

Reduced Nocturnal Temperature Increases Gains in Summer

Lee Whittington, BSc MBA

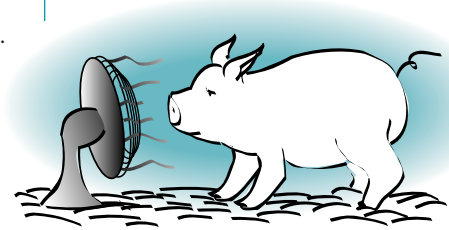
What can you do to increase performance without spending a dime? Turn down the heat this summer with a new ventilation strategy. During the day temperatures rise outside the barn. For a while the barn stays cool but eventually the attic temperature rises and all that heated air is brought into the room. "During the warm months of spring and summer we typically see room temperatures rise above outside temperatures", notes Dr. Stéphane Lemay, research Scientist in Engineering at the Centre. "It is expected to find room temperatures 3°C above outside temperature, and with some barn

designs temperatures can rise even further".

Heat stress occurs whenever the animal experiences a combination of temperature, humidity and airspeed resulting in an effective temperature above the animal's thermoneutral zone. This is the upper range of temperature, above which appetite will be depressed, resulting in lower daily gains and increased days to market. The severity of the effect varies with the weight of the animal. Younger animals can withstand and prefer higher temperatures than market hogs or nursing sows. A range of typical room setpoint temperatures for various categories of swine are shown in Table 1.

Just how severely high temperatures will affect the animals' performance can be estimated: For each 1°C rise in temperature above the thermoneutral zone (comfort zone), feed intake will be reduced by 1-2%. This drop in feed intake corresponds directly to a growth

rate depression of 3%. Thus, for every degree celcius above the pig's thermoneutral zone, net income is reduced by \$0.30 to \$0.45 per pig.



Turning the heat off with airconditioning is out of the question although many barns in southern climates make use of evaporative coolers and mist coolers to try and reduce the impact of heat stress. Scientists at the Centre have developed a no-cost alternative using your current ventilation system and a new strategy to take advantage of the cooler air of the evening to lower barn temperatures.

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Program funding provided by

Site Segregated Early Weaning Revisited

Lee Whittington, John Patience, Andrew Van Kessel¹

The practice of site-segregated early weaning has become increasingly more common place in Canada since the first studies were carried out at the Centre five years ago. A review of those results are discussed here. Research into the next generation of production questions continues.

Three experiments, involving 599 pigs were conducted at Prairie Swine Centre to investigate the impact of SSEW (site-segregated early weaning) when the herd of origin has a high health status, and also to consider the impact of early weaning on piglet behaviour. The treatments compared in all experiments included weaning at 21 ± 3 days with piglets kept on-site in all-in all-out nursery, 12 ± 2 days in an identical on-site nursery versus the third treatment of 12 ± 2 days and moving to an off-site nursery some 16 km from the Centre.

All pigs performed well. Off-site weaning resulted in consistent and significant improvements in 56-day body weight, ranging from 11% to 22%. The improvement appeared to be the result of both improved feed intake and improved feed efficiency. Pigs weaned at 12 days of age were found to be slower to develop normal patterns of eating behaviour than those weaned at 21 days of age, but did so by 48 hours after weaning. During the subsequent 5-6 weeks, early weaned pigs spent more time eating, drinking, nosing other pigs and chewing on objects than did pigs weaned at 21 days of age. The higher levels of nosing and chewing activity persisted into the growout period, substantiating concerns that early weaning may have a lasting effect on animal behaviour.

Phase II of the project involved a joint study with the Animal Biotechnology Centre, Department of

Animal & Poultry Science, at the University of Saskatchewan. This research utilized the same model used in previous studies, using piglets of 12 days at weaning, with both off-site and on-site nurseries. The most widely-held theory for explaining the growth advantage in SEW systems is that the sow herd is a primary source of infectious organisms and reduced transmission of disease results in improved piglet performance. However the precise mechanisms responsible for improved performance in SEW pigs are still unclear.

The focus of this work was to investigate gut microbiology and development in the segregated early weaned pig. This work would provide further clues as to the reasons for improved off-site performance with our long term vision to attempt to bring these advantages to more production units regardless of their weaning strategy.

