring and monitoring factors contributing to these areas, pork producers should be able to identify opportunities specific to their facilities and develop enhanced management strategies to improve performance.

Take Home Messages

- Large variation exists with respect to the successful introduction and retention of high value replacement gilts
- Quantifying that variation is important to allow management to focus on the biggest opportunities
- Early stages of productive life appear to offer the greatest opportunity for improvement

Improved gilt management can boost breeding herd efficiency

Improvements in gilt development programs can lead to major increases in breeding herd efficiency, says Dr. George Foxcroft of the Swine Research and Technology Centre at the University of Alberta. Proper selection and management of replacement gilts in purpose-built Gilt Development Units (GDUs) has a proven impact on lifetime non-productive days (NPDs), he points out. "The trend towards larger breeding sow herds seems to be decreasing the efficiency of breeding herd management." With replacement rates in North American herds of 60-70%, he says, there are many negative consequences for the gilt. "A larger pool of replacement gilts is needed to meet increased replacement requirements, which leads to overcrowding and negatively impacts health and welfare. Also, breeding herd parity distribution is unstable and biased towards lower parity females." And, he points out, gilts are often bred below the optimum weight in order to meet breeding targets and pressure to meet targets also results in less fertile gilts being bred using hormones to get them to cyde.

To reverse these trends, effective gilt management programs are urgently needed that will meet replacement targets from a smaller pool of gilts, and with gilts with improved lifetime breeding performance, Foxcroft believes. This will ultimately reduce annual replacement rates (target for top 30% of breeding herds should be <50%), improve sow "fitness", decrease sow death losses, and increase labour efficiency and space utilization, he suggests. "By making gilt management more efficient, we improve both the utilization of space and labour, and often achieve for the first time a flow of eligible (service-ready) gilts within the design specifications of the gilt facility."

The key objective of the breeding herd is to produce a reliable supply of piglets for the nursery, at a consistent weaning age and weight. "The single biggest factor determining the number of pigs born and weaned per week is the number of females bred, with the second largest influence being farrowing rate," Foxcroft says. "A well-managed GDU system ensures a constant supply of gilts per week, which stabilizes the parity structure of the herd and also improves longevity. It also prevents the tendency to retain sows for breeding that should really be culled, in order to meet breeding targets."

Gilt selection critical

Whether gilts are reared in house or purchased from a breeding company, identification of "select" gilts at as early an age as possible is a critical part of a successful gilt development program, believes Foxcroft. This process involves three steps:

Pre-select 1: This occurs at the time the gilts leave the nursery. At this time gilts must have good conformation, 12-14 teats and be free of hernias or ruptures. "As more data become available, it may also be appropriate to exclude gilts with inadequate growth rate at this stage," notes Foxcroft. "Also, after gilts leave the nursery an opportunity exists to 'condition' them to achieve adequate weights and body condition at puberty to sustain lifetime performance."

Pre-select 2: This should occur at around 140 days of age, Foxcroft says. "Ideally, gilts will be assessed for weight, growth rate and backfat depth at this time. Gilts should achieve a targeted growth rate at this stage to justify the investment in gilt that will follow." The lack of acceptable growth performance inevitably results in excessive gilt NPDs being accumulated to reach an acceptable breeding weight, or more usually, a high risk of these gilts being bred below target weight and leaving the breeding herd after producing a single litter, he notes. At "Pre-Select 2" gilts will be further examined to ensure that all gilts have good conformation, locomotion, 12-14 teats and are still free of hernias, ruptures and other ailments.

Final selection: The number of gilts required to enter the stimulation phase will depend on the breeding requirements of the herd. "Approximately 125% of breeding gilt requirements should enter the stimulation phase (expecting 22% not to spontaneously cycle and 3% to be culled for other reasons) to obtain the required number of gilts that are naturally cyclic within 40 days," Foxcroft explains. "If the target number of gilts needed to enter the gilt pool cannot be met with truly 'select' gilts, the balance of breeding requirements can come from 'opportunity' gilts as a last resort."

Induction of puberty

The age to begin puberty stimulation will depend on a number of factors. Generally, a younger age at stimulation corresponds to a decreased age at puberty, but requires more days in stimulation; conversely, older gilts at stimulation are typically older at puberty, but require fewer days of stimulation (Table 1). However, stimulating gilts at an earlier age has several benefits, notes Foxcroft. "Stimulation at a young age enables the producer to identify gilts that are most

Table 1: The effect of age at first gilt stimulation on the onset of puberty

Days of stimulation	Age stimulation started/ % of pubertal gilts	
	140 days	160 days
20	53%	67%
30	77%	84%
40	96%	93%

From: Prairie Swine Centre/Univ. of Alberta SRTC, 2003

sexually mature. Stimulating gilts early also permits a producer to cull non-cycling gilts as market animals, reducing the number of gilt NPDs and the financial cost to the producer." Another important reason is that gilts can be better managed to achieve the correct target weight (135 - 150 kg) and body condition at breeding. And, notes Foxcroft, early stimulation allows a producer to synchronize estrus in gilts using products like altrenogest and thus meet breeding requirements from a smaller pool of select, or service eligible, gilts. Finally, early stimulation of gilts permits producers to take advantage of the increased productivity of gilts bred at second or third estrus, he says.

Research into the effect of age at first boar stimulation shows differences between starting at 140 days of age or at 160 days. "In one of our studies, when gilts were exposed to the boar from 140 days onwards, 77% of gilts were pubertal within 30 days of stimulation," Foxcroft explains. "However, when stimulation is delayed to 160 days, 84% of gilts had recorded first estrus by the same 30-day cut-off, so this is most efficient in terms of labour and space utilization"

Boar stimulation method

Direct contact between the boar and gilt is many times more effective than any process of fence-line exposure, says Foxcroft. Moreover, the boars must have high libido during use. "They are either salivating and 'chatting' - thus releasing a potent package of boar pheromones - or they are not. A boar that is not 'frothing' at the time of use is of relatively little value."

These differences in boar quality will translate directly into non-productive days due to inadequate boar power and boar quality, he suggests. "Either of the two methods of direct contact with boars used - boar taken to the gilt pen or gilts moved to a boar exposure area - initiated a flow of gilts in recorded heat some 10 days earlier than the very carefully controlled system of front-of-stall contact. Remember these extra 10 days involve frustration for both the boars and the barn staff, for no return!"

Early estrus as an indicator of lifetime performance

There is evidence to support the concept that the 75 to 80% of gilts that respond earlier to boar stimuli will have the best lifetime fertility, Foxcroft says, including data from a gilt development study conducted at the Prairie Swine Centre. Gilts attaining puberty by 180 days of age were deemed to be "select" gilts and classified as Early (EP), Intermediate (IP) and Late (LP) with respect to age at first estrus. Gilts were deemed to be "Non-select" (NP) if first estrus was not shown by 180 days of age. "Select" gilts were bred at third estrus, regardless of age or weight. "Non-select" gilts were added to

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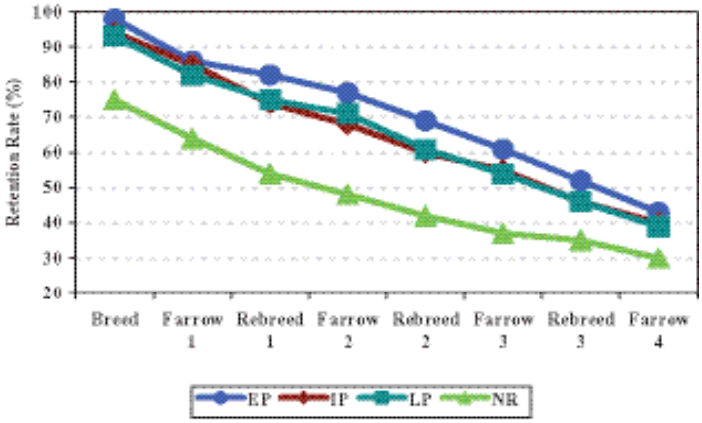
Direct contact between the boar and gilt is many times more effective than fence-line exposure

the gilt pool by production staff using available techniques such as mixing, additional boar contact and treatment with PG 600.

"As a percentage of the total number of gilts on inventory at the start of stimulation in each group, fewer 'Non-select' gilts were bred than any of the classes of 'Select gilts," Foxcroft explains. "Similarly, breeding herd efficiencies (NPDs/pig born) declined as age at puberty increased, when gilts were bred at third estrus irrespective of weight or age." Taken together, he says, these data lead to the obvious suggestion that response to a standardized protocol of boar stimulation can be used to identify the 75-80% of gilts that are likely to be most fertile. The trial also showed that retention rate in the herd was directly related to the length of time it took gilts to show estrus (Figure 1). "Taking these factors into account, and considering expected cost-benefits of efficient use of space and time, we recommend that the puberty induction phase begins when gilts reach 160 days of age or older and continue until they exhibit their first estrus or until 190 days of age, whichever comes first," Foxcroft condudes.

Figure 1: Breeding, pregnancy, farrowing, weaning, and rebreeding rate over three parities as a percentage of gilts originally on inventory



From: Prairie Swine Centre and University of Alberta, Swine Technology and Research Centre, unpublished data, 2004

Refinements to standardize breeding weight of gilts

Because of inherent variation in growth rate and rate of sexual maturation, and the lack of any clear relationship between these variables, a large variation in weight at first estrus exists. These large ranges in weight at first estrus present several problems to the producer. "Gilts that are heavy at breeding incur increased lifetime feed costs for maintenance and may cause welfare problems because of potentially larger physical size as mature sows," Foxcroft explains. "Conversely, gilts that are lightweight at breeding may lack the necessary body reserves to sustain body condition through several parities."

To overcome the problems associated with large variations in weight, a stricter selection program should be implemented, stipulating that all gilts weigh between 135 to 150 kg at breeding, Foxcroft believes. "With stimulation with boars at 160 days or older, and exclusion of gilts that have poor growth performance from the stimulation program, this usually means that something like 10%, 70% and 20%, respectively of gilts recorded in heat will need to be bred at 1st, 2nd and 3rd estrus to meet the breeding weight target of 135 to 150 kg," he condudes.

PG600 improves replacement gilt management

Changing from a haphazard gilt management system that failed to meet breeding targets to one utilizing well-managed boar exposure and PG600® (Intervet) treatment has resulted in significantly better performance in gilt-only herds within the Murphy-Brown herds in Virginia, USA. The improvements include more gilts bred per week, a higher percentage of multiple matings, lower returns to service, higher farrowing rate, larger litter size and more pigs weaned per week, Dr. Jeremy Pittman told delegates at the recent Swine Breeding Management Workshop.

"Prior to the new management program, gilts were moved to a finishing barn at 24-26 weeks of age for vaccination, identification and final growth," Pittman explained. "Casual fence-line boar exposure was performed, but no heats were recorded and animals were not yet identified. Large groups of gilts were brought into the breeding barn weekly and checked for heat by fence-line boar exposure." With this program, he says, the breeding barn gilt pool inventory increased, the pens became overstocked and the barn was more difficult to work in. Everyday work was exhausting and unrewarding. This frustrated employees, increased employee turnover and challenged management to question the parity segregation program. "Overall, poor gilt utilization, inefficient use of employee time and poor reproductive performance within the entire production pyramid resulted," says Pittman. "Needless to say, without knowing the estrus cycle in specific gilts (or even if they had attained puberty at all), breeding on a 2nd estrus or properly applying P.G. 600® was impossible."

The new gilt management program was designed to be a consistent process utilizing all the management practices and tools that were available. It was driven by using a combination of well-managed boar exposure and P.G. 600®. "We divided gilts into weekly synchronization/breeding groups. Each week, a new synchronization group was moved from the acclimatization barn into the designated synchronization barn," explains Pittman. "Gilts were moved weekly on Wednesday. Ten to twelve gilts grouped in pens were taken to one of two Intense Boar Exposure areas (IBE), based on the Boar Exposure Area (BEAR) system developed at the University of Alberta. In each IBE, two boar crates were placed in the middle of the pens, allowing 360 degree gilt-boar exposure." Boar exposure began immediately after movement, starting on Wednesday and continuing through Friday (3 days)," Pittman notes. "Entire gilt pens would be placed into each of the IBEs for 10-15 minutes. Each gilt was observed for signs of heat during this period and recorded on that group's pre-printed heat-no-service (HNS) list."

"On Friday afternoon, each of the gilts received a 5ml dose of P.G. 600®," he continues. "Thus, all gilts received boar exposure for 3 days prior to administration of P.G. 600®. It has been shown that 2-3 days of boar exposure priming may improve the percentage of gilts responding to P.G. 600®." The group of gilts would receive casual boar exposure over the weekend, defined by 10 minutes of fence-line contact. Beginning on Monday and continuing through Friday, each group of 10-12 gilts would return to the IBE for 10-15 minutes. A daily heat score was recorded for each gilt using the following system:

Score 0 – no signs, no interest

Score 1 – vulva swelling, slight/no interest in boar

Score 2 – vulva swelling, obvious interest in boar, but no standing/locking heat

Score 3 – vulva swelling, standing/locking heat

"Gilts that achieved a score of 2 or 3 were identified as Heat No Service (HNS) and placed back in their pens," says Pittman. "They remained in defined groups for two weeks before being moved to the breeding barn on Friday, just prior to projected second heat when they would be bred. Gilts scoring a 0 or 1 heat score were mixed, placed in 'opportunity' pens and provided physical boar contact until a heat was identified or until they were culled for non-response."

Gilts that entered the breeding barn and did not re-cycle in the projected synchronized week were given a second dose of P.G. 600®

on Friday of the projected breed week and bred if in heat during the following week. Gilts that did not respond to the second dose were culled within 21 days.

To evaluate the performance of the new program, key performance parameters were compared for the first 52 weeks of the new program to the 52 weeks prior to the program. "Despite a PRRS break during the period, with the new program, the farm averaged 6.7 more first services per week with 5.2% less repeat services," Pittman explains. "The percentage of multiple matings increased by 24.1% and conception rate improved by 8%. The farm increased the average number of gilts farrowed per week by 7.2 and improved farrowing rate by 7.8%. Total born increased 0.6 pigs per litter, born alive increased 0.3 pigs per litter and the percentage of litters with less than 7 pigs born alive decreased by 0.4%." The end result, he notes, was that the farm weaned 52.8 more pigs per week on average and increased output by 1.21 pigs weaned per gilt entered. "The number of weaned parity 1 sows transferred to downstream parity 2+ farms in the parity-segregated system increased by 7.1 per week. Gilt retention improved from 71.5% of gilts entered under the old system to 80.5% under the synchronization program."

The economic impact of the management changes was also considerable, Pittman points out. "Using weaned pigs as the sole measure of improved efficiency, a rough Return On Investment (ROI) calculationwas 5:1 assuming the worst case scenario, or 12:1 assuming the best," he says. "However, the calculations only took into account the increase in number of piglets produced versus the cost of PG600 and there are other factors that could be taken into economic consideration." Decreased gilt pool size, reduced non-productivedays, less cull gilts, lower labour requirement for the gilt pool and heat checking are all additional benefits, he notes.

"The reproductive improvements we have seen were most likely due to several factors associated with the P.G. 600® induction program," Pittman believes. "Estrus was induced and synchronized in large numbers of gilts, allowing for more predictable timing and number of matings per week." Heat detection and timing of insemination was more accurate with induced heat-no-service gilts, he adds. "We used the new program and hormonal manipulation to create a practical program that was more manageable by the farm staff on a day to day basis, without the need to be make-shift reproductive physiologists." However, because of the new focus and attention to detail in the gilt, he says, the farm staff became exposed to and learned more about her reproductive physiology and the estrus cycle. The net result was an overall improvement in reproductive efficiencyof the herd and entire system, he says.

"Gilt utilization and farrowing performance of these 'programmed' gilts have enabled us to better understand potential gilt performance, and benchmark accordingly across our entire system," says Pittman. "We strongly feel that this program provides us our best evaluation of gilt reproductive potential in a commercial setting." Based on the above results, the program has been introduced into the normal, mixed-parity commercial herds within the production system. So far, results have been favourable compared to previous years, however further, more detailed analysis needs to be completed, he notes. "Overall, we feel the synchronization program has added value to our system," Pittman condudes.

Today's sows need different management

Traditional management practices that were established even 20 years ago need to be re-evaluated if we are to capture the full economic potential of the modern breeding sow and her offspring, believes Dr. George Foxcroft. Recent work at the University of Alberta's Swine Research and Technology Centre suggests that today's sows are more resilient to deficiencies in nutrient supply during lactation and return to estrus quickly after weaning, even if they have lost significant body weight. However, the downside to such an early ovulation is that follicle quality may be impaired and embryo survival reduced. The answer, the research suggests, could be to delay ovulation through the use of hormone treatment, especially in young females.

