

# Facts Not Perceptions

*Ken Engele, BSA, P. Ag*



*"Dr. Chuck Okere, Genex Swine Group explains some of the modern reproductive technologies impacting swine productivity"*

The goal of the Focus on the Future Conference is to feature the newest information available from the Prairie Swine Centre. This year's Conference, recently held in Red Deer, Alberta on February 20-21, 2001 lived up to its name. Over 100 people turned out for the 2 day event to listen to leading edge ideas in the areas of: consumer trends and marketing, in-barn management issues related to nutrition, alternative sow housing, odour management and feed mill compliance.

The conference kicked off with an enlightening look at *Consumer Trends in the 21st Century*. Mr. Joe Leathers (PIC USA Ltd.) demonstrated the growing importance of the restaurant and food service market by examining today's consumer, when asking: "What are consumers looking for in food

products? What future trends will we continue to see emerge?" Mr. Leathers feels the bottom line is that our industry needs to innovate and create new products to meet the consumer demand for quick meal solutions. There is growing importance on the consistent, high-quality pork in the fresh meat case, and stressed that quality is ultimately the defining factor in a great eating experience.

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*(Continued on page 2)*

## In This Edition

Graduate Student Profile . . . . .2

A Systems Engineering Approach to Address Challenges and Opportunities in Manure Management . . . . .3

Reducing The Danger – Hydrogen Sulphide Awareness Workshops . .5

Management Training for the Swine Industry . . . . .5

Introducing Murray Pettitt . . . . .6



*Sponsors supporting the Focus on the Future Conference*

Program funding provided by



# Graduate Student Profile

**K**imberly MacDonald was born in Montreal, Quebec, but moved to Whitby, Ontario in 1981, where she completed the majority of her schooling. After graduation in 1995, Kim attended the University of Guelph and earned a BSc. degree in Agriculture with a major in Animal Science in 1999. Deciding to pursue an MSc., Kim "headed West" to study under the



*Kimberly MacDonald*


supervision of Dr. Harold Gonyou at the University of Saskatchewan/Prairie Swine Centre. In her research, Kim is looking at the feeding behaviour of grower-finisher swine. More specifically, she is examining the effects of feed presentation and type on eating behaviour and how these influence the maximum pig to feeder space ratio. Recent research suggests that the standard five pigs per feeder space, underestimates the actual stocking

density that can be handled by modern feeder designs. Several factors have been identified as having an impact on the feeding behaviour of pigs, such as competition, size of the pig and how the feed is presented. In the first study, pens of 12 pigs were assigned to one of four possible feed types and presentation

combinations: dry mash, dry pellets, wet/dry mash or wet/dry pellets. Pens of pigs were videotaped for two twenty-four hour periods in order to determine the total duration of eating. Results indicated that pigs fed a dry mash diet spent a significantly longer amount of time eating, had lower average daily gain (ADG), but similar average daily feed intake (ADFI), as compared to the other treatments. The drop in ADG without a corresponding decrease in ADFI may

have been due to increased feed wastage. Pigs fed wet/dry mash, dry pellets or wet/dry pellets all spent a similar amount of time at the feeder. Using the data collected from the first experiment, an estimate of the number of pigs required to create various levels of feeder space utilization under each feeding condition was calculated for a second experiment. Levels of stocking density examined included 95, 110 and 125% of feeder capacity in the grower phase and 80, 102.5 and 125% of capacity in the finisher phase. As stocking density increased to over 100% of capacity, ADG and ADFI decreased.

## The Bottom Line

Dry mash diets limit the number of pigs that can be fed from a feeder space and producers should consider pelleting their diets or providing water in the feeder in order to increase the stocking capacity of their feeders and, perhaps, decrease wastage. Exceeding the capacity of the feeder will result in a decrease in intake and growth. 

## Facts Not Perceptions

*(Continued from page 1)*


conjugated linoleic acid (CLA) has a positive influence on carcass quality by effectively reducing subcutaneous fat by 6.6-6.8% and increase carcass lean by 2.3-2.7% in commercial pork cuts. Dr. John Patience (PSCI) observed the growth rates of pigs marketed over 21-25 weeks and reported that a 1 kg weight advantage at weaning represents up to 12 kgs by the time pigs reach market weight. This results in more than a \$15/hog difference in feed costs over the growth period.