Initial findings indicated there were significant differences in populations of bacteria in the gut of SEW and control pigs. These differences were consistent with a lower pathogen load and may have contributed to changes in gut development.

Rapid post-weaning gut development is important for digestion and absorption of nutrients to support body growth as well as a defense against enteric infection. The SEW pigs exhibited significant morphological differences including longer villi (absorption sites in small intestine). Gut enzyme activity (example lactase) was greater in SEW pigs at 22 days post-weaning. Lastly a thick mucus coating over the epithelial cells in the


ileum of control pigs was not apparent in the SEW pigs. The increased mucus secretion aids in controlling pathogen entry but could limit nutrient absorption.

We would conclude from the work completed to date that SEW pigs showed advanced post-weaning gut development and evidence of reduced pathogen load compared to the control pigs weaned early but left on-site.

Prairie Swine Centre has recently

“SEW pigs showed advanced post-weaning gut development and evidence of reduced pathogen load.”

received funding from NSERC (Natural Sciences and Engineering Research Council) and AAFC (Agriculture and AgriFood Canada) to match pork producer dollars to further investigate three aspects of early weaning: 1) Determine the effect of varying weaning age on observed growth response, 2) Seek to define precisely, the nutrient requirements of the early weaned pig based on lean tissue growth (much as we do for grower-finisher pigs), 3) Define the optimum temperature regime for early weaned pigs, as there is surprisingly almost no research available in this important area of management.

As many pork producers on the prairies operate single site farrow-to-finish units, the Centre is also considering how these results can be applied in conventional as well as multi-site farms. 

¹ Animal Biotechnology Centre, Department of Animal & Poultry Science, University of Saskatchewan

Savaging: When a Sow Kills Her Piglets

Moira Harris, M.Sc. - Graduate Student, Ethology

Pork producers have always known that an occasional female will attack and kill one or more piglets from her litter around the time of farrowing. We sometimes call these sows 'nervous', and conventional wisdom has it that this situation is more likely in gilts than in more experienced sows. The behaviour is sometimes labeled cannibalism - although there is little evidence that sows ever actually consume their offspring. Folklore also contains suggestions for remedying this unwanted situation: for example, feeding half a gallon of beer to the afflicted animal.

The modern-day pig producer will probably inject a sedative to calm a savaging sow and remove her litter temporarily until it takes effect. To date, however, science has provided the farmer with little coherent explanation of the causes of this behaviour or how it can be prevented. Agreement on the frequency of savaging is also lacking: published estimates of how often it happens, and how many piglets die as a result, have been based on anecdote or small studies, rather than the necessary large-scale research.

ECONOMIC IMPACT

Why is it important to research the issue of savaging? Our preliminary survey revealed that savaging is responsible for the death of approximately 1% of liveborn piglets. Canada produces more than 17 million pigs annually, with a newborn piglet estimated to be worth \$20-\$30. Therefore, deaths due to savaging are currently costing the Canadian pork industry \$3-5 million per year, not including the cost of replacing gilts who may be culled because of their tendency to savage. In real farm terms this is approaching \$5 per inventoried sow. The current expansion of

Canada's pig industry means that this figure is rising.

RESEARCH

A program of research was designed to investigate the causes of savaging behaviour. A preliminary survey of two barns confirmed that sows savage more often in their first parity than subsequently. Interestingly, it also appeared that more savaging occurred at a new operation (with an all-gilt breeding herd) than among gilts in a mixed sow-gilt herd. Approximately 7% of gilts housed in all-gilt farrowing rooms killed one or more piglets by savaging; among sows, the incidence was around 2.5%. The preliminary survey also suggested a correlation between large litter size (12 or more piglets) and a tendency among gilts to savage.