"Previous literature has suggested that nutrient intake during lactation or litter manipulations such as partial weaning during lactation can have drastic effects on subsequent reproductive performance, especially in first parity sows," Foxcroft explains. "When considering weaning to estrus interval (WEI), the literature suggests that with feed restriction at any time during lactation, WEI is generally increased." However, he says, more recent similar trials with first parity sows are currently re-assessing the consequences for variation in WEI and other measures of weaned sow productivity.

Two recent metabolic studies that involved feed restriction late in lactation resulted in a consistent WEI among treatment and control groups. Additionally, in another split-weaning study a similar WEI was also recorded, regardless of treatment. "This is surprising considering that decreasing the WEI and increasing the number of weaned sows bred within a 7-day breeding week are considered to be key outcomes from the application of split-weaning techniques," says Foxcroft. "It appears as if these modern animals are better able to cope with detrimental conditions in lactation, which in turn translates into little difference in WEI."

The trend for a lack of treatment effects on key benchmarks of post-weaning fertility is also apparent when ovulation rate is studied. Again, in earlier studies, periods of feed restriction applied during late lactation produced a significant reduction in ovulation rate. "However, for the most part, in our recent studies with feed restriction, changes in ovulation rate have not been recorded," Foxcroft notes. "It now appears that in contemporary sows the main response to both feed restriction in late lactation, and the limitation on sow productivity that can be overcome by applying skip-a-heat breeding, is a decrease in embryonic survival."

"Although embryonic survival was also affected in earlier studies, the timing of the period of feed restriction seemed to be a critical aspect of this response," Foxcroft explains. "However, as WEI and ovulation rate were also affected in the worst case situations, a change in embryonic survival tended to compound other effects of feed restriction on subsequent fertility." In contrast, he says, recent studies (see Table 1) involving feed restriction in late lactation suggest that embryonic survival was a key variable in the absence of treatment effects on WEI and ovulation rate. Moreover, a sex-dependent loss of embryos was observed and, regardless of their sex, the surviving embryos are developmentally delayed, he notes.

Table 1: The effect of feed restriction in late lactation on sow reproductive performance and embryo survival data

Item	Control (n = 16)	Restrict (n = 17)
Wean-to-estrus interval (days)	5.3 ± 0.3	5.4 ± 0.3
Ovulation rate	18.3 ± 0.7	18.2 ± 0.6
Pregnancy rate (% of sows bred)	100	100
Day of gestation at slaughter	30.3 ± 0.2	30.1 ± 0.2
Number of live embryos*	14.4 ± 0.8	12.3 ± 0.8
Embryonic survival rate (%)*	79.2 ± 4.0	67.9 ± 3.9
Number of males	7.7 ± 0.6	7.5 ± 0.6
Number of females*	6.5 ± 0.6	4.7 ± 0.6

*P < 0.05 compared with Control sows.
From: Vinsky et al. (2006)

"Collectively, the results of these studies suggest that although these modern, first parity sows are able to come into estrus at consistent intervals and ovulate at the same rate independent of treatment, the emerging pre-ovulatory follicles are of poorer quality, and detrimental conditions during lactation compromise this quality even further," says Foxcroft. "This poor quality may be reflected in the size of the follicle prior to ovulation." The idea that follicular quality may nevertheless still be related to follicular size, is supported by skip-a-heat data in which follicle sizes increased by approximately 1mm on average in sows bred on the second post-weaning estrus and embryonic survival was also improved in this experiment.

The dynamics of follicle maturation has changed substantially over the last two decades of selection for increased sow prolificacy, Foxcroft believes. "First parity sows have smaller follicles, but these are still

hormonally active enough to trigger estrus and ovulation," he says. "These are reminiscent of the follicular characteristics described for prolific Chinese breeds like the Meishan." However, the lack of any delay in follicular development and ovulation presents us with a new dilemma, he believes. "Do we breed all sows when they first stand after weaning, or is there reason to consider techniques for delaying post-weaning ovulation to give better sow performance?"

Foxcroft believes that these recent results show that a catabolic state leads to the ovulation of relatively immature follicles. "The impact of treatments previously assumed to improve hormone status during lactation or at weaning, such as split-weaning or PG600 treatment, and thus accelerate follicular growth, may result in more sows being in estrus and bred within 10 days of weaning but may actually be detrimental to the quality of follicles ovulated, and more sows bred then translates into lower litter size born."

The development of management strategies that delay estrus and ovulation, thereby improving follicle quality, may be the most realistic way of improving overall post-weaning fertility of the first parity sow, Foxcroft suggests. "Given the positive responses in lower parity sows, skip-a-heat breeding still seems to be a serious management option to consider, with the potential to produce two extra pigs in return for 21 extra non-productive days" he says. "We have also started to re-evaluate the use of an oral progestagen to delay emergence of pre-ovulatory follicles for periods of less than 21 days." Recent research has shown that treatment for 7 and 14 days, so that sows show estrus about 14 and 21 days after weaning respectively, leads to better embryo survival at 30 and 50 days of gestation. At day 50, the sows treated for 14 days had an average of 13.6 fetuses, whereas the 7-day treated sows averaged 12.2 and the untreated sows 11.8.

"The use of oral progestagen to delay the return to post-weaning estrus for greater than 18 days appears to have potential for improving weaned sow productivity, comments Foxcroft. "Overall, the concept that this delay may result in the development of better quality follicles and result in an improvement in subsequent litter size born seems to be consistent with the results of this recent study." However, he says, a delay of 12 to 13 days to post-weaning ovulation in the 7-day treated sows (the 5-day period of altrenogest treatment added to the 7 day interval to estrus onset after withdrawing treatment) still may not have been sufficient to achieve all the benefits seen in the sows treated for 14 days that had a post-weaning to ovulation interval of approximately 20 days. "Some intermediate interval between weaning and first ovulation may be more economically justified," he suggests.

The need to develop management techniques that reflect the changing biology of contemporary dam-line females seems to be an urgent issue, Foxcroft concludes. "In view of this new knowledge, the key economic question that should drive the development of alternative management techniques in contemporary weaned sows will be a cost-benefit analysis of the trade-off between the high pregnancy rates and minimal NPDs after weaning in untreated sows, compared to the cost of extra NPDs incurred by delaying post-weaning estrus but improving the number and quality of pigs born."

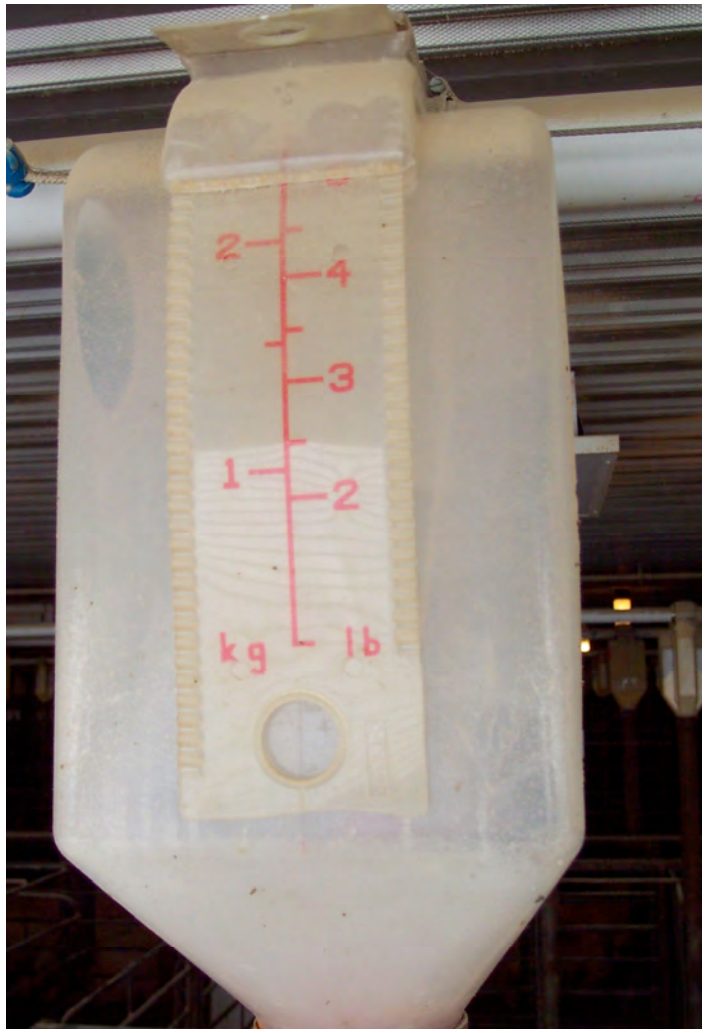
Achieving a 90% farrowing rate and 13 born alive

Targets for the breeding herd of 90% farrowing rate and 13.0 pigs born alive are realistic with good management, veterinarian Dr. Tom Riek told producers at a series of PIC Farm Manager Boot Camp meetings held across westem Canada in April. If these figures are not being achieved, the reasons must be identified and action taken, he said. The difference between the top 10% of herds in the PIC League List, which have an average farrowing rate, and the top third, with 85.8%, is equivalent to an extra one pig weaned per sow each year. In order to reach the farrowing rate target, returns to service must be around 8%, with a further 2% of dropouts due to abortions, discharges, NIPs and deaths, Dr Riek suggested.

"Regular returns, which occur at 18-23, 40-44 or 60-64 days after breeding, are usually when something went wrong at service, for example timing or semen quality issues, or in the first two weeks of gestation, before implantation," Dr. Riek explained. "Non-regular returns, which are usually 25-35 days after breeding, are related to the presence of less than five embryos beyond the implantation stage." The ratio of regular to irregular returns should be around 3:1, he noted.

Feed levels important

Giving adequate amounts of feed is essential for good reproductive performance, Dr Riek stressed. "From a metabolic point of view, reproduction is a luxury. Breeding can only happen when the sow's maintenance requirements are fully met." In the three weeks prior to breeding, the gilt's feed intake should be maximized, he said. "Also, during this time, any stress from movement, disease, lameness, vaccination or inadequate feed or water availability should be avoided." Similarly, weaned sows should be fed as much as possible between weaning and breeding and then fed to recover any body condition loss sustained in lactation, Dr. Riek said. "Thin sows not fed to recover body tissues could lose embryos or even return." He suggested a simple feeding program during gestation, based on the need to regain or control body condition. "Feeder boxes should be adjusted so that thin sows receive 6lbs per day in order to regain condition, to 5lbs in order to limit weight gain in normal sows and to 4lbs to control weight gain in fat sows," he advised. Body condition should be evaluated and feeder adjustments made four days after breeding and at weeks 4, 10 and 14, he said.



Regular adjustment of sow feeders is required to maintain the correct body condition

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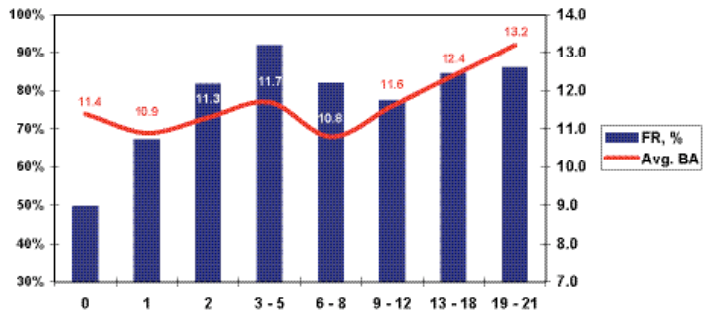
During lactation, sows should consume an average of 13lbs (5.89kg) per day or 280lbs (127kg) during a 21-day suckling period, Dr. Riek suggested. "In order to maximize feed intake, feed should be mildly restricted pre-farrowing and for 2-3 days after farrowing and then full-fed," he said.

Weaning to estrus interval has a major effect on both farrowing rate and litter size, with the maximum fertility occurring 3-5 days after weaning (see Fig. 1). From day 6 onwards, fertility drops and then recovers again after day 13. "In order to achieve the 90% farrowing rate target, it is essential to have as many sows as possible bred within the first 7 days after weaning," Dr. Riek pointed out.

Figure 1: Reproductive performance according to WEI duration



From: Poleze et al., 2006

Service timing and semen quality are key factors

Timing of insemination is another key factor in achieving a high farrowing rate. "Sperm survives for up to 24 hours in the sow's reproductive tract, but the eggs only live for 8-12 hours after ovulation," explained Dr. Riek. "The best results are obtained when sows are inseminated 0-24 hours prior to ovulation. However, although we know that ovulation takes place in the last third to the last half of the heat period, we don't know exactly when, so multiple mating is the answer." Good timing will result in 90% or more multiple matings, he said. "Using a simple system, with heat detection once a day, in the morning, is the best approach for many units. Sows are bred one hour after heat detection and then every morning as long as they are in solid standing heat, regardless of parity." However, gilts, returns and sows that have delayed estrus after weaning should be bred in the morning and the afternoon, ensuring that there is a minimum of 8 hours between matings, Dr. Riek advised.

Good semen storage practices are essential in order to ensure semen quality. "Semen must be stored in a narrow range of temperatures from 15-18°C (50-64°F)," Dr. Riek pointed out. "High temperatures are more detrimental to the viability of the doses than lower temperatures." One third of refrigerators were found to be at an unacceptable temperature in a survey published in 2005, he noted. "Make sure the refrigerator is working well by using a Hi/Lo thermometer to evaluate the internal temperature," he advised. "Also, do an annual check and service on the refrigerator before each summer." In order to ensure an even temperature for semen, room should be left around the semen containers to allow air circulation. Ideally, semen should be used within 4 days of collection to ensure maximum motility, Dr. Riek advised. "Use semen as fresh as possible and keep in mind the policy of first in-first out."

Culling of the less productive sows is necessary to boost overall herd performance, Dr Riek noted. "It's hard, if not impossible, to improve when you do not cut the bottom 20%," he stressed. Gilts that have not shown heat within 6 weeks of boar exposure and those with a low weight for age should be culled, he said. "Sows with no heat 4 weeks after weaning, sows that abort, sows with true vaginal discharges and second returns should also be removed."

Well motivated people are the key to success

Well motivated people are the key to a successful business and they need to be passionate about what they do to achieve excellent results, believes Dr. Jose Piva, PIC's Product Performance Director for North America. Speaking at a series of PIC Farm Manager Boot Camp meetings in western Canada, he said: "We may have excellent genetics, feed and technology, but without passion and drive we can't get the best results." The performance potential of today's pigs is much greater than 15-20 years ago, with 28 pigs weaned per sow being a realistic target on many farms, compared to 20 pigs/sow in the 1980s. "Yesterday's top performance is today's bottom performance," he commented. But, he noted, many farms do not wean as many piglets as they should, usually because of many small things that add up to make the difference. "The most expensive piglet is the one we don't produce or deliver," he stressed.

It is important to know the genetic potential of the breeding stock being used, Dr. Piva explained. "We need to know what the potential is and how far away we are from reaching it," he said. "If you realize 30% less than what the pigs can do, that's not good enough." But, he noted, we need to recognize the limitations of the production system and understand what is possible and what isn't. "We need to have realistic expectations and every barn is different." Also, we can't just use one measurement of production success, because the objectives of each unit are different, he said. "We may use pigs weaned per mated female per year, pigs weaned per week, quarter or year, farrowing crate efficiency, or weight of piglets weaned per year as a measure," Dr Piva said. "Our goal should be to get as many pigs as possible as long as they fit into the system flow and they are of acceptable quality and cost."

Dr. Piva stressed the interdependency between the people that work in the barn. "If the person working in the gestation barn feeds sows too much, sows won't eat during lactation, which causes all sorts of problems," he said. "People need to talk to each other and understand the implications of what they do." He also noted that people working with pigs must understand and respect their biology and basic requirements. "If we keep pigs in the nursery at a temperature of 20°C, we are not respecting the pig's basic physiology," he explained.

In order to improve performance we must change the way we do things, which means breaking existing paradigms, Dr. Piva said. "For example, with today's very large litters, it's become essential to split suckle piglets, whereas this wasn't necessary in the past."

Good results can only be achieved with well-motivated staff and many factors affect people's level of motivation, according to Dr. Piva (see Table). "If we explain the 'whys' of what we do, this provides motivation to do the correct job," he suggests. "Instead of just saying 'don't breed a gilt at less that 130kg', we should help people to understand the reasoning behind it." Good discipline is also important to motivation. "Staff can't just do what they want, otherwise this leads to frustration and lack of motivation." Above all, good communication is the key to motivation, Dr. Piva believes. "There is nothing worse than poor communication to de-motivate people," he said. "We need to communicate the production figures and discuss them to make people feel part of the team as well as clearly explaining our expectations of the individual." People must have clear direction and targets to keep them motivated, he stressed.