One topic that generated significant interest throughout the conference was Dr. Harold Gonyou's (PSCI) presentation *Group Housing of Sows*. Most people in attendance agreed sow housing is a very

important issue facing the industry in the next few years. Dr. Gonyou went further to explain the advantages and disadvantages realized with each housing system, and outlined PSC Elstow Research Farm's experience with their electronic sow feeding system.

Day two of the conference began with a look at future swine reproductive technologies. Dr. Chuck Okere, Genex Swine Group, lead the audience through new technologies from cryopreservation to marker assisted selection. Topics addressing the daily operation of the farm included: feeding the high-producing lactating sow (Dana Cooper, PSCI) and 21st century feed mill compliance (Dr. Eduardo Beltranena, PSCI). Dr. Stéphane Lemay reported on some of his work at Prairie Swine Centre with the development of a two-air-space building. This system was effective in reducing ammonia emissions

by 40% and total odour concentration by 20% with the construction of an enclosed dunging area (EDA) and biofiltration system. The conference wrapped up with Dr. Claude Laguë's presentation on green house gas emissions, and outlined the issues that could face Canadian pork producers in upcoming years.

This year's conference was an overwhelming success, resulting from the high-calibre of presentations and feedback generated throughout the two days. The conference will maintain the focus of providing cutting edge research eye on "the bottom line". Next year we will hope to see you in Winnipeg in mid March 2002. Proceedings and videos of the conference are available at a nominal charge (proceedings \$10, Video - 4 tape set \$39.95). A very special thanks to PIC Canada Ltd., this year's corporate sponsor. 

# A Systems Engineering Approach to Address Challenges and Opportunities in Manure Management

*Claude Laguë, P.Eng., Ph.D., University of Saskatchewan / Prairie Swine Centre Inc.  
Sask Pork Chair in Environmental Engineering for the Pork Industry*

## Managing Manure Is a Challenge

Manure constitutes a direct and unavoidable by-product of any type of animal production system. But what exactly is manure? In addition to animal excrement (urine and feces) that provide its basic components, manure produced in modern livestock production systems also includes many other products: animal debris (e.g. hair), water (e.g. wastage from drinkers, precipitation into open storage facilities, washing), feed materials wasted by the animals, bedding materials, human wastes, etc. Those components are added to the manure at different stages of the livestock production systems. Animal manure is thus a complex and dynamic product composed of mineral and organic solid components mixed with water. As a result, it may be used to provide:

- nutrients, organic matter and water to soil-crop systems;
- energy (e.g. electricity, heating) for use on the production sites or elsewhere;
- waste water for use on the production sites (e.g. in-barn flushing).

As soon as it is produced, manure enters into a processing system that comprises natural and artificial processes that can be biological, chemical or physical. Those processes must be coordinated and optimized in order to achieve the desired end uses for the manure. As it is the case for any other human-initiated activity that has any level of complexity, we believe

that manure management engineering can be better addressed if a systems engineering approach is used.

## Need for a Systematic Approach

The industrial and the current information ages have demonstrated that technology can be a most valuable tool to provide solutions to problems that face human societies at the economic, societal, and environmental levels. However, the successful application of technology needs to consider not only the symptoms of the problems and the potential technological solutions, but also other more intangible factors such as institutions and values for example.

The successful application of systems engineering to manure management engineering requires that manure management systems be defined in terms of inputs (e.g. what is coming in), outputs (e.g. what are the intended uses for manure), and transfer functions (e.g. what are the biological / chemical / physical processes required). An example of such a representation is illustrated on Figure 1. System parameters and functions may be quantitative (e.g. concentration, cost, energy, mass, volume, etc.), or qualitative (e.g. odour, social perception, etc.), and all these need to be properly evaluated and weighted relative to one another in order to assess the global performance and efficiency of any given manure management system.