COMMERCIAL-SCALE STUDY

We are in the process of conducting a large-scale survey, involving seven new farrowing operations. Producers are being asked to keep records of farrowing behaviour for each gilt. Results should help confirm the link between the all-gilt farrowing environment and increased savaging. We also hope to confirm the correlation between larger litters and savaging. The survey will also provide information about any effects on levels of savaging of factors such as gestation length, sow condition, induction or

non-induction of farrowing and sex ratio of the litter. Farrowing sows will also be subject to two treatments: The effects on maternal behaviour of a recording of newborn piglet vocalizations or an altered lighting schedule in the farrowing room will be analysed. It is well documented that the behaviour of the stockperson can have significant effects on both behaviour and production of animals. By



Sow and piglet. A savaged piglet is one which has been attacked by its mother. Savaged piglets are bitten, and one or more bite marks will usually be visible. Bites are often directed at the head and face, or at the rear end. A savaging sow may kill or injure a single piglet from a litter, or several piglets, or attack piglets without injuring any. Piglets that have been savaged to death are usually found towards the front of the farrowing crate.

comparing data between the seven barns, we will also be able to examine any effect of different stockpeople upon sow behaviour around farrowing.

DETAILED STUDY AT PSC

We are also examining maternal behaviour among sows at Prairie Swine Centre by videotaping them before and during farrowing. This will allow us to observe the details of savaging, and of aggressive attempts, which may not result in injury to piglets, and may not be seen by the farmer. In some species, females low in the social order will be

poorer mothers than their higher-ranking peers. Dominance testing of group-housed pregnant sows will allow us to examine any effects of social status on behaviour around farrowing. Sows' temperament, assessed by their behaviour in relation to a novel place, person and object, will also be examined in relation to their farrowing behaviour. Finally, one theory of savaging suggests that when females are disturbed prior to giving birth, aggressive behaviour towards their piglets can result. On the day before giving birth, females in this study are subjected to one of three human environments: quiet (with human presence twice per day for feeding and checking); disturbing (with frequent human presence, conversation and tape-recorded piglet distress squeals); or control (with frequent human presence only). If disturbance increases the tendency to savage, sows subject to the quieter treatments prior to giving birth will demonstrate less aggression towards their piglets. Conversely, a busier pre-farrowing environment could produce less piglet-directed aggression,

HISTORICALLY SPEAKING


"If you are present when the trouble starts, you must act quickly. The sow must be restrained and the piglets removed to allow the sow to relax for a short time; then smear her face, and the backs of all the piglets, with a strong smelling material -- a kipper will often do".
(Barron, 1964, The Pig Farmer's Veterinary Book)

"If a sow or gilt savages her young, give her half-a-gallon of beer mixed with barley meal, and then walk her around for about 20 minutes until she starts staggering. This will quieten her down and she should accept her piglets without any further trouble".
(Johnson, 1965, Pig Farming, 13)

perhaps due to the calming of a human presence.

WELFARE CONSIDERATIONS

The cost of savaging is significant, costing the industry significantly in lost productivity however, savaging is more than just financial. The welfare of farm animals is important to all animal producers and to the general public. Obviously, being subjected to maternal aggression is a welfare problem for piglets which are

savaged, resulting in injury or death. The welfare of farrowing sows is also a concern, since any unusual behaviour can indicate a problem in an animal's environment. Research on the causes of savaging behaviour may help producers to reduce unnecessary stresses on their sows, as well as reducing the amount of savaging that occurs. This would be of financial benefit to the pig industry, and could improve the welfare of millions of sows and piglets. 

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STRATEGY


By lowering the temperature on the ventilation controller by 6°C below the recommended temperature, scientists were able to create a cool nighttime environment. "The pigs became more active in the cool evening as we would expect. Their first inclination was to go and eat!" notes Dr. Lemay, lead researcher on the project. This cooling period effectively reduced the overall impact of high temperatures on the pig performance each day and reduced the night time temperatures by about 2°C below the control rooms. "After two summers of research we are convinced that this strategy will pay significant dividends to the producer". Our experience shows average daily gains increased 5% for both males and

Table 1 Setpoint Temperatures (°C) for Swine during the Cooling Season*

Room and Body Mass (kg)	Solid Floor	Slatted Floor	Solid Floor with Straw
Dry Sows	19	21	18
Nursing Sow	18	20	17
Weanling 7 kg	27	29	26
20 kg	24	26	22
Grower-Finisher (continuous)			
25-60 kg	19	21	18
60-100 kg	16	17	15
25-100 kg	19	21	18
(all-in all-out)			
25 kg	22	24	22
45 kg	17	18	16
90 kg	16	17	15

* Source: Swine Building Ventilation - A Guide for Confinement Swine Housing in Cold Climates, Prairie Swine Centre Inc., 1994.

females compared to rooms where setpoint temperatures were not decreased". The results have consistently shown improvements of 3-5 days fewer to market; the net value

of this treatment is \$0.75 per pig sold. The best part is that anyone can adopt and make use of this technology tomorrow since it requires only minor adjustments and no capital purchase. 