Some factors that affect motivation

- Training
- A clear understanding of what, how and why jobs need to be done in specific ways
- Positive recognition and rewards
- Job variation or rotation
- Instructive and positive discipline
- A good working environment
- Challenge and opportunity for advancement
- Flexibility in working hours and time off
- Company loyalty and remuneration
- Good communication and clear expectations

Motivation can be depressed by a number of problems, especially where there is too much pressure on staff, for example when the facilities are overcrowded or there is a lack of staff, Dr. Piva pointed out. "Poor production performance or a high level of problems is very de-motivating because people don't want to fail," he said. "Also, a lack of recognition of achievements is a reason for reduced motivation." Friendly competition between staff is healthy and increases motivation, Dr. Piva noted.

Providing the right facilities and equipment that enable staff to do a good job is essential, says Dr. Piva. "Having to use equipment that is broken or not working properly is very frustrating and de-motivating. Also, poor facility design or pig flow has the same effect." Motivation can be increased by better facility maintenance and by making improvements to genetics, health or nutrition, he said.

"If we have individuals who have a negative attitude, it will reduce the overall motivation of the team," Dr Piva warned. "Because of this, it is often best to replace negative or pessimistic staff."

Ultrasound scanning – more than just pregnancy testing

By Johannes Kauffold, Gary Althouse and Neville Beynon

In Europe, ultrasonography – for which the term "scanning" is used – has been implemented increasingly on swine production units. This technique is usually performed through the skin, usually of the abdomen, without the need to penetrate the animal via the rectum, as is the case in horses or cattle (Figure 1). The main purpose for scanning pigs is to test for pregnancy, indeed, scanning is superior to other methods of pregnancy diagnosis. The main advantage is that it allows for early use (starting day 20/21 after breeding; Figure 2A), combined with its accuracy at even this early stage of pregnancy (close to 100 %). The main disadvantage is the relatively high price of the equipment although, over recent years, prices have decreased dramatically and good machines are currently available for a reasonable cost.

However, scanning offers more than merely testing for pregnancy. With ultrasonography, both the non-pregnant uterus (Figure 2B) and the ovaries (Figure 2C) can be visualized. Imagine the many situations when you wanted to have a look inside the animal but failed for obvious reasons. Using ultrasound, gilts and sows are now virtually transparent! Besides pregnancy testing, this unique form of ultrasonography can be used for multiple purposes in breeding pig facilities. Those purposes are:

Figure 1: Procedure of transabdominal ultrasonography of pigs. A linear transducer is placed horizontally just above the last pair of teats onto the ventral right abdomen (1A).

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1. ***Checking the ovulation process:*** The ovary and all the ovarian structures that appear around ovulation are well described. This allows for checking when ovulation occurs in individuals and in groups of breeding sows. Scanning to check for ovulation is useful whenever there are questions relating to the breeding management and timing of insemination in particular.
2. ***Checking for puberty (i.e. sexual maturity):*** As the pig matures sexually and changes from the pre-pubertal to the pubertal stage, there is uterine growth and the gilts commence their cycling activity, with the first ovulation and subsequent development of corpora lutea or "yellow bodies" in the ovary. Scanning allows for the visualization of the uterus and the ovaries in both the pre-pubertal and the pubertal gilt and the assessment of both organs can give valuable information on sexual maturity. If the ovary is scanned, animals having only small follicles are considered pre-pubertal, while those having large, pre-ovulatory follicles or ovarian structures indicating completed ovulation (corpora lutea) are pubertal. If the uterus is used for assessment, the uterine size has proven to be a reliable measure of whether gilts are pubertal or not. In order to make this assessment, the uterus has to be imaged as a cross-section, then measured in two dimensions and the cross-sectional area calculated. Pre-pubertal gilts have a cross-sectional area of 1cm^2, while it is 1.2cm^2 in pubertal animals. Though separate assessment of either the ovaries or the uterus gives almost 100% correct diagnoses, maximum accuracy is achieved if the assessment involves both organs concurrently. Scanning to check for puberty might be desired in case of low gilt performance, in terms of low conception rates or small litter sizes.
3. ***Examination of females with reduced or complete cessation of fertility:*** If a female displays reduced fertility or absence of fertility, this can be for different reasons. Scanning is directly helpful if the reason is the female herself, with defects related to the ovaries and/or the uterus. Ovarian cysts are usually considered one main reason for the animals' failure to breed.

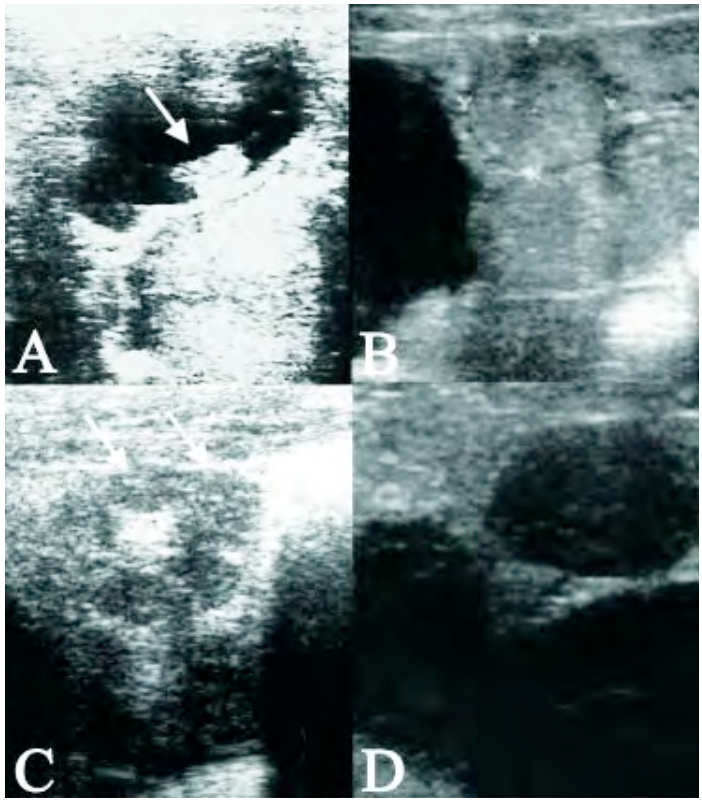

Figure 2. A): Image obtained from a gravid (pd+) pig showing an example of a uterine cross-section containing embryonic fluid and the embryo itself (arrow) on day 20 after breeding. B) Cross-sections of an ingravid (non-pregnant) uterus. C) Ovary with several corpora lutea. Two are marked with arrows. D) Ovary with large follicular cysts (black "pockets").

However, it is only polycystic ovarian degeneration (POD), where the ovary has only cystic ovarian structures, which is fatal to fertility, while single or multiple cysts accompanied by "normal" ovarian structures are more frequent but of lesser

significance. Cysts can indeed be identified using ultrasonography, (Figure 2D) and females with POD quickly culled, thereby reducing the number of non-productive days. Amongst females exhibiting fertility problems, many have uterine infections such as inflammation of the endometrium or lining of the uterus. Although the chronic inflammation is more prevalent, the acute type can sometimes be observed combined with a purulent vaginal discharge. Unfortunately, scanning allows only for the detection of acute endometritis, and recognition usually occurs on the basis of abnormal flocculent or clotted fluid within the uterus.

The echotexture is another parameter used to describe the appearance of the uterus in ultrasound images and uses the distribution and frequency of lighter and darker areas for description. The echotexture can be described as homogeneous or heterogeneous and undergoes normal physiological changes during the oestrus cycle. It is heterogeneous when females approach or are in heat and larger follicles are present, and homogeneous at any other stages of the oestrous cycle, for example when corpora lutea are present. Any deviation from the physiologically normal status might be considered abnormal and is associated with reduced fertility. A third parameter, uterine size, might also be helpful in assessment of whether a uterus is functioning normal or not. The size is determined as described for gilts and is given as the sectional area. Uterine size has been shown to correlate with uterine weight and the weight itself helpful in the diagnosis of uterine disorders. For instance, the mould toxin zearalenone, which can cause reproductive problems in pigs, has been associated with very small (light) and very heavy reproductive tracts.

With its multipurpose usage potential, ultrasonography can be much more than merely a procedure to test for pregnancy. Given that pregnancy diagnosis may be performed on day 20 or 21 after breeding, non-pregnant females can be detected right at the time they are presumed to return to service, so they can be subjected to very close heat detection supervision. The concurrent assessment of the ovaries and the uterus in these non-pregnant females gives additional benefit. As mentioned before, animals with POD can be culled immediately. However, as a number of non-pregnant animals will have corpora lutea or small follicles, producers might be willing to treat them hormonally to induce oestrus and/or ovulation. Finally, animals with obvious uterine alterations, such as abnormal intrauterine fluid or atypical echotexture and thus reduced fertility, can be quickly sent to slaughter. This entire procedure, in combination with routine pregnancy testing, including ovarian as well as uterine diagnosis, will certainly increase productivity through the reduction of non-productive days.

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Alberta Pork tackles labour shortage

Over the last few years, the availability of skilled labour, or indeed any labour at all, has been an increasing challenge faced by the Alberta pork industry. The only solution for most producers is to recruit foreign workers, but the process is long and cumbersome, resulting in a delay of up to 12 months before a new employee arrives. Alberta Pork has been working with Alberta Agriculture and Rural Development (AARD) and Service Canada since the Fall of 2007 to address producer concerns over this issue.

"As with all the livestock industries, the pork industry's success is vitally dependent on experienced managers and technicians as well as inexperienced people who wish to pursue a career caring for pigs," says Stuart McKie, Policy Specialist with Alberta Pork. The lack of available employees in Alberta is not a crisis unique to the pork industry, he notes. "It has come to the point where businesses are cutting back their hours of operation due to a lack of staff. Unfortunately, the livestock industry does not have this as an option except to close its doors completely. Without a dependable labour supply, production units can suffer either in productivity or possibly compromise animal welfare – two unacceptable solutions to this crisis."

The main delay is the time taken to obtain a Labour Market Opinion or LMO, a prerequisite to hiring a foreign worker. Applications to the Foreign Worker Recruitment Branch of Service Canada have been taking up to 30 weeks to process due to the large numbers received – over 80,000 applications over the last 12 months. However, more recently, processing times have been reduced to about half that time. Following discussions with Service Canada, it has agreed to review applications from producers who find themselves in a crisis situation with regard to labour. "The process involves Alberta Pork handling completed LMO applications from producers," explains Stuart McKie. "They are then checked to ensure applications are correct and complete prior to forwarding them to Service Canada, providing a means of 'quality control', so that all applications are of the required standard."

The applications are prioritized according to their urgency, with non-urgent applications going into the regular Service Canada administration system and urgent applications being dealt with on a case-by-case basis. Bernie Peet of Pork Chain Consulting Ltd has been contracted to assist with this project and is carrying out the day-to-day work on behalf of Alberta Pork. Alberta Agriculture and Rural Development has provided funding assistance. "Producers are encouraged to plan ahead and apply for an LMO in plenty of time, even if they don't need a worker immediately," stresses McKie. "The LMO is valid for six months and there is no fee to pay, so it's best to have one tucked away for a rainy day."

A throng of hopefuls waiting to register at the job fair in Manila

With a number of producers going out of business over the past year, some foreign workers have needed help to find new employers, although this still requires an LMO to be obtained because work visas are specific to the employer, the employee and the job. "There's no shortage of people wanting to employ a worker that's already here because it's a quicker process," says Bernie Peet. "However, the waiting time for an LMO has been the sticking point, but, working with Service Canada, we have been able to rush these through so that the foreign worker has not been left without a job or had to leave the country." Visa applications are processed at Citizenship and Immigration Canada (CIC) at Vegreville, which is currently taking about a month, he notes.

Murray Roeske of Alberta Pork interviews a candidate at the job fair

The second part of the Alberta Pork project is to establish a "database" of foreign workers that is available to producers so that they can select suitable individuals. This is being done by attending overseas Job Fairs, interviewing potential candidates and selecting the best for consideration by producers. In April, Murray Roeske, Alberta Pork's Field Services Specialist and Bernie Peet took part in a three-day job fair organized by AARD and held in the city of Manila, Philippines. Marvin Salomons and Scott Dundas of AARD coordinated the event, which included three other employers from the food processing industry. More than 1,400 Philippine job seekers attended the venue. Food processing employers interviewed 904 qualified candidates and made 241 job offers on-site. A total of 157 selected job applicants were interviewed on behalf of Alberta pork producers by Peet and Roeske over the three days. "The qualifications of these potential employees were found to be excellent, with a majority of them having a Bachelors of Science in Agriculture degree or are Veterinarians," comments Murray Roeske. "As English is the second language in the Philippines, all of the interviews were conducted in English and therefore, on-farm communications should not be a problem." Bernie and Murray returned to Alberta with 111 potential resumes and these are now available for review by producers.

Assisting the process in the Philippines was a recruitment agency called Golden Horizon, which has developed a good working relationship with Philippine government organizations and the Canadian Embassy in Manila. This has helped with processing times for visa applications and working with this company has also proved very cost effective in the applicant selection process. Once a candidate has been selected, Golden Horizon ensures that the process of obtaining the work visa goes as quickly as possible, shortening the time taken to get a worker into Canada.

Further job fairs, in Mexico and Europe, will be attended in the near future in order to maintain and develop a pool of potential workers for the industry. One objective of these overseas missions is to understand the processes involved in obtaining a work visa, especially the potential hold-ups, with the objective of reducing processing times. This involves contact with the Canadian Embassy and organizations in the country being visited that have an influence on the process. "We want to raise our profile and name recognition as a responsible employer, while working to make the process as efficient as possible," explains Stuart McKie.

If you would like more information about the Foreign Worker Project or help with recruiting a worker from overseas, please contact Stuart McKie on (780) 491-3527 or Bernie Peet on (403) 782-3776.

Alberta Pork gratefully acknowledges the assistance and financial support for this project given by AARD and especially the help given by Marvin Salomons, Scott Dundas, Alan Dooley and Ab Barrie.

Water medication systems

By Dr. Mike Brumm, Brumm Swine Consultancy, Inc., North Mankato, MN

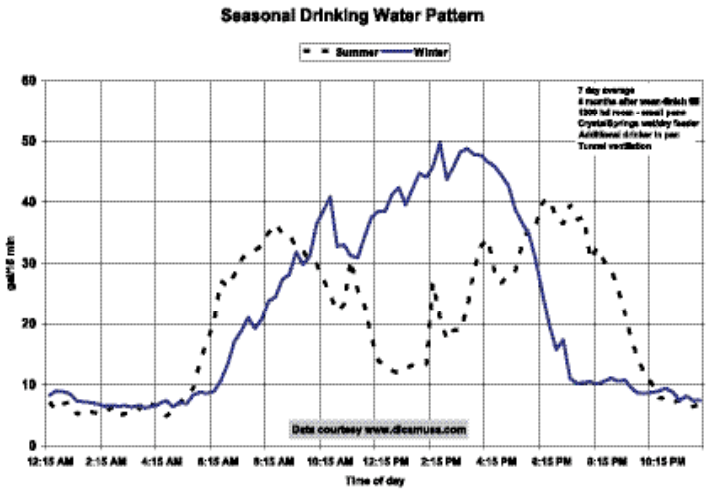
Increasingly, pork production systems around the world are using drinking water as the delivery mechanism for a variety of nutritional and health related products. These products can range from acidifiers and probiotics at weaning to vaccines to antimicrobials to nutritional supplements, etc. throughout the growth process.

Delivery of these products via the drinking water system most often relies on a pump and mixing chamber to incorporate these materials into the drinking water. In the US, most medicators are based on a fixed ratio of 1 part stock solution per 128 parts drinking water.

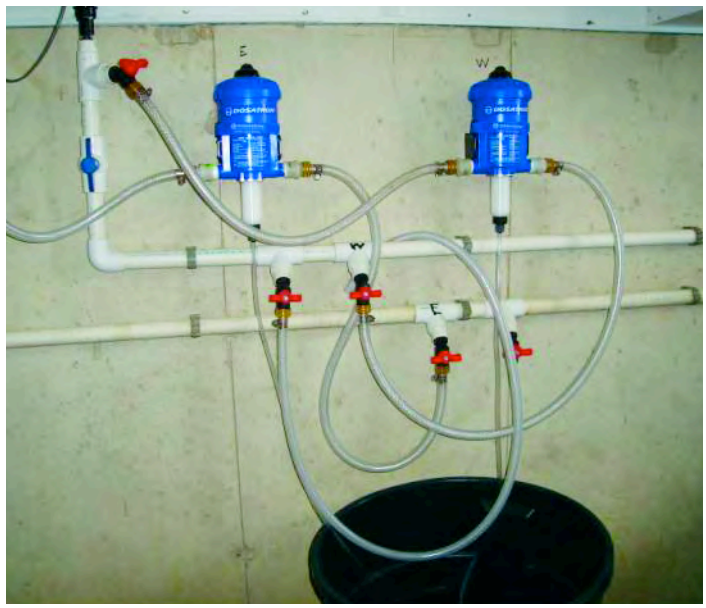
With the increased usage of water delivered products has come an increase in the risks associated with these delivery systems. The following are common mistakes made by US producers in using water as the delivery mechanism for a variety of products.