## A 5-step Approach

We believe that an efficient systems engineering approach to manure management challenges and opportunities must proceed through five different steps:

1. Determination of the evaluation / selection criteria to be used to compare different potential solutions to a given manure management engineering problem
2. Determination of the relative importance of those different evaluation / selection criteria in the decision-making process
3. Identification of potential solutions to the problem
4. Evaluation of the performances of each potential solution with respect to each of the evaluation / selection criteria
5. Identification of the optimal solution based on overall weighted performance

## An Example

Consider the particular case of a manure management system, such as the one illustrated on Figure 1, that is aimed at optimizing the recycling of manure through a given set of soil-crop systems located in the immediate vicinity of a livestock operation. The desired output for that system is the maximum use of manure components (water, mineral and organic solids), by those soil-crop systems and the minimum losses of manure components to the environment (air, soil and water),

*Continued on page 4*

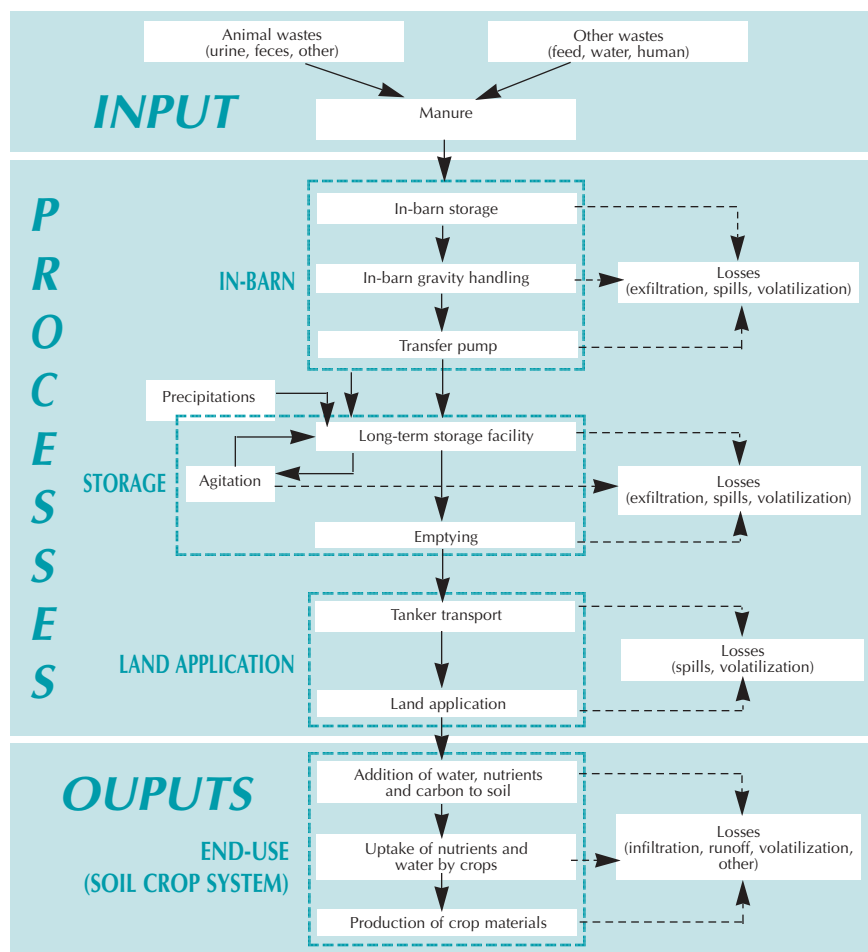


FIGURE 1. Schematic representation of a manure management system

(Continued from page 3)

while the inputs are the specific characteristics of the manure produced in that operation.

Typical criteria that may be used to evaluate and compare different manure management options for such a system may include protection of ground and surface water, capital and operating costs, energy efficiency, labour requirements, odour emissions, etc. (step 1). Each livestock operation would need to establish its own list of criteria based on the specific manure management opportunities and challenges that it must address. In Saskatchewan for example, the provisions of The Agricultural Operations Act related to agricultural nuisances and intensive livestock operations (protection of ground and surface water), would definitely have to be included in such a list. Step 2 then involves the ranking of those criteria.