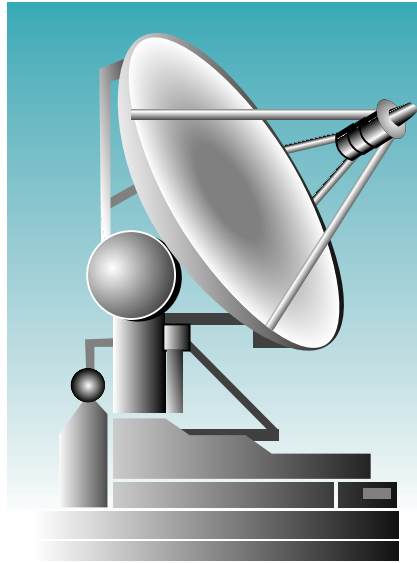
Practical Advice and Survival Tips Mark Fifth Satellite Conference

On February 24, 1999, pork producers and their advisors gathered together to watch a little TV. In fact, about four hours of televised program specifically for pork producers was produced and transmitted across Canada. This is the fifth such program produced by the Centre to address current topics and discuss recent research. Volunteer site coordinators and farms all across Canada took advantage of the opportunity to hear and to question top industry experts. The topics included risk management and business strategy, pig handling techniques, farrowing room management, and survival strategy tips.

The program targets the hands-on producer with an emphasis on improving barn management and profitability. The half day program format combined with the ability to receive the signal anywhere, including in the barn, have made this a popular staff training event. The program begins with a global view of where we are and where our industry is going. This year, Dr. Michael Boehlje from Purdue University reminded us that to succeed we need to: evaluate new technologies, control costs, evaluate networks/alliances, manage operating risk, develop a strategic direction, expand carefully, and think like a CEO or general manager.

Dr. Madonna Benjamin discussed her recent pig handling research and tips for identifying the type of training required for stock people. Dr. Neil Shantz, with an eye to the practical farm questions he experiences each day as a practicing swine veterinarian shared his six principles of production management. The six challenges Dr. Shantz sees regularly that limit performance and profits are: genetics, facility air quality, nutrition, adequate records, animal health and trained people.

John Spencer added a humorous note to the proceedings through his



subject "The Care and Feeding of Your Lender". The topic was designed to provide a fresh approach for how to communicate and recognize opportunities for maintaining lender relationships during turbulent periods such as we are currently experiencing in the pork industry.

The complete 2 tape set of the program, including printed proceedings for all speakers are available from the Centre for \$25.66.

As we went off the air there were still a number of interesting questions from viewers that our panel members had not addressed. These questions are summarized here and in future issues of Centred on Swine;

Q. What is your opinion regarding age at first service?

Dr. Neil Shantz - Breed at 190-230 days for best litter in parity 1. Performance in parity 2 through 8 is not affected by age at first service as long as it is within the above range. The lifetime production per year is best on gilts bred at 170-180 days of age. Average parity at removal from the herd is often higher in herds where gilts are first bred at 170-190 days.

Q. What is the best way to get rid of greasy pig?

Dr. Neil Shantz - You can't. The bacteria causing the clinical disease is

part of the normal skin flora of all mature sows. You can reduce incidence of disease by: 1) maintain a mature sow herd - offspring of gilts most susceptible, 2) reduce incidence of open wounds (needle teeth, mixing pigs at grower), 3) reduce humidity in nursery, 4) treatments are specific to barn-*ie.* pig flow, age of pig with problem, sensitivity of bacteria, ability of staff to observe disease in early stages.

Q. If I reduce mineral levels in my feed will production suffer?


Dr. John Patience - Calcium and phosphorus are the two minerals in the largest quantity in any diet. We know that many diets still contain more than is required by the pig. Potential savings of \$0.60 to \$2 per pig are possible. Our research would indicate that the lower levels now recommended have no adverse impact on performance.

Q. What are the implications for a greater degree of temperature fluctuation in the reduced setpoint summer ventilation strategy you have developed? (see related story on page one).