Many products, especially vaccines, require that the pigs consume the product within 4-6 hours of reconstitution. Recent data from Iowa State University suggests that 100% of weaned pigs will visit a nipple drinker within a 4-6 hour time period beginning at 8 am. Thus, timing of delivery of the product to the drinking water is of critical importance if all pigs in a population are to receive an adequate amount of the product.

Figure 1: Effect of season on 24-hour water usage pattern in a 1200 head wean-finish facility 5 months after weaning in central Nebraska. Data courtesy Dicamusa.com.



In thermo-neutral conditions, both feed and water usage generally begin increasing around 6 am in the morning, with a mid-morning peak around 10 am, followed by the day's peak in disappearance at 2-3 pm. By 6 pm, both feed and water intake have returned to a relatively low level. There is very little feed or water intake during the night. Drinking water disappearance, and by association feed disappearance, is minimal during late evening and early morning hours.



Two medicators for 2400 wean-finish pigs with 125 litre (33 gal) stock solution reservoir

If pigs are grown to slaughter in warm conditions (summer conditions in much of the upper Midwest), these patterns change. Feed and water intake now begins at approximately 4 am, with the morning peak at 8-9 am. This morning peak is followed by a mid-day decline in feed and water disappearance, with a resumption in intake in the early evening hours. Even in these conditions, there is limited drinking water usage during late evening or early morning hours.

In North America, commonly used water medicators are often rated at a capacity of up to 26.5 litres (7 US gal)/minute. In almost every instance, they are connected to water lines in the facilities that have a capacity of 21 liters (5.5 gal) per minute (19 mm/$^3/_4$" inside diameter piping). This suggests that the sizing of the water delivery pipes in the facility are the limit to water flow. However, it is quite common to see water medication devices connected to water delivery lines with 13 mm ($^1/_2$") diameter hoses, which have a capacity of only 9.5 liters (2.5 US gal)/minute. A common complaint by producers who make this mistake is 'my pigs don't like the medicine in the water because water intake always decreases when I water medicate'. The real cause of the decline in drinking water is the restriction in water flow associated with the water medication device connection.

A second common mistake is a stock solution reservoir that is too small. Many producers assume that water usage is relatively stable throughout a 24-hour period. If the pig's drinking water usage is 4 litres (1.1 US gal) per day and there are 1000 pigs in the facility, the total stock solution required at 1:128 dilution is 31.25 litres (8.3 US gal). If the stock solution reservoir is filled twice daily, this suggests that a 16 litre (4.2 US gal) capacity reservoir is adequate. In reality, almost 70% of the drinking water is consumed from 6 am to 4 pm. If the reservoir is filled at 7 am and 5 pm, the capacity of the reservoir needs to be at least 22 (5.8 gal) litres or there is a risk that the reservoir will be empty prior to the next recharge, resulting in pigs drinking water that has no stock solution added.

Water medicator rated at 26.5 litres (7 gal)/minute incorrectly connected to 19 mm (3/4") inside diameter piping with 13 mm (1/2") washing machine hose.

Many producers fail to account for the impact of pressure regulators on water flow. If the incoming water line pressure is 275 kPa (40 psi) and a regulator is used to lower the line pressure to 140 kPa (20 psi), water flow is reduced to 71% of what it was at the original pressure. This suggests that sizing of water lines is even more important than many producers think.

Water filters are often installed in delivery lines to deal with sediment issues associated with the on-site well, etc. In some instances, the location of the filters makes them very difficult to routinely flush or clean, while in others, a routine of regular maintenance is not planned for.

Finally, don't overlook the water meter as a flow restrictor in the water line. Many swine facility contractors install water meters with 16 mm ($^5/_8$") orifices that have 19 mm ($^3/_4$") NPT connectors. These meters are generally $50-75 cheaper than meters with larger orifices.

WHJ

Producer meetings explore survival strategies

A series of producer meetings, organized by the Prairie Swine Centre and provincial pork organizations, was held across western Canada earlier in the year and addressed topics aimed at helping producers survive the current industry crisis. We report on three of the presentations.

Implementing strategies for reducing energy use

By Bernie Peet

With sharply increasing energy costs in recent years, carrying out an energy audit to identify areas for savings is very cost-effective, according to Ron MacDonald, whose Ontario-based company Agviro Inc. carries out audits for pig producers. "Before you think about digesters, solar panels and the like, minimize your energy consumption," he advises. "It gives a quick return and the savings go on for ever." Performance benefits also result because using energy correctly to provide the right environment for the pig, improves the efficiency of feed use, he notes.

Changes to lighting equipment can provide a very quick payback, says MacDonald. "There is a huge range in the efficiency of the various lighting types. T8 fluorescent fittings are five to six times more efficient than incandescent lighting." He advises purchasing a good quality fixture with four clamps on each side and a continuous gasket to cope with the harsh conditions in the barn. There are also savings to be made where there is a source of natural light. "Rather than leave lights on when there is sufficient natural light, use a photocell to turn lights down or off," he suggests.

Air leakage is a major source of heat loss from buildings, MacDonald explains. "Typically there are leaks around inlets, fan shutters, doors, conduits and sometimes from manure pits," he says. "Most buildings are like leaky sieves. By testing for leaks and sealing them with a high-quality GE silicone, the problem can be solved." Also, care should be taken not to get leakage of warm air into attics or short-circuiting of air between rooms, he says.

Heating is the biggest component of energy cost and should be well controlled. "250-Watt bulbs are from another era," he exclaims, suggesting a change to 175W bulbs or, preferably, heat pads, which are much more energy-efficient. "Good control can give big savings," MacDonald says. "Simple diode dimmer switches will save $30 per year when used on a 175W lamp and variable dimmer switches $50 per lamp. A further $10 per year is saved if heat lamp circuits are fitted with a high temperature cut-out thermostat." He also advises producers to look out for a new heat bulb, the Retrolite, which gives a much more even heat distribution than regular bulbs. "It provides an even 97 degrees at a height of 18 inches," he notes.

In the grow finish and breeding/gestation areas, although heating is only required for short periods, a lot of heating capacity is required, explains MacDonald. "I prefer to use indirect heating to avoid the by-products of combustion and hot water heating has many advantages as it's a clean energy source and doesn't increase humidity." However, he warns that using hot water pipes to heat a barn results in a very slow response to control and there is a lag effect, which results in excess heat being pulled out by the fans. "With hot water systems, boiler efficiency is critical and they should be regularly serviced," he advises. "Also, control systems have to be very good, otherwise energy will be wasted."

A Solag panel wall on a hog barn, which can increase incoming air temperature by 8-10°C

If a direct heat source such as a gas heater is used, MacDonald suggests it should be switched to run at half power unless the weather is extremely cold, because this gives better temperature control. "Infra-red tube heating is the best direct heating type because it gives a 15% energy saving and exhaust gases can be vented to the outside," he notes. "Another benefit is that, positioned correctly, they result in a graduated temperature from the front to the back of the pen, allowing pigs to lie where they feel most comfortable, which leads to better performance."

When building a new barn or carrying out renovation, it is worth considering Solag solar walls, MacDonald says. Grants are available from Natural Resources Canada for 25% of the cost. "The grant is available not only for the Solag system but for the ventilation equipment," he explains. "If the Solag system costs $25,000 and the ventilation system $75,000 you will get a grant of $25,000, so effectively it could be free." However, it's necessary to engage an engineer for the project, he notes. "The Solag panels have holes in them which give an area that copes with the building's minimum ventilation rate. When more ventilation is needed, a vent at the bottom of the panel opens to allow in more air," MacDonald points out. "The system can increase incoming air temperature by 8-10 degrees, reducing heating costs."

MacDonald also advises the use of a dual ventilation system in new barns in order to save energy. This uses fan ventilation in winter, when close control of ventilation rate is required to conserve energy. In summer, natural ventilation takes over, which saves on the energy cost of running large numbers of fans.

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Manitoba producers advised how to ride out tough times

By Myron Love

Canadian hog producers are sailing into a perfect storm. A combination of rising feed costs, weakening prices and dollar parity have cut sharply into profits. Producer income is down 35% just through the change in the value of the Canadian dollar, noted David Hunt, a farm production extension specialist with Manitoba Agriculture, Food and Rural Initiative (MAFRI).

Hunt, though, had some ideas to help producers get through the current tough times, ideas he shared with producers attending a series of meetings throughout Manitoba in the last week of February. The meetings were organized jointly by MAFRI and the Manitoba Pork Council and featured a number of speakers with suggestions on how producers can cut their costs. Hunt noted that most of the ideas he was suggesting aren't new. "Consider them reminders," he said. "In a perfect storm, it is what you did to prepare before the storm that makes the biggest difference," he said. "You know the hog business is cyclical. It is best to plan ahead when prices are good."

For those producers who haven't planned ahead, Hunt stressed the importance of knowing your production costs - the price of feed, energy and labour - if you want to know where savings can be found. He noted that the provincial government has a booklet available for producers that outlines the average cost of production on a step-by-step basis. Producers can use the booklet to measure where their production costs are, compared to the average provincial production costs.

"You also have to keep track of your production data to see how you are doing over time," he said. He added that you don't need a high-end computer to do that. Pen and paper will work just as well. He further suggested that producers might want to consider forming producer groups to share data, save money on ordering supplies and learn from each other.

Hunt sees times of economic difficulty as an opportunity - an opportunity to really examine your entire operation and find areas where you can cut costs, without jeopardizing the farm. He suggested looking into better cell phone and Internet deals and lower insurance and interest rates. "Perhaps you might call on your vet to reassess your herd health program," he suggested. "There might be new cost effective products available or new varieties you weren't aware of. Improved herd health can increase the price of your hogs by up to $7 a pig."

As for energy savings, Hunt referred to an earlier presentation on that subject by Manitoba Hydro spokesperson Ray Boris who spoke of different and less expensive heating options as well as Hydro incentives for producers retrofitting their barns to make them more energy efficient. Hunt further noted that there are savings in recalibrating sensors and controls.

Feed, he pointed out, can account for up to 75% of input costs. For producers who

formulate their own feed, he suggested reformulating more often to take advantage of better pricing on different ingredients. Producers could also look into buying feed as mash which, Hunt noted, is considerably cheaper than feed pellets. He also said that according to several studies split sex feeding is more effective than mixed sex feeding.

He reported that water wastage can be reduced by up to 40% by using a nipple drinker and that can be cut by 40% more if you adjust the height. The new Ball Bite drinker is even more effective, he said. It forces the pig to hold the whole valve in its mouth and bite down to release the water. To get the best drink, pigs have to approach the ball drinker straight on. When they do, they spill less water into the pit.

Producers can also save money by culling ridglings from their herds early, he said, and profits can be maximized by increasing the numbers of pigs shipped, thus optimizing shipping weights. He further urged the audience to take advantage of government aid programs for producers.

In a separate presentation, Gerry Friesen of the Manitoba Mediation Board noted that communication - with the bank, suppliers and even spouses - is the single most important element in saving your farm in times of economic hardship. "The banks don't want your farms," he said. "But they want to know in advance if you are going to have trouble making your payments so that other arrangements can be worked out."

Tips for mothballing a hog barn

By Myron Love

Mothballing a hog barn so that it can quickly be put back into production at a later date with a minimum of cost and effort was the subject of Brian English's presentation to Manitoba hog producers attending a series of seminars around the province in the last week of February. The seminars were co-sponsored by the provincial government's Manitoba Agriculture, Food and Rural Initiatives (MAFRI) and the Manitoba Pork Council.

The first step, said English, an agricultural engineer working out of MAFRI's Livestock Knowledge Centre, is to drain shallow manure completely from gutters. In Manitoba, he noted, producers must notify Manitoba Conservation if manure is going to remain stored in the barn for more than a year. The next step is to clean the barn as thoroughly as possible, paying particular attention to self-feeders and the feed delivery system. It is also important to ventilate the barn to reduce the humidity inside to prevent condensation on interior surfaces, English noted. He pointed out that excessive humidity will cause steel to rust very quickly.

It is also necessary, he said, to close fresh air inlet openings to prevent moisture-laden air from "back-drafting" into the attic and to shut off and drain the water supply to prevent damage due to freezing. Also, shut off and drain the water supply to prevent damage due to freezing – and shut off the natural gas, if that is the energy source you have been using.

Rats and mice could well be a problem, English noted. They can damage insulation in a very short time. Producers should check mothballed barns regularly for signs of rodent activity. A leaflet by MAFRI swine specialist Brian Cotton gives advice on controlling mice and rats, he pointed out. Cotton observed that rodents generally come out just after dusk, so conducting inspections at dusk may help the producer in identifying the location, distribution and severity of a rodent infestation.

Rodent control, Cotton said, should involve rodent-proof construction and population reduction. A strip of coarse gravel (one inch) in a two-foot wide by 6 inch deep band around the building foundation will discourage rats from burrowing near the foundations. A buried ½ - ¼ inch mesh curtain extending 12-18 inches downward and outward to 12 inches will also keep out rats. Traps and toxic baits can reduce rodent populations, Cotton added.

English also recommended keeping the area around the mothballed barn free of weeds.

"Do not disconnect the electricity," he said. You will want to keep the heat going to prevent foundation damage and you will want to have lighting. He also recommended checking or updating your insurance coverage on the barn. Finally, he said, keep the barn locked to discourage vandalism and check regularly for signs of unauthorized entry. WHJ

Use of Dried Distillers Grains with Solubles (DDGS) in swine diets

By Malachy Young, Gowans Feed Consulting

Introduction

The rapid expansion of the North American ethanol industry has resulted in a large increase in the price of cereal grains. Grain prices have been further fuelled by low yields of wheat due to droughts in certain parts of the world. Crop farms have historically produced grain crops for food for people and livestock. The ethanol industry is adding a third major use. With the large increase in feed costs we have experienced in Canada in recent months it is important we consider and optimize the use of alternative ingredients if we are to keep our feed costs in check. Dried Distillers Grains with Solubles (DDGS) is one such product and a co-product of ethanol production. As the ethanol industry in North America has expanded, there has been a subsequent increase in the production and availability of DDGS.

Dried Distillers Grains with Solubles (DDGS)

Cereal grains including barley, corn, rye, sorghum, and wheat can be used for producing ethanol and subsequently DDGS. However, corn and, more recently, wheat have been the major grains of choice for ethanol production in North America. The interest in DDGS is mainly due to the three-fold increase in the concentration of nutrients (protein, fat, vitamins and minerals) in the DDGS compared with its parent grain, which could potentially make DDGS a better feed ingredient (Table 1). The nutrient profile of corn DDGS is quite different from wheat DDGS. Corn DDGS contains more fat, while wheat DDGS is higher in crude protein. Some considerations to take into account when purchasing DDGS are:

- Quality and consistency of the final product
- Ease of handling (loading & unloading) and transport
- Incidence of mycotoxins - is the plant testing and how often?
- Nutrient profile of DDGS - total fat, protein, fibre content, etc.
- Amino acid content and availability.
- Know plant where sourcing from - all sources are **not** the same and there can be large differences between sources in nutrient content and value.

Nutrient composition of DDGS

DDGS is a source of protein, energy and available phosphorous to swine diets and will replace a portion of the grain, protein source(s) and supplemental phosphorous. It is important to remember that that DDGS products are still evolving, which emphasizes the importance of knowing the source you are using as it is likely a much different product than sources produced from older generation plants 3-5 years ago. In corn DDGS, the crude protein can range from 22 to 32%, while total lysine ranges from 0.40 to 0.99%, whereas in the wheat-based DDGS, the

DDGS is becoming increasing available to Canadian pig producers but quality should be monitored

crude protein ranges 23 to 37%, while total lysine ranges from 0.49 to 0.94% (Payne 2007). Typical levels of the most important nutritional components of corn and wheat DDGS are shown in Table 1 and compared with the levels in corn and wheat.

Table 1: Nutrient profile of wheat, wheat DDGS, corn and corn DDGS as fed

Item	Wheat	Wheat DDGS[1]	Corn	Corn DDGS[1]
Moisture (%)	12.0	9.8	11.0	11.9
Protein (%)	13.5	35.0	8.3	27.2
Fat (%)	1.9	6.0	3.9	9.5
ADF (%)	4.0	13.6	2.8	9.9
NDF (%)	13.5	33.1	9.6	25.3
Total lysine (%)	0.34	0.90	0.26	0.85
Av. phosphorous (%)	0.19	0.39	0.04	0.52
ME, Mcal/kg	3.21	2.97	3.42	3.34
NE, Mcal/kg	2.54	2.00	2.73	2.45

[1] New generation ethanol plants

If we look at the amino acid availability for corn DDGS and specifically lysine, which is the first limiting amino acid for swine, we observe a large range in lysine digestibility between sources (Table 2).