One effective method of doing so is to use a paired comparison matrix in which each criterion is compared against each of the other ones. Total scores and weighing factors for each criterion can then be determined from that matrix. The results from this ranking process are likely to vary from one livestock operation to another given the specific conditions under which it must operate. Once the criteria have been clearly identified and ranked, it then becomes possible to identify different manure management options (step 3). The common characteristic of those options is that they must contribute to provide the desired output (in this case, maximizing the recycling of manure components by the available soil-crop systems while minimizing losses to the environment). As many practical options as possible should be identified in order to maximize the likelihood of selecting the one that is truly optimal. For the

example presented on Figure 1, a number of sub-options are possible in terms of in-barn manure collection and handling, water management, type of storage facility, land application modes, etc. The quantitative or qualitative performances of each of those options with respect to the different evaluation / selection criteria then need to be determined (step 4). For example, quantitative performance indicators can be derived for criteria such as cost, water protection, labour requirements and energy efficiency, while a combination of quantitative (intensity) and qualitative (hedonic tone) indicators could be determined for the odour emissions criterion. In the end, the optimal manure management system should correspond to the option that achieves the highest total weighed score (step 5).

Manure management problems are often addressed by concentrating on only a few pieces of the puzzle. The proposed approach rather looks at the "big picture", which improves the likelihood of identifying or designing optimal manure management systems that are adapted to the particular needs of specific livestock operations.

## Practical Implications

Livestock operations that need to improve existing manure management systems or to design new ones because of expansion or changes in operating practices for example, would benefit from the use of the proposed approach. Although performance indicators, especially for some qualitative criteria (nuisances caused by odour emissions for example), are still difficult to estimate, the proposed systematic approach has the merit of putting many manure management options through a thorough analysis and to compare them against uniform sets of criteria. As more and more manure management options become available for livestock operations while at the same time further constraints are put into place, it becomes increasingly important to make the right choice. 🐷



# Reducing The Danger: Hydrogen Sulphide Awareness Workshops

By Jeff Drake/The Marketing Den

**H**og barn employees are well aware of the lethal effects of hydrogen sulphide (H<sub>2</sub>S), yet every year this deadly gas claims lives. In low concentrations, hydrogen sulphide is easily recognized by its characteristic foul odour, similar to the smell of rotten eggs, but continued exposure will temporarily eliminate one's sense of smell. The effect usually misleads the worker into thinking the danger has passed; often with tragic results.

Prompted by local incidents and stories in the media about the dangers of hydrogen sulphide, the Prairie Swine Centre started to develop an in-house course for their employees. Coordinator of Training Programs, Mary Petersen, soon found that the need for the courses was so great, that she turned the program into a Hydrogen Sulphide Awareness Workshop to educate hog barn employees.

"The one-day workshops are about safety in the hog barn concerning H<sub>2</sub>S and the properties of H<sub>2</sub>S," says Mary. "We study the effects of the gas on humans and on hogs. We also deal with the safe handling of liquid manure. Even though every barn is different, there are still standard operating procedures that

can be used. People in the workshops learn the properties of H<sub>2</sub>S, how to handle the gas and how to reduce the danger in their operation."

One important aspect of the workshops is the case studies. Mary has collected incidents from the Occupational Health and Safety Department and from barns across the province. At the workshops, the participants analyze the case studies and discuss what went wrong. That soon leads to a discussion on what they do in their own barn and the participants decide if they need to revise the way that they work. The workshops have shown that the workers are well aware of the dangers, they just do not know all of the effects of H<sub>2</sub>S and how to increase the safety of their workplace.

"Funding from CARDS enabled the workshop to be developed. CARDS also funded a video that is currently being produced to accompany the class," adds Mary. "I started conducting The Hydrogen Sulphide Awareness Workshops in January and right now my schedule is almost full until the end of April. I generally handle classrooms of 20 students, but I can make arrangements to accommodate hog barns with fewer employees."