Dr. Stéphane Lemay - Firstly, the herd has no disease challenge and experienced no ill effects from the lower evening temperatures. Secondly, the amount of temperature fluctuation in the control rooms over the average day was 11°C, compared to 13°C in the test rooms.

Q. What is the bottomline on research in the area of group size?

Dr. Harold Gonyou - Our preliminary analysis on group sizes up to 80 pigs/pen indicates there is no reduction in ADG. Others working in this area have preliminary data to suggest reductions of 5-10% in groups of 100. We have a lot more to learn about pen layout, including the position of feeders for larger groups.

Watch future issues of Centred on Swine for more discussion on topics of production efficiency and the role of research to solve practical production problems. 

Training Programs Offer a Management Perspective

Mary Petersen, BEd

Providing training for owner operators and managers of hog barns is a task which Mary Petersen, Coordinator of Training Programs for the Prairie Swine Centre Inc., takes very seriously. Faced with an industry which is experiencing tremendous growth there is an immediate need for training. This need ranges from the new inexperienced employee, who knows little about hogs, to the owner/operator or manager of the hog barn, who knows a great deal about hogs but wishes to add to their skills in managing people, finances, and advanced records analysis for example. Additional challenges include: budgets for training are often lean or non-existent; the manager may not know what training is available or what level the training is designed to cover; the owner/operator finds himself too busy to take time to be away at a training course.

Faced with these challenges, Mary Petersen has accepted the task to coordinate the development and delivery of approximately twenty training courses for managers and owner/operators of hog barns. Mary has taken this initiative originally developed by Lee Whittington in consultation with the industry, and is bringing the courses to life. Mary's background is adult education and she has successfully applied her skills and knowledge to this new program.

The entire program will cover four areas of competency - human resources, business, facilities and production. Each course is designed to contain as much practical knowledge and information as possible to enable the students to apply what they have learned the next day upon their return to the barn. The students are challenged to draw upon their past

experiences and actively participate in case study analysis, activities and projects with their fellow students. It is recognized by the course developers that students learn by doing, sharing ideas and utilizing their vast past experiences. Often what separates managers from the other employees is their ability to critically think, analyze data and solve problems. These are skills which can be learned and students are asked to stretch and increase their skills in these areas.

The courses are being delivered in a face-to-face format and delivered over two days. Why a two-day Program? First, due to biosecurity requirements, managers and owner/operators do not often have the opportunity to meet with their peers. Providing time for networking is an important part of the course. Second, it is an opportunity to share ideas on dealing with the challenges faced each day in their barn and comparing your solution to how others have handled similar situations. There is comfort in knowing that others are experiencing the same problems, and significant time savings by building on the experience of others. When students have an opportunity to laugh and have fun, one can be assured that learning is being retained. Delivering the course over two days allows the participants the opportunity to informally socialize in the evening. The delivery of the existing courses has been extremely successful and students leave the course eagerly anticipating the upcoming courses.

The 1999-2000 delivery schedule will be available in mid-summer. Watch this publication and your provincial pork board newsletter for details. Information on courses and schedules is also available at our web site <http://adminsrv.usask.ca>. 

Focus on Harassment

Participants in the course *Issues in Agricultural Management* learn the benefits that come from a harassment free workplace. Providing a harassment free workplace is a requirement of the Occupational Health and Safety Act and regulations. Harassment can take many forms from the overt to the subtle. It can be made on the basis of "race, creed, religion, colour, sex, sexual orientation, family status, disability, physical size or weight, age, nationality, ancestry or place of origin." Employers who realize that harassment can occur in any workplace, and that it is their responsibility to provide a workplace free of harassment also realize that they can save money. Workers in a positive workplace can concentrate on quality of work and productivity, while the hidden costs of tardiness, sick days and employee turnover are reduced.

An employer can take several steps to prevent harassment. The employer should communicate clearly that harassment will not be tolerated by developing a harassment policy and ensuring that all of the employees are aware of the policy. Supervisors should be trained regarding their responsibility to ensure that the policy is enforced. Supervisors and employers need to be aware of the correct manner in which to deal with any incidents.

It is really a matter of respect!



Centred on Swine is a quarterly newsletter produced by Prairie Swine Centre Inc. (PSCI).

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Subscription Rates (includes GST):

\$32.00/1 year
\$61.50/2 years

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