The variation in lysine content and digestibility can be attributed to a number of factors:

1) Variation associated with parent grain due to variety, regional or environmental differences, drying and storing.
2) Perhaps the most significant reason is the variation in the drying process from one plant to the next for the DDGS. Drying temperature can range 120 to 620 ˚C and if not controlled effectively, over-heating can cause significant damage and renders lysine and other heat susceptible amino acids unavailable to the pig post digestion.

Table 2: Concentration and digestibility of crude protein and amino acids in 36 samples of corn DDGS

		Standard ileal digestibility (%)			
Item	Average	Av.	High	Low	CV
Crude protein (%)	27.5	72.8	63.5	84.3	7.32
Lysine (%)	0.78	62.3	43.9	77.9	12.2
Methionine (%)	0.55	81.9	73.7	89.2	5.0
Threonine (%)	1.06	70.7	61.9	82.5	7.4
Tryptophan (%)	0.21	69.9	54.2	80.1	10.0
Isoleucine (%)	1.01	75.2	66.5	82.6	6.3
Valine (%)	1.35	74.5	65.8	81.9	6.3

From: Stein et al., 2006

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The low digestibility of lysine is often associated with low analyzed total lysine in the sample. Calculating the lysine to crude protein ratio gives an estimate of the quality of the lysine in the sample. If the lysine to crude protein ratio is 2.80% or greater for corn DDGS then this sample has an average or above average quality, but if the ratio is lower than 2.80%, then it has reduced quality. Because lysine is usually the first limiting amino acid in diets fed to swine, corn DDGS samples with a lysine to crude protein ratio that is less than 2.80 should not be used in swine diets. Because wheat DDGS is a relatively new product there are few published reports that provide estimates of amino acid digestibility for swine and those available are with product from older generation plants that may not be representative of product available today from the new generation plants.

The digestibility of phosphorous in the DDGS is greater than in the parent grain and may be a result that some bonds that bind phosphorous to the phytate complex in the parent grain have been hydrolyzed during the fermentation process in the ethanol plants, which makes more phosphorous available for absorption. If DDGS is included in swine diets this reduces the need for supplemental inorganic phosphorous and decreases the amount of phosphorous that is excreted in the manure. Because of the variation among sources of DDGS it is recommend that producers examine the concentration of nutrients in the product before buying DDGS. A suggested checklist for corn DDGS is outlined in Table 3. In addition it is recommended that assurances be sought for the absence of mycotoxins in DDGS before it is purchased.

Table 3: Checklist when buying corn DDGS

Item	Minimum	Maximum
Crude protein (%)	27.0	–
Fat (%)	9.0	–
Phosphorous (%)	0.55	–
Lysine (%)	2.80 % of crude protein	–
ADF (%)	–	12.0
NDF (%)	–	40.0

From: Stein et al., 2006

Feeding recommendations for DDGS

Many feeding trials have been carried out over the past 5 years with corn DDGS in the US to determine the maximum feeding level for different ages of swine. We conducted a grow-finish feeding trial at a commercial research barn in Irma, AB with corn DDGS sourced from a new generation ethanol plant in Minnesota. The feeding trial found we could feed up to 25% corn DDGS from this new generation ethanol plant and achieve similar biological performance as with a typical Western

Canadian diet without corn DDGS (see WHJ Spring, 2007, page 38). From a number of research trials comparing corn DDGS to a corn soybean meal control diet it is suggested that yield or dressing percentage declines as pigs are fed increasing levels of DDGS. It is believed that the higher fibre and/or excess protein in the diet with increasing DDGS levels in the diet are involved with the reduction in dressing percent. Thus, it is important that this be taken into account when calculating the net return to using DDGS and in the decision whether to use DDGS. As a lot of the feeding trials were conducted using corn DDGS sourced from different ethanol plants with some major differences, corn source, old versus new plant (technology), drying process, etc many of the feeding trials come up with different feeding recommendations.

For the most part, if the corn DDGS is purchased from a plant which is taking due care sourcing good quality grain, which has a controlled drying process of the DDGS and where regular nutrient analysis and mycotoxin screening is being conducted, the following are suggested feeding levels:

- Late nursery - 10-15%
- Grower and finisher - 20%
- Dry sow - 20-25%
- Nurse sow - 10-15%

Because of the severe negative long term impact mycotoxins can have on sow reproductive performance it is recommended that regular screening for mycotoxins of DDGS be conducted to ensure mycotoxins are absent or at very low levels. It is very important that producers choose carefully when sourcing DDGS as quality varies from plant to plant. In addition if you are purchasing DDGS through a broker that you know the plant where the DDGS is being sourced from and that the broker is clear that he needs to receive approval from you or your nutritionist to change source.

There is not a lot of research information here in Canada on feeding wheat DDGS to swine. Some of the initial studies have been conducted using wheat DDGS with reduced protein quality and suggest that increasing levels of wheat DDGS may reduce feed intake and growth performance (Thacker, 2006). For some of these trials, diets were not formulated on an NE and digestible amino acid basis, which may have contributed to the reduced growth performance. Contrary to this, research from the Netherlands (Cited by Zijlstra 2007; Smits 2007, personal communication) with diets formulated on a NE and digestible amino acid basis using high quality wheat DDGS found that they can include up to 15% in the diet with no impact on performance. We expect that wheat DDGS sourced from new generation ethanol plants which have taken due care in sourcing good quality wheat, and have a controlled drying process for the DDGS will produce a good quality DDGS. However, it will be important to characterize the quality of the source before using.

Conclusions

With the continued expected growth of the ethanol industry in North America and the resulting availability of corn and wheat DDGS there will be increased availability for and use of DDGS in swine diets. However, considering the variation in nutrient content it is extremely important that producers are informed as much as possible about the source of DDGS to be purchased or being used as all sources are not equal. It is recommended that proper quality control guidelines (minimum specification, nutrient analysis, mycotoxins screening, etc) be put in place and be conducted on a regular basis to allow diets to be adjusted as needed to avoid risking animal performance.

References:

Payne, R. 2007. Current knowledge on Distillers Grains in Animal Nutrition. Eastern Nutrition Conference.

Stein, H. 2007. Distillers dried grains with solubles (DDGS) in diets fed to swine. Swine Focus.

Thacker, P. A. 2006. Nutrient digestibility, performance and carcass traits of growing-finishing pigs fed diets containing dried wheat distillers grains with solubles. Can. J. Anim. Sci. 86:527-529.

Zijlstra, R., G. Widyaratne, and E. Beltranena; 2007. Characterization of Wheat DDGS and Feeding to Swine. Western Nutrition Conference 2007. pp 207-213.

«WHJ»

Factors influencing feed conversion in the finisher barn

By Jan Geurts and Mick Hazzledine, Nutrition Partners Inc.

With the current state of the industry, feed conversion ratio (FCR) is one of the most important numbers to control the feed cost/shipped pig. With negative margins per pig it is important to lower the cost, in order to minimize losses. What are realistic targets for FCR in the finisher barn and what factors most influence FCR? This is a big subject and we review some of the factors in this article.

Typical FCR

A typical FCR for finishing pigs would be around 3.0. However, the range is huge, with variations from 2.6 - 3.4. Realistically, most commercial herds are in the 2.8 - 3.2 range.

The cost of 0.1 feed conversion calculation would be:

0.1 x (shipping weight – starting weight) x price of feed/kg

Current example - 0.1 x (120 – 25) x 0.275 = $2.61

So the range of 0.4 could mean a difference of $10.44 /shipped pig.

Factors influencing FCR

FCR is simply feed used (not feed eaten) per kg weight gain. There are many factors that influence feed usage and weight gain and some are given below

1. ***Feed wastage*** is notoriously difficult to measure but, where this has been estimated in studies, a range from 2.5-10% is not unusual, with floor feeding of meal being particularly poor (despite looking clean!). This range also applies to wet feeding.

- **extra 7% wastage vs 2.80 feed conversion = 0.196 FCR = $ 5.12 /shipped pig**

2. ***Feed nutrient density*** in finishing feeds is generally lower than it was some years ago when fat was "cheap". A finisher trial conducted by the Prairie Swine Centre showed that raising the energy level from 3090 kcal DE/kg to 3570 kcal DE/kg (+ 15.5%) and maintaining the lysine:DE ratio, improved the FCR by 14.1% (Table 1).

Table 1: Effect of dietary energy density (3090, 3340, 3570 kcal DE/kg)

Parameter	3090	3340	3570	Difference vs 3090 (=100)
Kcal DE /kg	3090	3340	3570	100.0 – 108.1 – 115.5
Initial weight,kg	31.2	31.5	31.1	
Final weight, kg	115.1	115.3	115.6	
ADG, g/day	1000	1030	1050	100.0 – 103.0 – 105.0
ADFI, kg	2.76	2.67	2.49	
FCR	2.76	2.59	2.37	100.0 – 93.8 – 85.7
Feedcost $/ton	163.07	208.07	247.26	
Feedcost $/kg gain	0.450	0.539	0.586	100.0 – 119.8 – 130.2
Fat, mm	16.83	18.33	19.39	
Lean, mm	61.65	62.72	61.06	

In this trial the FCR improved by 14.3% (3090 vs 3570), but to get there the feed cost increased by 30.2%, therefore always look at the balance of price of feed and FCR in order to get the lowest feed cost/kg gain

3. ***Feed form (meal vs. pellets vs. wet)*** influences FCR through changes in energy digestibility, intake, gut health, and feed wastage. This is also compounded by particle size. Prairie Swine Centre compared the differences between these different feed forms and in different feeders in an experiment (Table 2).

Table 2: The effect of feed form and feeder type on ADG and FCR

Type feed	Feeder type	ADG (g/day)	ADFI (kg)	FCR	Improvement vs mash/ dry feeder
Mash	Dry	792	2.50	3.16	
Mash	Wet/Dry	903	2.38	2.64	+ 16.5%
Pellet	Dry	868	2.48	2.86	+ 9.5%
Pellet	Wet/Dry	899	2.37	2.64	+ 16.5%

4. ***Average Daily Feed Intake (ADFI)*** probably has the biggest impact on performance. A higher feed intake impacts both energy and amino acid intake. This impact is usually bigger than varying the nutrient density. Studies at the University of Alberta showed a large difference in ADFI among pigs (gilts 50-100kg), which varied between 1.57 to 3.15 kg/day.

There are many factors affecting ADFI:

Health status

Dietary factors (energy density, amino acids balance, particle size, additives)

Water (type of drinkers, flow rate, ease of access, quality)

Feeding systems (wet/dry/liquid, pigs/feeder space, access to feeder)

Management (weight at entry, moving/mixing, stocking density, pigs/pen)

Genotype/sex

Environment in the barn (temperature, temp. fluctuations, drafts, air quality)
Production system (all in/all out, fill time)
(adapted from Whittemore, 1998)

ADFI in the early growth phase

It is critical to have a good intake in this stage. Pigs normally can't reach their maximum lean gain potential in this phase, because of insufficient intake. The growth in this phase is very economical because high lean gain, which contains a high percentage of water, has a very good feed conversion. There is also less fat deposition at this stage, which is very high in energy and has a high feed conversion.

An example generated with the NRC model illustrates this very well (Table 3).

Table 3: Expected impact of intake on performance with NRC model
25 kg, high lean gain pigs (375g lean gain/day). 3300 kcal DE/kg, $300/ton

Feed intake (kg/day)	Expected Daily gain	Protein Tissue gain	Fat Tissue gain	Expected FCR	% fat in total gain	% fat in extra gain	Feed cost/ kg gain
1.00	473	342	102	2.12	21.6		$0.636
1.20	604	428	140	1.99	23.2	29.0	$0.597
1.40	735	513	178	1.91	24.2	29.0	$0.573

- ***Improving the feed intake will improve the ADG (mainly lean gain, limited fat gain) and the feed conversion resulting in lower feed cost/kg gain.***

ADFI in the finishing phase

In the finishing stage pigs can normally easily reach their maximum lean gain potential. Once they reach their maximum lean gain, the remainder of the nutrients will be directed towards fat deposition. The following NRC model generated table illustrates those dynamics (Table 4).

Table 4: Expected impact of intake on performance with NRC model
100 kg, high lean gain pigs (375 g lean gain/day), 3190 kcal DE/kg, $250/ton

Feed intake (kg/day)	Expected Daily gain	Protein Tissue gain	Fat Tissue gain	Expected FCR	% fat in total gain	% fat in extra gain	Feed cost/ kg gain
2.60	948	615	277	2.74	29.2		$0.822
3.00	1064	615	386	2.82	36.3	94.0	$0.846
3.40	1180	615	494	2.88	41.9	93.5	$0.864

- High intakes in the finishing stage will improve the ADG (almost exclusively fat gain), which results in a higher feed conversion giving a higher feed cost/kg gain and less desirable carcass.

5. Space allowance

Studies have found a negative impact of crowding on productivity and welfare, measured mainly on small groups. Prairie Swine Centre conducted a study on the impact of crowding in small groups (18 pigs) and large groups (108 pigs). Space allowance was expressed using an allometric approach relating bodyweight to floor area, as determined by the equation: k = area(m^2)/BW (kg)^0.667. Below k = 0.035, space becomes restrictive and growth depression begins (Table 5).

Table 5: The effect of space allowance on pig growth

	Small group Uncrowded	Small group Crowded	Large group Uncrowded	Large group Crowded
Pigs / group	36	36	108	108
m^2 (sqft)/pig	0.78 (8.4)	0.52 (5.6)	0.78 (8.4)	0.52 (5.6)
Start weight, kg	38.01	38.02	36.55	36.97
End weight, kg	96.21	93.95	93.10	91.29
ADG, g/day	1098	1049	1055	1016
ADFI, kg/day	2.78	2.87	2.77	2.80
FCR	2.53	2.73	2.62	2.76

Overall, crowded pigs had a poorer FCR and lower ADG than the uncrowded pigs. The first sign of growth depression in response to crowding occurred much sooner for the pigs in large groups compared with pigs in small groups. In the large groups, the critical point (k value) at which crowding and growth depression began was k= 0.042, while k=0.035 was the critical point for pigs housed in the small groups.

In the different growth stages on farm, space allowance should be based on the end weights per phase, for optimal growth and feed conversion (Table 6).

Table 6: Optimal space allowance at different weights (m^2/pig, (sqft/pig))

Weight of pig	25kg m^2 (sqft)	50kg m^2 (sqft)	75kg m^2 (sqft)	100kg m^2 (sqft)	110kg m^2 (sqft)
Small group (*k*=0.035)	0.30 (3.2)	0.48 (5.1)	0.62 (6.7)	0.76 (8.1)	0.80 (8.7)
Large group (*k*=0.042)	0.36 (3.9)	0.57 (6.1)	0.75 (8.0)	0.91 (9.7)	0.97 (10.4)

6. Other factors

Environment

This influences energy requirements and thus feed intake. Pigs kept below their Lower Critical Temperature will eat more and convert more poorly.

High carcass fat

See above

Genotype

Pigs with a higher lean gain potential are better able to convert the nutrients efficiently into lean gain and will have less fat tissue gain, resulting in a better feed conversion.

Disease

This normally increases mortality, but also the immune response diverts nutrients away from lean growth towards fighting disease. The reduction in lean growth leads to a deterioration in FCR. This may be severe – as much as 0.5. Feed intake is normally reduced, the extent depending upon the actual disease. Feed intake depression is particularly acute with pneumonia.

Clearly there are a huge number of factors that influence weight gain, apparent feed intake, and thus FCR, so attention to these can help to reduce feed costs.

Getting to grips with group housing

By Bernie Peet

Recent announcements by a number of production companies in the USA and Canada regarding group sow housing have many producers wondering whether this signals the beginning of the end for sow stalls. The answer to this question is, to a large degree, a matter of conjecture bearing in mind that there seems to be no big push by Canadian food retailers to go down this path or indeed any significant political pressure on sow stalls. However, lobby groups are actively pursuing the sow stall agenda and, at some point in the future, sentiment on the issue will change, maybe quite quickly. It's therefore a good idea for producers to start making themselves aware of the practical considerations relating to group housing and even considering the unthinkable - what would you do if sow stalls were to be phased out over a relatively short time period? And perhaps producers and others in the industry should be looking at what has happened in Europe over the last 20 years to learn from experience there.

In the UK, the short time-scale (eight years) that the industry had to convert to group housing was a major cause of both practical and financial problems. For example, a significant number of producers converted sow stall houses to group pens to reduce the cost of meeting the legislation and, in many cases, this resulted in an unsuitable solution for the pigs, the operators and the unit's productivity. If the North American industry moves in an orderly way towards group housing over a relatively long period of time, then many errors can be avoided. In fact, assuming a loose housing system for sows is introduced as part of a farm's normal building replacement program, there is no reason why it should not be as productive and cost-effective as a stall system, while bringing benefits from a consumer perception viewpoint.

Group housing systems in the UK have resulted in equally good performance to sow stalls

Performance not an issue

Many comparisons of group housing and sows stalls have been carried out over the last 25 years and the majority show little differences in terms of the major breeding herd parameters such as litter size, farrowing rate, litters/sow/year and pigs/sow/year. If anything, group systems show a number of advantages over stalls such as a shorter weaning to oestrus interval, lower stillbirthrate and better sow longevity. Work carried out at Britain's National Agricultural Centre, where one of the country's first electronic sow feeding (ESF) systems was built in 1986, compared performance in this ESF system to that for sows housed in groups of six (sow yards) and individual sow stalls (Table 1).

Results from group housing compared to stalls do vary somewhat, depending on the type of group system, whether sows in groups are on slatted or bedded floors and with the timing of mixing into groups relative to the day of weaning. However, in Europe, after 20 years of comparison, it is widely accepted that there are no significant performance advantages of either individual or group housing. In practice, any differences noted by producers tend to be due to variations in the design and construction of group systems and the way they are managed.

Table 1: Performance of three sow housing systems

	E.S.F. yard	Sow yards	Sow stalls
No. of sows recorded	482	559	331
Av. wean to first service (days)	6.5	5.7	5.7
Returns to first service (%)	11.8	14.3	12.1
Farrowing rate (%)	83.8	80.9	83.7
Av. nos. born alive/litter	11.2	10.8	11.0
Av. nos. born dead/litter	0.6	0.7	0.8
Av. nos. mummified/litter	0.3	0.2	0.3
Pre-weaning mortality (%)	12.4	10.4	11.3
Av. nos. reared/litter	9.4	9.9	9.4

From: NAC Pig Unit, UK, 1991

Re-engineering facilities may compromise efficiency

For an existing production system, one of the most important issues is to decide how facilities can be re-engineered in order to convert to group housing. However, direct conversion from stalls to groups is fraught with practical difficulties. The first and most important aspect is that, typically, a sow stall building has an average of about 1.86 - 2.14m^2 (20 - 23ft^2) per sow, including access areas, whereas group housing systems require in the range 2.3 - 2.6 m^2 (25 - 28 ft^2) per sow of total space. That means a reduction in sow numbers or a compromise on space for the sow, either of which will have negative economic consequences. Some systems in the USA have opted for a lower than optimum space allowance and will reap the consequences in lost performance and higher sow mortality and morbidity. The second disadvantage of conversion is that the layout of most sow stall buildings does not lend itself well to group penning, particularly due to the positions of the slatted areas. The alternative is to go ahead anyway, in which case pen cleanliness is likely to be a problem, or to replace all the floors, which is very expensive. It is often more practical and cost-effective in the long term to build a new sow barn than to carry out a conversion.

During the 1990's, I helped many clients in the UK go through the process of deciding how to re-engineer their units. In most cases we opted to utilize the sow stall barn for additional farrowing space, nursery pens or finishing rooms, depending on the requirements determined by pig flow through the new system. The main objective here was to look for opportunities to increase efficiency and output at lowest cost because the investment in new group housing would bring very little financial benefit on its own. For example, utilizing a sow stall barn for additional finishing space in order to increase carcass weight was always a very cost-effective option. Of course, utilizing a sow stall barn for nursery or finishing is only possible on a farrow-to-finish site and in multi-site systems sow stall barns either have to be converted, probably with some additional space added, or replaced. Building additional space will require the appropriate development permits and, in some situations, could be a limiting factor. However, in the UK the authorities were quite understanding, bearing in mind that the change to a group system was a legal requirement.

Flooring type influences choice of system

One of the key decisions about group housing is whether to use bedding or not. In Europe a majority of systems have straw-bedded floors, with either a slatted or solid dunging area, although un-bedded systems are also used. The floor type and whether bedding is used also influences choice of group system and certain aspects of management. However, the use of bedding may not be feasible in many North American systems because they currently handle manure as a liquid and are not likely to want to operate two manure disposal systems. Despite this, I would urge people to consider the advantages and disadvantages of using some (not necessarily large amounts) of bedding, compared with slatted floors. One aspect of performance that is significantly improved where solid floors and bedding are used is sow mortality and culling rates. Table 2 shows that average

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sow death losses in Britain, where the majority of gestating sows are housed on straw, are about half of those in the USA and Canada, where most sows are kept in slatted stalls. Culling rates are also lower.

Table 2: Sow death rates for 2005

	Britain	Canada	USA
Average	4.7	8.1	8.9
Top 10%	N/A	5.5	4.8
Worst 10%	6.6	13.2	13.2

Source: PigChamp Benchmarking Database/MLC Pig Yearbook

Systems that combine the use of a bedded lying area with a slatted dunging area are sometimes used in Europe. The slatted area may be raised above the level of the bedded area to retain straw and prevent it being dragged onto the slats by the sows. Alternatively, systems with a solid floored lying area and slatted dunging area may use sufficient bedding to provide some rooting material and gut-fill for sows, without creating the need for a solid manure handling system. Such compromises are worth considering.

Despite the benefits of bedding, I suspect that slatted floors will be most widely used in North America. If that is the case, close attention must be paid to the quality of slats used in group housing systems, to minimize the amount of injury to feet and legs. While they are more expensive to manufacture, slats with rounded, moulded edges will result in less injury than those with the standard ground-off edge and will therefore be most cost-effective in the long term. Slat width and gap is also important and sows are more comfortable on a wide slat that allows them to easily stand with their whole foot on the solid part of the slat, rather than having one half of a hoof down the edge of the gap. Slat widths of 125mm (5") with an 19-20mm (3/4"+) gap are ideal.

Time of mixing affects group management

Sow groups should be formed at weaning, immediately after service or at about 28-30 days into gestation. The big advantage of keeping sows in stalls for the first part of gestation is that it makes management of breeding, checking for returns and scanning so much easier. Research in several countries suggests that, overall, there is no performance advantages either way, although some trials showed a slight advantage where sows are housed in stalls for 28 days. Table 3 shows the results of Danish trials on two farms where sows were grouped either at weaning or on day 28 after service and there were no statistical differences in performance.

Table 3: Results from two herds with sows in large groups and ESF

Time of entry	Herd1		Herd2	
	After service	4 weeks after service	After service	4 weeks after service
No. of litters	281	299	361	309
Total born* per litter	12.0	12.0	12.8	12.7
Farrowing rate (%)	87	90	86	83

* Liveborn + stillborn

From: National Committee for Pig Production, Annual Report, 1998, Denmark

Another very important reason for delaying grouping until around 28 days is that it maximizes space utilization. Where sows are mixed either at weaning or after breeding, a decision has to be made about what to do with sows that return or are found non-pregnant. If they are left in the original group, this makes management much more difficult, but if they are removed and mixed with a contemporary group, the pen is then under-utilized. Not only that but re-mixing of sows at any stage is undesirable. After the time that sows have been scanned, very few dropouts should occur and groups can remain

In slatted systems the slats should be wide enough to fully support the sows' feet and have rounded edges

stable. Large, dynamic groups make more efficient use of space than systems with smaller groups because they are more flexible and involve regular mixing of sows anyway.

Good pig skills are key to success

One thing that is very clear from my 25-year involvement with group housing systems is that a higher level of ability is required in the managers and technicians operating the system if they are to realize excellent results. There is no doubt that it is harder to identify individual animals, recognize sick sows and spot abnormalities than it is in stall systems. Operators must have an excellent knowledge of pig behaviour in order to be effective. Unless you are confident that staff have the abilities required, group housing should be avoided.

Hospital pens essential

In any group system it is inevitable that a few sows will be sick, injured or become disadvantaged for various reasons. In some cases those sows may be bullied by others in the group. In a stall system, such animals cannot be bullied by other sows and can be given individual treatment, whereas in a group system, they must be taken out of the group. Consequently a number of hospital pens are required, where sows can be housed individually or in small groups. These should preferably have solid floors and straw bedding because a significant proportion of the sows removed will have foot and leg problems.

Learn from existing systems

There is an enormous amount of experience and information about the design, construction and operation of group housing systems, especially from Europe. Of course not all of it is applicable to North American conditions but there is no point either re-inventing the wheel or making the same mistakes that were made in Europe 20 years ago, although there is no doubt this will happen to a degree. Producers thinking about group housing should make sure they gather as much information as possible because there are so many aspects to consider.

Take Home Messages

- Many comparisons of group sow housing with stalls show similar levels of breeding herd performance
- Sows housed in groups tend to show shorter weaning to oestrus intervals, lower stillbirth rate and greater longevity
- Group housing with bedded floors appear to result in lower sow mortality rates compared to slatted systems
- In group systems with slatted floors, good slat quality is essential to improve comfort and minimize foot and leg injuries
- Mixing sows into groups either immediately after breeding or four weeks after breeding results in similar litter size and farrowing rate
- Good stockmanship skills are essential for the successful operation of group housing
- Hospital pens must be provided for sick, injured of disadvantaged sows

Group housing sows in Europe

By Neville Beynon

In the UK all newly weaned and gestating sows have had to be kept in group housing systems since 1999 following a 7 year conversion period. The EU introduced legislation in 2001 that banned the construction of new individual confinement systems from 2003 and will make all existing sow stall housing illegal in 2013.

The UK legislation enforces a ban on confinement (apart from the week pre-farrowing and through to the day of weaning) and is 'gold plated' in comparison to the minimum requirements of the EU, which states that all sows must be kept in groups only from the 5th week of gestation up to 1 week prior to farrowing when they can be moved into the farrowing accommodation. Some other EU countries and even federal states within a country have also often 'gold plated' the legal requirements well in excess of the basic requirements. Pressure is beginning to build up for a ban on farrowing crates with some UK supermarket chains now demanding that all pig meat should be sourced from herds that do not use confined farrowing facilities.

The good news is that there are now herds operating across Europe achieving in excess of 30 pigs weaned per sow per year using group housing systems and weaning at around 33 days.

The UK's early conversion, followed closely by its pig meat suppliers Denmark and Holland, has provided some examples of what can be achieved with group housing systems. It has been absolutely clear that the key to any sow housing system is the feeding method employed and in fact there are as many feeding system variants as there are potential housing solutions.

The situation also differs across Europe, with family farms and no employed labour in areas such as western and southern Germany, whilst in the eastern areas of Germany there are larger herds (>300 sows) run entirely with employed labour. The (usually) smaller family farms will probably be considering either to expand or sell up and no longer produce pigs, whilst the larger units with employed labour will be considering the viability of converting relatively large existing slatted floored buildings, albeit often with limited financial reserves and with the need to provide a viable system for 300 or more sows and the employed work force. The solution for a smaller family farm intending to expand will certainly differ considerably from an existing large breeding unit. However, both will have to initially consider the system they will adopt based on the feeding system and whether they will operate a 'static' or 'dynamic' sow group during gestation.

There has been a trend for larger units to run batch farrowing systems based on farrowing only every third, fourth or even fifth week. This produces very large group sizes and therefore suits the management of the large static groups. The management routine will then operate around weeks where farrowings are planned and other weeks where weaning and mating (usually A.I.) are concentrated. This has implications for the sow housing and farrowing accommodation, as well as the work routine for the animal attendants and management. Management discipline needs to be first rate.

Herds operating a weekly or fortnightly farrowing sequence will often consider either a large dynamic group where animals are added in at weaning or after they are confirmed pregnant (the 5th week), spending this initial period in individual confined housing or small service groups. Static groups are also sometimes built up over several weeks in smaller and medium sized herds with sows added to the group at weaning/mating or once confirmed pregnant. This leads to an increased risk of aggressive behaviour and returns to service.

Where static groups are kept in smaller herds farrowing weekly or fortnightly, then they are often in groups of 4 to 8 sows. A range of systems are commonly used in Europe for such static groups and these include:

Free access feeder stalls with a communal pen, which can be partly slatted or straw bedded. Most countries, or federal states (when applicable) within individual countries, will often insist on the provision of a solid floored bedded area with access to edible/chewable bedding in slatted systems. The sows are usually fed automatically (rationed as a group) with either dry or liquid feed. These facilities will often be fitted into an existing individual stall house or a purpose-built new building. When converting old or existing housing it is important to consider that the overall stocking density may be reduced and in very cold northern parts of Europe supplementary heating is often included, along with modifications to the ventilation system. Straw bedded and part/fully slatted versions are also found.

Kennel systems are also being used increasingly in the colder areas of mainland Europe and these have long been popular in the UK. They are quite simply either individual lying kennels or now, more commonly, small low-roofed insulated kennels or huts (similar to outdoor pig huts) where the sows rest and sleep in small groups. They can be either under a roof or partly in the open, but have natural ventilation. The dunging and exercise yard can be solid or slatted. Huts can have insulated floors without much bedding (some must usually be provided even in slatted housing) or be straw bedded and cleaned out using a tractor/mechanical scraper.

Both of these kennel systems, straw bedded yards and partly slatted environmentally controlled pens, can also be fed in individual feeders (one per sow or on a cafeteria system). These are usually found on existing pig units as they are extremely expensive when built in from new. The individual kennel variant even allows for them to be fed in the individual kennel or cubicle and this is often combined with the daily mechanical removal of solid manure from a solid straw based run.

The "Kombifeeder" is an individual feeder that can be used as a stall for the first 4 weeks of gestation. This approach is favoured on smaller units where they want to ensure the sows do not mix for the first part of gestation when they may still be confined all of the time. Subsequently it can be used as an individual feeder and the sows can lie in them (albeit with no automatic gate at the rear to protect them).

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The "Vario-Mix" or "Time-Mix" type feeder has one or more feeding spaces with electronic controlled feeding located in the exercise/dunging area. The feeder drops small portions of feed (usually 20-25g in the case of dry feed or 150g of wet feed) at each drop and can be fitted to feed a small static group of 5 to 8 sows per feeder. The sow triggers either a mechanical or electronic switch and effectively has to root for food. A computer can be used to control the portions and the times the feed is available. This system is found on large herds in Europe (up to 750 breeding sows), but it also fits well into smaller herds. It is best suited for groups of between 5 and 30 sows (1 to 4 feeding points). However, some sows do not respond to these system and these will have to be catered for in alternative accommodation.

Other variants of these feed stations include the tube wet feeder ("Breinuckel") where the sow is recognized by a transponder and fed according to the ration programmed into the system. The sow only has shoulder barriers for protection and is fed through a metal tube. It is recommended that of these feed stations can provide for a maximum of 18 sows.

The Belados feeder is in effect an electronic feed station without a feeding stall. This is based either on an existing liquid feeding system or alternatively it can be fitted with its own feed and water mixing tank. It is claimed that about 30 sows can be fed per station. These two wet feeding hybrids of the single space and EFS feeder are not yet widely used and experience is limited.

The Kombifeeder is an individual feeding stall that can be used as a confinement stall for the first 4-5 weeks of gestation

Trickle feeders can also be used with kennels for large and small static groups in straw based or slatted pens in a new or converted building. It is important to ensure that there are about 15% more feeding spaces available than are theoretically required in order to ensure that varying batch sizes can be managed successfully. Not all animals appear to cope with the trickle feeder system, even though the majority do. Some alternative arrangements need to be made for maybe 5% of the gestating herd.

The Quickfeeder drops liquid feed into a trough that contains a fixed level of water

Drop feeders are similar to trickle feeders, except the feed is delivered to all individual animals in one drop from a volumetric hopper or tube. There is also a very effective wet feed variant, the 'Quickfeeder' that drops the feed into a trough maintained with a fixed water level. Sows fed wet feed tend to exhibit less aggression during feeding because the slower eating pen mate has a better chance to consume a full ration more quickly, therefore there appears to be a more even intake.

The EFS (Electronic Feeding Station) system is well known and is the feeding method often seen as fitting in best with the so-called dynamic group housing system. These are usually based on large pen variants containing 60 to 200 sows with individual transponders in one dynamic group, with usually 2 to 4 EFS stations. The EFS system can involve a two-pen variant where the sows move from one pen into the other via the feeding station. The sows are moved into the pen that allows entry to the feeder by the opening of a gate once daily (usually first thing in the morning). The advantages are claimed to be less aggression and easier supervision of animals that fail to feed. Gilts are usually either placed into the large dynamic group immediately after first mating or penned separately until after their first weaning. Management and supervision ability and demands must not be underestimated. EFS systems have high maintenance and repair needs and transponders must stay in place for the system to deliver top performance.

Dump or spin feeders are quite popular in the UK, but are almost completely absent on mainland Europe. These can be used to feed both fixed and dynamic groups of various sizes. The pens are usually straw bedded and some EFS users have actually removed their old EFS feeding stations and replaced them with dump or spin feeders. Both of these drop the feed over an area sufficiently large to ensure a reasonably even feed intake. The spin feeder is intended for a larger area and usually for a large group. Despite evidence of good performances achieved by herds using these methods, European advisors and their pig producing customers are concerned about the problems of feed wastage and potential aggression.

Liquid feeding of gestating sows in a long trough with (and even sometimes without) shoulder barriers can also be used for a range of usually small to medium sized static groups. Liquid feeding offers a tremendous advantage in ensuring more even feed intakes and thus maintaining more even sow body condition scores.

Ad-lib feeding of gestating sows, using a high fibre diet, is a recent trend in the Netherlands. Good results are claimed for this approach for both static and dynamic sow housing systems. They employ ad-lib single space feeders filled automatically. This system demands low nutrient density high fibre rations that match the sow's voluntary feed intake with her nutrient needs. Unfortunately, these special feeds cannot be formulated economically in many areas of Europe as they are based on high fibre raw materials not universally available.

Neville Beynon is a UK-based consultant who works extensively in continental Europe

Single dose therapies can help control disease

By Dr. Don McDermid

Producers know all too well how quickly disease can spread in a herd, not to mention the dramatic impact it can have on their profitability. Swine respiratory disease (SRD) is costly to North American producers in terms of productivity losses, medication and labour. Clearly, controlling disease is key to running a profitable operation. Producers can take control through good preventative health management practices and by incorporating new drug therapies, such as single dose anti-infectives, into their disease protocols.

Disease treatment - Why single dose therapies?

Water and feed medications are commonly used in hog operations and certainly have their place in the treatment cyde. However, when pigs are sick, they usually eat and drink less so it can be difficult to ensure each pig receives the correct amount of medication.

Single dose therapies provide a better alternative in many cases. From a practical standpoint, when a complete treatment of anti-infective therapy is contained within a single dose, the animal gets all the medication it needs at once, saving you time and money. There is also the advantage of reduced stress on the animal. Why risk exacerbating an already sick and stressed animal by using a multiple-dose treatment when a single one is available?

By its very nature, single dose administration also ensures compliance, i.e. following veterinary recommendations. You could say that compliance is "built-in". Not following a medication's directions can create unnecessary problems. For example, when a sick pig begins to look better, producers may be inclined to stop treating the animal. This is an easy mistake to make, but the repercussions can be serious and may hinder the animal's recovery and lead to relapse. Additionally, the development of antimicrobial resistance is a potential threat in under-dosed animals.

The moral of the story is that to make the most of anti-infective therapies and minimize the costs and impact of disease, it is vital to follow the correct dosage and recommended duration of therapy. These two success factors are easily achieved with a single dose product allowing you to focus on other management issues.

Disease prevention - herd health management protocols

Disease treatment will likely always be part of your routine; so should herd health management protocols. Why? Remember the old saying that an ounce of prevention is worth a pound of cure. Adopting herd health management protocols can help to prevent disease from occurring in the first place and help producers and barn employees recognize the symptoms when disease does occur.

Producers can take certain steps to ensure their barn environment is as healthy as possible, minimizing the stress on animals. For example, barns should be constructed to maximize comfort including protection from drafts, moisture and variable temperatures. Animals should also have access to food and fresh, clean water at all times. Your veterinarian can provide other suggestions and assist you in developing a herd health program that's right for your operation.

As effective as single dose therapies can be in treating and controlling the spread of disease, they only work to their full potential if a producer follows proper herd health management protocols. By doing both, you can help ensure the continued good health, performance and optimal profitability of your herd.

Dr. Don McDermid is Manager of Veterinary Services - Swine, at Pfizer Animal Health Canada

• International Round-up

Pigs grow better with correct chemistry

Pigs grow quicker when they are placed in a group where the 'chemistry' is optimal, according to a study by the Dutch Institute for Pig Genetics (IPG) and the Genomics Centre of Wageningen University. The institutes discovered that it is possible to select pigs and to breed them with a particular social behaviour.

The study shows that the interaction between one pig and another has a big effect on growth. Wageningen researcher Piter Hijma says that "by mixing socially-interactive pigs with a group of other pigs, the latter group tends to grow quicker." Pigs that 'get on' better in a group, tend to invest less energy in fighting each other. Further study into this phenomenon is planned.

Hijma hopes that further research will show that there is a connection with animal welfare. "If pigs are bred better on a social behaviour level, then not only are the producers happy, but also the public at large and animal welfare organizations."

Seaboard opens bio-diesel plant

A subsidiary of US pork production giant Seaboard Foods recently opened a bio-diesel plant that uses pork fat from the company's processing plant. High Plains Bioenergy is Seaboard's first venture to produce alternative, renewable energy from its integrated food system.

Pork fat from the Guymon pork processing plant will be used as the primary feedstock to produce up to 30 million gallons of bio-diesel annually. However, the plant was built to use multiple feedstocks in addition to pork fat, including vegetable oils, says the company.

Bio-diesel is a renewable, clean-burning fuel produced from natural oils, such as animal fats or vegetable oils, and can be used in any concentration with petroleum-based diesel fuel in existing diesel engines with little or no modification.

Selection for piglet vitality pays off

A decision taken in 2002 to select for piglet vitality has resulted in more piglets per litter and less mortality, says Netherlands-based breeding company TOPIGS. Due to increases in litter size and changing circumstances in the swine industry it is critically important to ensure good maternal characteristics and strong and vigorous piglets, says the company.

One of the challenges is that the amount of time each piglet receives has decreased due to high labour costs and increasing automation. Dutch data suggest that between 1997 and 2007 the time input per weaned piglet has halved: from more than 40 minutes per piglet to 20 minutes per piglet. At the same time, selection for litter size and leaner growth had put growing pressure on piglet vitality since the mid-1990s.

Dutch research has demonstrated that it is possible to select for piglet vitality. To do this, it is necessary to introduce a piglet weighing protocol in which newborn piglets are weighed and mortality and cross fostering recorded. Research has also revealed that the underlying biological mechanisms had genetic differences in vitality and that these were mainly related to higher energy reserves at birth rather than a higher birth weight.

Selection for piglet vitality has resulted in more piglets per litter and less mortality

"By applying this knowledge within the dam line breeding program TOPIGS has improved the accuracy of selection for survival and seen considerable benefits," says the company. "Since

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2002 the genetic trend for litter losses has been falling, whereas the trend for litter size has continued to increase."

TOPIGS says that its understanding of the biological backgrounds and the behaviour of the sow after farrowing and during lactation has increased. This insight has also been integrated into the in the breeding program under the term 'nurturing ability'. "Genetically good mothers ensure that piglets take up colostrum faster because they are quieter in the nursing pen, lie more often in the feeding position and are more alert in responding to the piglets' needs," it says.

Suspend biofuels target say scientists

A group of 20 independent scientists who make up the Scientific Advisory Committee of the European Environment Agency have called on the European Union to suspend its proposed 10 percent biofuel target. The committee says the "over-ambitious" target is an experiment, whose unintended effects are difficult to predict and difficult to control. The committee recommends suspending the 10 percent goal, carrying out a new, comprehensive scientific study on the environmental risks and benefits of biofuels, and setting a new and more moderate long-term target, if sustainability cannot be guaranteed.

Web site offers inside story on Ohio pork farms

The Ohio pork industry is aiming to give consumers a new perspective on pork production through OhioPorkTour.com, a Web site that takes a deeper look at production facilities across the state.

Created through a partnership between the Ohio Pork Producers Council and the Ohio Soybean Council, the site features short videos that each highlight a different pork operation in Ohio. The videos give in-depth tours of the different facilities, but also cover hot topics such as animal care, the environment and social issues affecting pork production operations.

"Our goal is to address misperceptions about modern pork production," said Jennifer Keller, director of marketing for the OPPC. "Through the Ohio Pork Tour, we're opening the doors and inviting people to see what's going on at Ohio's swine farms."

The site posts a video from a different farm each month, and aims to have 12 videos in total up and running by October. OhioPorkTour.com also answers frequently asked questions and provides links to other educational resources.

Outrage in UK over EU proposal on porcine MBM

A proposal by the EU to allow porcine meat and bone meal to be used in poultry feed has caused outrage in the UK, according to Sunday newspaper *The Observer*. Utilizing the material would help to reduce feed costs at a time when ingredient costs have soared.

The practice of using pig remains in chicken feed was banned in Europe after the BSE crisis ten years ago. This proposal has outraged animal rights campaigners, and Muslim organizations among other groups, who claim the move would put families at risk, offend religious sensibilities and lead to a major consumer backlash.

"There are two million Muslims in Britain and 25 million in Europe and this move would be a disaster for every one of them," said Dr Abdel Majid-Katme of the Islamic Medical Association, adding that this is a sinful idea.

The RSPCA voiced its concerns about the health risks involved. Additionally, agriculture experts believe many consumers would be offended by the idea of a return to the use of animal remains in farm feeds. "I think there will be such a backlash from consumers that the idea would have to be dropped," said Tom Acamovic, a nutrition expert based at the Scottish Agricultural College.

The Department for the Environment, Food and Rural Affairs (Defra) said it would back the move only if proper safety tests were introduced. "We understand the European Commission will be submitting a proposal later this year," said a spokesman.

"We would only support it if we were fully satisfied that appropriate and effective testing had taken place to control the use of such proteins in poultry feed."

A former risk assessment adviser for the Food Standards Agency, Philip Comer of DNV Consulting, however, backs the proposal. "The by-products of slaughter are a very valuable source of protein," he said. "We should not be wasting it."

US consumers trust in safe meat

Ninety percent of US consumers trust that the meat sold in their grocery store is safe, according to the Food Marketing Institute's US Grocery Shopper Trends 2008 report. However, consumers expressed that they had less trust in the government, as was evident as 79% agreement with the statement, "I trust the US Department of Agriculture to ensure that the food I purchase is safe." The survey also stated that only 76% hold this view about the FDA.

The report revealed that 71% of US consumers are eating more at home to save on the expense of eating out. Consumers are also buying fewer luxury products (67%), and 60% of consumers are purchasing more store-brand items and 58% are reported to be eating more leftovers.

Consumers who are very concerned about the nutritional content of the food they eat make up 41% of the surveyed group. The main points of interest here is the fat content listed on the Nutrition Facts label, with more than half checking saturated fat, trans fat and total fat. More than four in 10 check the calorie count, look for whole grains and focus on the salt, sugar and cholesterol levels, FMI says.

Pork Checkoff releases videos on YouTube

US pork promotion organization Pork Checkoff recently released three new videos on YouTube to answer consumers' questions about animal care, feeding, transport and more. The videos, which run approximately one to two minutes each, feature pork producers and industry experts answering consumer questions on animal care issues.

"Sites like YouTube allow messages to spread around the world faster than you can blink," says Steve Weaver, vice president of the National Pork Board, who owns a 60-sow farrow-to-feeder pig operation near Elk Grove, Calif. "I'm extremely proud of the YouTube videos the Pork Checkoff has created to help us tell our story."

Videos include "Pig Farmers Take Action" (which focuses on animal health and well-being, including Pork Quality Assurance Plus), "Ride Along with a Pig" (which shows why transportation is a very important issue for pork producers), and "Pigs Are Hungry, Too" (which addresses pigs' nutritional needs and requirements for optimum care).

"The more people who view these videos and rate them, the higher the videos will appear in the online search. This is viral marketing, and it will help us spread the message that pork producers are doing the right thing," says Teresa Roof, public relations manager for the National Pork Board.

This is extremely important, says Weaver, who is featured in some of the YouTube videos. "If we don't tell our story and educate others, no one else will."

Visual imaging "weighs" pigs

A new visual imaging system, which takes images of pigs while they are feeding or drinking and converts them into a weight measurement, has been developed by Aberdeenshire, Scotland company Innovent Technology. Currently on trial in the UK, the Qscan system detects when a pig enters the monitoring position and then several images are recorded and processed. At the end of the visit, the median of all these images is selected and stored in the database along with the image of the pig. Data is presented as a growth chart and weight distribution graphs are also produced. Reports can be viewed directly on a monitor, or remotely via a network connection. The data is also uploaded to the Qscan website where it is available to be viewed by farm staff, veterinarians and advisors. This also allows several different barns or sites to be monitored remotely.

The system weighs only 3kg and can easily be installed by the producer. In future Qscan could include a spray-marking feature, allowing market weight pigs to be identified.

Group housing of sows – 16 points from 10 years successful operation

By John Gadd

More than 25 years trial and error in changing from gestation stalls to group housing in Europe has taught us a lot. I was in it from the start and so far have been involved with over 60 farm conversions, including what it cost, since everything had to be changed over legally in Britain by 1999. Sure, we made plenty of mistakes, so I'm putting down a few of the more important points we have learned the hard way to help you with your own learning curve.

1. There is nothing wrong with the well-designed and operated gestation stall. We had to change to meet public demand – the only concession we have secured is to be allowed to use the stall for 4 weeks from weaning. Fight strenuously to retain this welfare and profit-positive concession, as it is important.
2. There is now ample comparative evidence that when they are well managed, there is little to choose in performance terms between either concept. If anything the well managed, adequately big enough stalls still have the edge.
3. Visit as many successful group housed conversions as you can. The learning curve is a steep one and you will learn much from other people's initial difficulties and how they overcame them. I appreciate that distance is a real difficulty in Canada but it is one you must try to address.
4. We were given a generous period of six years to make the change and I have found a minimal time split to be one year for thinking/researching/go-seeing; one year making the alterations; one year of learning/making mistakes/correcting them. Then you should be comfortable and indeed rather pleased with things, if a little sore about what it all cost (see below). Lobby hard for a government grant (in the UK we had to pay for it all ourselves), as you will be doing the public, the sow and the government a favour.
5. Group housing is more difficult to manage well than stalls. Poor management, badly thought-out layout and a low level of stockperson skills will lead to very poor results. Grouped sows need more time, often lacking on the larger units, which has caused initial bad-mouthing of the system until having enough people with the necessary skills was realized.
6. Are any of the five systems better than the others? Not really, as all will work well under good management and design. The capital cost can be different, however – it depends on the space you have available. Minimum lying area is 1.4 to 1.6 m^2/sow plus at least another 1m^2/sow for movement/dunging. Large dynamic groups, where sows due for farrowing and culls are removed and gilts fed into the system, are favoured here. A static group is where sows are served within a few days and remain in the group.
7. Dynamic or static? Dynamic groups are best supervised in 150 sow gestation blocks (two groups of, say, 70) where several such blocks can go to make up larger herds - this size of group together is manageable. Management can be onerous in very large dynamic groups as each group will have sows at different stages of pregnancy. Static groups work well when services exceed 50 per week ie about a 1000 sow herd. Large dynamic groups allow more flexibility of layout design and are generally cheaper per sow.
8. Group size depends on number of services needed per week and on the system chosen. For example one electronic feed station will feed 45 to 60 sows and up to 4, maybe even 6 stations, can supply one large group housed together, especially if bedded rather than on slats.
9. So……. slats or bedding? After all, Canadians are the world's leaders in concrete flooring! We Brits, French and Scandinavians have learned that for us, bedding - invariably wheat straw - is best and suits large dynamic groups. There is nothing more satisfying seeing sows blissfully asleep buried in straw! However they get so comfortable that it can be a problem raising them up for their daily inspection. This is avoided by installing the rotary system, where at the end of the day's feeding cycle, when all the sows have been through the feed stations and exited into the post feeding yard – the gate is opened for them to re-occupy the pre-feeding yard again. They can then be inspected by a skilled, sharp-eyed attendant as they pass by and before they settle down.
10. Slatted floors are perfectly satisfactory too, and take up less room, but with no bedding at all preferred, total slats need a quite different layout to bedding. In any case we find totally slatted groups work best with fixed, stable groups, which are usually smaller. There are more foot and leg injuries with dynamic groups on slats; this is overcome by having a bedded lying area and a slatted dunging/feeding area.

11. What about aggression – naturally never seen with stalls? It happens of course, but can be controlled by good design. Siting of electronic feeders is critical and the better manufacturers with a proven track record on installation can design you a minimal aggression layout to suit your floor plan and/or suggest alterations to your existing floor space. A failing is not to supply enough 'fleeing space' (dominants will usually give up after a 7-metre chase) in any layout especially the smaller-group Trickle Feed and Cafeteria systems, see below. One good idea is to hang a strip of mine-belting to provide a visual 'hide', or a large straw bale – we call them Heston bales - a physical one. So a 2.5m^2 total space allowance per sow seems essential to minimize aggression.
12. And of course with dynamic groups, mixing is a peak time for scrapping and many pages could be written on how to mix sows and gilts successfully. If you can get hold of a copy of my book 'Pig Production Problems – a Guide to their Solutions', I deal with this important subject in the chapter on mixing sows, pps.343-350, all information collected from the 60 or so farms involved.
13. Which system? The various systems were well described in the Banff issue of this journal, which majored on ESF. By all means - if you are prepared to pay the considerable extra costs of ESF over the alternatives, are used to on-farm computers, you feel more comfortable with true individual gestation feeding, can master the skill of gilt training (which is part of the learning curve) and can hook up with a manufacturer who can get you spares at a day's notice and who supplies a friendly telephone problem-solving service (vital for the first six months, I can tell you!) - then go for it.
14. About 25% of breeders have chosen one of the other four systems and they work well, preferred on the older farms a little strapped for conversion /alteration capital. But there are plenty of tips worth knowing, nearly always supplied by other breeders who have done it before you and have been visited at the thinking /planning stage for their willingly-given advice.
15. So what about costs? With the difference in costs and exchange rates on both sides of the Pond, it is better, I guess, if I relate the current costs of conversion to the cheapest option in percentage – not absolute - terms. This will give you a guideline figure and leave you to refine it under your own circumstances and building layout.
16. **Comparative conversion costs from over 60 European projects monitored during the past 20 years. Based on the cheapest system – Trickle feeding.** (Indudes spatial alterations as well as equipment).

System	Typical no. of sows per group.	% Unit cost per sow over cheapest system.	Relative extra cost/sow
Trickle feed	12	Base of 100	100
Cafeteria – manual	8 to 10		165
Cafeteria – auto.	8 to 10		174
Spin/ dump*	12		185
ESF	70 to 90		221 to311**

*Dump feeding without spinning disc distribution of feed over a predetermined area is behaviourally too disruptive. Spin dump needs a lot of room hence its high comparative conversion cost.

**Wide variation - not between the different manufacturer's equipment - but dependent on the alterations needed to the existing buildings.

Operating cost factors

- Straw bedding costs us 20% more to dispose of than spreading slurry on pasture but is less polluting in run-off terms - vital to us with our overcrowded acreage and strict legally-permitted thresholds.
- Labour costs are about 20% more for all group systems compared to stalls.
- Feed costs are little different between systems.
- Vet/med costs have varied from no difference to stalls (due to vulva-biting troubles in some ESF layouts) to 40% less in favour of the group systems - mostly fewer leg and sores problems
- Sow replacement costs are 8 to 18% lower due to a longer sow productive life.

Frankly with what we now know about group housing of sows, a whole book could be written about it, but I hope this artide summarizes the main points you should consider. «WIL»

UK Pig Fair and industry update – Light at the end of the tunnel?

By Stuart Lumb

Current situation – things are looking up!

The UK pig industry is sadly a shadow of its former self. Ten years ago the UK breeding herd was just under 800,000 sows and gilts. Currently this number now stands at 400,000. The number of market pig slaughterings had bottomed out from 2004 through 2006 at 9 million head and in fact showed a slight increase in 2007. UK slaughter weights have always been lower than on mainland Europe but are increasing, which makes production more profitable. In fact one major UK processor is taking pigs up to 100kg deadweight - not so long ago 75kg was the norm. Furthermore, pig meat sold per sow has risen from a low of 1234kg in 2003 to 1488kg in 2007, this being a result of better sow productivity combined with higher slaughter weights. Another encouraging statistic is that in 2007 the top 10% of UK herds, with an average size of 624 sows and weaning at 27days, reared 25.9 pigs/sow/year. Also the top 1/3 UK producers' productivity is now equal to that of other major European producers, so all is not gloom and doom.

Over the last few years producers had finally got to grips with PMWS and a fertility problem that had plagued the national herd, with national sow numbers just starting to show a slight increase, when they were hit by a double whammy. Many were hit by the massive feed price increases which were building in the summer of 2007 and which was of course a worldwide phenomenon. The other catastrophe particular to the UK was the outbreak of FMD - at a government research institute of all places. This resulted in movement controls etc., export bans on pork and bans on exporting live breeding pigs. A friend of the author's had just rented and stocked a 2000 sow unit, at that time. He was caught with massive feed price rises which was bad enough, but he was selling 20kg pigs. The movement ban put in place as a result of the FMD outbreak put paid to all that so his cash flow dried up and sadly the farm went into receivership just beforelast Christmas. At this time producers were losing around £23 per finished pig. Fortunately prices have been slowly rising, now standing at 130p ($2.60), but still need to rise another 20p to put most producers in a break - even situation.

Industry spokesman upbeat at Pig Fair

Stewart Houston is a pig farmer and Chairman and Executive Director of the British Pig Executive (BPEX). He has been involved in pig politics for many years, he regularly rubs shoulders with MPs at Westminster and is an excellent front man for the UK industry. One big issue currently is that the Dutch want to ship weaner pigs over for finishing in England but Houston is against this. For one thing disease profiles are different in the two countries plus there's a shortage of decent finishing accommodation in England. Also from the farm assurance angle the pork would be labelled as European. "Rather than shipping weaners over, let's have the Dutch guys come and invest in pig farms here," was Mr. Houston's concluding comment on this topical issue. One of the seminars at this year's Pig Fair had a major supermarket marketing executive sharing the platform with the MD of one of the biggest pig processors in the UK. "Ten years ago this would have been impossible," commented Houston. "The industry today has far better links with the retailers and in the current crisis the retailers have increased the price of pork and bacon on the shelves. The only problem is that this increase is not getting back to the farmer. Consumers want to buy British and we have our quality mark on British pigmeat. We have only 50% of the market, but due to the world situation supermarkets must not assume they can pull in cheap imports, as they have in the past, if the British product gets too expensive, as they just won't be available. Also the Pound Sterling / Euro exchange rate has made for dearer imports and importantly cheaper exports, with the major processors now exporting cuts which have never been exported previously.

There was the big rally in London on March 4th attended by 1000 pig farmers highlighting the plight of the pig industry, climaxing in the presentation of a petition entitled "Pigs are worth it" to the UK Prime Minister at No.10 Downing St. Alongside this was a substantial advertising campaign funded by BPEX. Pig prices are rising but still have a way to go to get producers back in profit. When this happens there will be a temptation for some producers to sell out. What is needed is a period of stability and reinvestment so that UK producers can get their costs of production in line with mainland Europe. The PCV 2 vaccine project will help producers improve productivity and reduce production costs. This is a £1.5million project being run in conjunction with several vaccine manufacturers. Producers get the vaccine at a discount in return for forwarding unit data to BPEX and since April 1st, 55% of the English breeding herd has signed up to the project. Recently the "Young National Pigs Association" was set up. This is a group of second-generation pig producers who meet together to discuss industry matters and who will provide continuity in the industry. Training is vital for the industry. Many of the agricultural colleges have stopped running pig training courses but fortunately the industry has set up its own "Agskills" training program, with its own set of qualifications and awards and this scheme ensures that the industry has a well educated work force, essential if UK pig units are to produce to their potential.

The British Pig and Poultry Fair, which is held biennially in May

The future

According to BPEX, the UK national breeding herd of 400,000 sows is 12% down on 2007 numbers. There is, however, a wide margin of error around these core forecasts depending on how resilient the pig industry is in the face of trading losses. Based on the core breeding herd forecasts and the expectation that sow productivity will continue to increase, UK slaughterings in 2008 are forecast at 9.07 million, 2% less than in 2007. However, a declining trend in throughput means that slaughterings in the final quarter of the year could be down as much as 6%. Total pig levy invested in 2008 for promotional work, advertising etc. will be £9.9million including £3.5million from reserves. The reserves will be managed in such a way that allows the producer levy to be reduced by 10p to 75p a pig in 2008/09.

A producer's view

Steve Panton is a survivor. He runs a small unit by today's standards, with 340 sows, in the heart of East Yorkshire, home to internationally known breeding companies JSR Genetics and ACMC. Steve has only room to produce 20kg weaners and in those days sold them to a north Yorkshire farmer for finishing. Nine years ago Steve was producing 25 pigs/sow/year but like many other producers suffered over the years from PRRS, PMWS and the like and his productivity fell at one stage to just 16 pigs/sow/year. His pig unit was built 40 years ago and, typical of that era, the sheds were made of timber. Regular maintenance and plenty of paint has kept his unit in good condition though. Today Steve has fewer sows - 280 - because two years ago he switched to a 3-week batch system and had to reduce sow numbers to fit with the number of farrowing crates he has on his unit. At the same time he remodeled his farrowing houses replacing the labour intensive solid floors with wall-to-wall plastic slats. Steve now produces 360 pigs per batch. These pigs are "Bed and Breakfasted" on 6 different units in about a 60km radius. (B&B is common in the UK - a farmer is paid a fixed fee to look after finishing pigs

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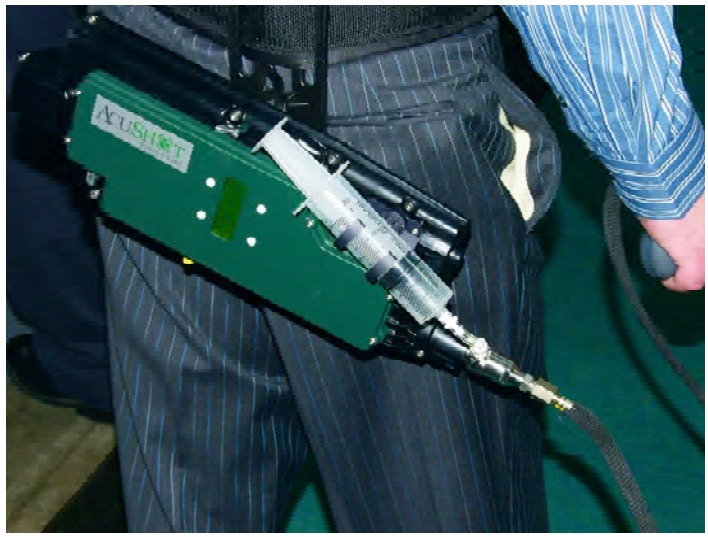
with all other inputs including feed supplied). Steve wisely bought feed forward last year – but not enough, he ruefully admits. "The PCV 2 vaccine has been a Godsend – my first vaccinated pigs have just gone to market. Mortality was 5% (20-120kg), compared to 16% previously and undoubtedly without that vaccine I would have gone out of business" said Steve. The unit is now producing a very respectable 24 pigs/reared with a 4-week weaning system and a lot of this is due to Vicky Panton, Steve's daughter and right hand pigperson. "Pig prices still need to increase as feed isn't going to get much cheaper in the foreseeable future but I reckon the worst is over," concluded Steve. "Having an understanding bank manager is a big bonus too!"

UK Pig Fair highlights

This year's biennial show was held on Tuesday May 13 and Wednesday May 14. Given the trauma of recent months farmers were remarkably bullish. Having said that those visiting the show were the survivors though. Co-product feeders always seem to do well in times of crisis. Two brothers who farm in NW England said that co -products have not gone up in price relative to cereals. They were currently shipping salmon fish waste down from Scotland but rocketing fuel costs may make that unviable before too long. Building manufactures were being asked to provide quotes for new finishing accommodation which is very encouraging. Many producers are making money despite high feed costs and the PCV2 vaccines have had a huge beneficial impact. John Richardson of Shering-Plough/ Intervet was heartened by the upbeat comments he received during both days of the show. "Given the high price of cereals some industry watchers were suggesting that the large farms with big outdoor units might be pulling out of pigs, but I don't see any indication of that happening," commented John.

New Product Awards

Hardly surprisingly, Merial received the Top New Product award for its Circovac PCV 2 vaccine. Runner up was Rotech Livestock Equipment with their microscope adapter. A small rectangular screen sits in place of the microscope lens. The screen displays real time images of sperm to allow motility to be checked and abnormalities to be easily seen. The device costs £275.



The Accushot needle-less injection system, developed in Canada

Vetsonic used the show to launch the Acushot ™ range of needle free injectors. Manufactured by a Winnipeg, Canada based company, the Acushot™ technology significantly does not need an external power source such as CO^2 or compressed air but instead uses nitrogen, one cylinder being able to deliver well over 500,000 injections. Big advantages of the Acushot™ A are that it incorporates a failsafe mechanism, showing if an injection fails, plus the injector can be mounted on a stand for hands free operation, making iron injection or piglet vaccination much easier and faster. This model costs £1500.

JSR Genetics Ltd used the show to launch their JSR Geneconverter 700 boar. Dubbed "the world's most efficient pig" the Geneconverter's superior FCR equates to a saving in £5 per slaughter pig sired. Most of the UK breeding companies were exporting gilts and boars to Russia last year and of course the tragic FMD outbreak put an end to that for a number of months. A similar situation existed with exports to China. Hermitage Seaborough are a breeding company based in Devon, but the parent company Hermitage is located in Kilkenny, Ireland. Despite the FMD in the UK Hermitage were able to keep exporting to Russia and company boss Ned Nolan stated they have set up two 1000-sow nucleus units in the Federation to supply gilts to the Russians.

Farmex have always been a forerunner in using technology to help pig producers farm more efficiently. At this year's show Farmex launched GuardianACTION – which alerts producers as to when there's a problem in the piggery. The system uses sophisticated technology to monitor and evaluate key factors affecting production such as temperature, feed and water supply. Sensors pick up information and data flow is automatically analyzed as it happens and an early warning is issued if there are any anomalies in the system or when serious problems occur.

Zesty Ground Pork Pizza Burgers

By Roy Kruse, Alberta Pork

Yield: serves 4 ❖ Cooking time: 10 min ❖ Preparation time:

Ingredients

1 lb	(500 g)	ground pork
1/2 cup	(125 ml) each	chopped mushrooms and dry bread crumbs
1 tsp	(5 ml)	dried oregano leaves
		salt and ground black pepper, to taste
1/3 cup	(75 ml)	prepared pizza sauce
1/4 cup	(50 ml)	shredded mozzarella cheese
4	4	sandwich buns
		lettuce
4	4	tomato slices

Cooking Instructions

In a medium bowl, stir together ground pork, mushrooms, bread crumbs, oregano, salt and pepper. Shape mixture into 4 patties.

Preheat barbecue on high; reduce temperature to medium. Place patties on grill; close barbecue cover and grill or broil patties 5 to 7 minutes per side or until no longer pink inside.

Place burgers on buns; top each with pizza sauce and cheese. Arrange lettuce and slice of tomato on the other half of the bun. Garnish, if desired, with rings of grilled green pepper, sliced mushrooms and red onion.

Nutritional information

Zesty Ground Pork Pizza Burgers

Per 1 person serving

Calories	610	Cholesterol	125 mg
Fat	32 g	Sodium	850 mg
Saturated	12 g	Carbohydrate	37 g
Monounsaturated	13 g	Fibre	2 g
Polyunsaturated	3 g	Protein	42 g

• Events Diary

July

27-31st	**World Veterinary Congress 2008**	Vancouver, B.C	www.worldveterinarycongress2008.com Contact: Khara Robertson (604) 681-2153

August

24-27th	**59th Annual Conference of the European Association of Animal Production**	Vilnius, Lithuania	www.eapp2008.org Contact: Dalia Laureckaite-Tumeliene (+370) 6 89 83438

September

3-4th	**Nottingham Feed Conference**	Nottingham, U.K.	www.nottingham.ac.uk/feedconf
7-10th	**World Meat Conference**	Cape Town, S.A.	www.worldmeatcongress2008.co.za Contact: Mr. Manie Booysen (+27) 12361-4545
9-12th	**SPACE Animal Production Show**	Rennes, France	www.space.fr Contact: (+33) 223 48 28 80
20 -23rd	**Allan D Leman Swine Conference**	Minnesota, USA	www.cvm.umn.edu Contact: (800) 380-8636 or (612) 624-3434
23-24th	**29th Western Nutrition Conference**	Edmonton, Alberta	Contact: Joanne Morrison (780) 492-3236

October

20-22nd	**VIV China 2008**	Beijing, China	www.viv.net Contact: +31 30 295 2772
22nd	**Swine Technology Workshop**	Red Deer, Alberta	Contact: Kate or Kyla (403) 244-7821

November

10th	**Alberta Pork Regional Meeting**	Grande Prairie, Alberta	www.albertapork.com
12th	**Alberta Pork Regional Meeting**	Lethbridge, Alberta	www.albertapork.com
13th	**Alberta Pork Regional Meeting**	Red Deer, Alberta	www.albertapork.com
14th	**Alberta Pork Regional Meeting**	Fort Saskatchewan, Alberta	www.albertapork.com Contact: Charlotte Shipp (780) 491-3525
11-14th	**EuroTier**	Hanover, Germany	www.eurotier.de
23-28th	**World Conference on Animal Production**	Cape Town, S.A	www.wcap2008.co Contact: (+27) 21880-2248
25-29th	**Agromek**	Herning, Denmark	www.agromek.dk Contact: (+45) 8675 4545

December

3-4th	**Hog and Poultry Days**	Winnipeg, Manitoba	www.hogandpoultrydays.com
10-11th	**Alberta Pork Annual General Meeting**	Calgary, Alberta	www.albertapork.com Contact: Charlotte Shipp (780) 491-3525

2009

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

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

May

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

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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