To book a workshop, or to find out more information, please contact Mary Petersen, Coordinator of Training Programs at the Prairie Swine Centre:  
 Phone: (306) 667-7436  
 Fax: (306) 955-2510  
 E-mail: [petersen@sask.usask.ca](mailto:petersen@sask.usask.ca)

## Workshop Feedback

The pork production and marketing company Quadra is taking advantage of the Hydrogen Sulphide Awareness Workshop by enrolling all of their barn employees. Here's a sample of the feedback they have received so far:

### What was the most valuable thing you learned?

- "How to think fast when in a situation involving H<sub>2</sub>S."
- "I now know how to recognize H<sub>2</sub>S exposure symptoms and how to react."
- "How many people don't actually know what they are dealing with."
- "How deadly H<sub>2</sub>S gas could be."

### General comments.

- "It was excellent."
- "Very enjoyable, excellent instructor."
- "Valuable knowledge gained in the course."
- "I think the interaction and idea exchange between the barn employees is valuable."

## Management Training for the Swine Industry

Alberta Schedule	
Date	Course
April 24 & 25	Being an Effective Manager
May 15 & 16	Environmental Management
June 12	Conflict Resolution
<b>Delivery Location: Olds College</b>	
<b>To register call: 1-800-661-6537</b>	

Saskatchewan Schedule	
Date	Course
April 17 & 18	Environmental Management
May 8	Conflict Resolution
June 19	Grow/Finish Feeding
<b>Delivery Location: Watrous, SK</b>	
<b>To register call: 1-306-946-2094</b>	

### Being an Effective Manager

This course, the first of three on Human Resource Management, guides the student to becoming an effective personnel manager. Students will assess and understand their own management styles and gain an understanding of the role of a manager. Interpersonal communication will compose a large

*Continued on back page*

Continued from page 5

part of this course with problem solving and conflict management being emphasized. Students will learn how to create and manage work groups within a hog production unit.

Alberta

Instructor: Mary Petersen

April 24 & 25

Time: 10am – 4:30pm (Day 1)

8 am – 5:00 pm (Day 2)

### Environmental Management

This course assists the owner/operator or manager to develop sound environmental management practices and procedures. The focus is on the operational responsibilities as opposed to siting/location issues. The participants will develop a good understanding of the legislation and its impact on their production unit. By using tools described in the course the manager can monitor environmental impact. Emergency plans, corrective action and standard operating procedures will be developed.

Alberta

Instructor: Kevin Dunn

May 15 & 16

Time: 10 am – 4:30 pm (Day 1)

8 am – 5 pm (Day 2)

Saskatchewan

Instructor: Shawna Argue

April 17 & 18

Time: 10 am – 4:30 pm (Day 1)

8 am – 5 pm (Day 2)

### Conflict Resolution

Conflict in an organizational setting is unavoidable, but it can be managed productively to result in a win/win fashion. Individual strategies for resolving conflict are identified and assessed in relation to the various situations arising in the workplace. Through assessment, communication and problems solving, participants will learn how to handle conflict in a respectful and collaborative manner.

Alberta

Instructor: TBA

June 12

Time: 9:00 am – 5:00 pm (1 day)

Saskatchewan

Instructor: TBA

May 8

Time: 9:00 am – 5:00 pm (1 day)

### Grow/Finish Feeding

Participants will gain an understanding of the concepts surrounding the management of feeding and what is under their influence to

improve the efficiency of their production. Factors associated with the animal, feed and environment and how it affects feed intake and growth will be examined, as well as the importance of growth composition, nutrient requirements and feeding methods. Participants will compare their production feedback with industry standards to set attainable goals.

Saskatchewan

Instructor: TBA

June 19

Time: 9:00 am – 5:00 pm (1 day)



## Coming Events

### Sask Pork Annual General Meeting

April 26, 2001

Willows Golf and Country Club

Business Meeting

10:00 am – 2:00 pm

H<sub>2</sub>S workshop

2:15 – 4:30pm

Contact Kim or Shannon

to register: 244-7752

1-866-244-7675 (toll free)

## Introducing

**O**n November 1st, 1999, Dr. Murray Pettitt joined the staff of Prairie Swine Centre Inc. in the position of Assistant Manager – External Research Services. Raised in Russell, Manitoba, Murray completed his B.S.A. (1986) and M.Sc. (1991) in Animal Reproduction in the Department of Animal Science at the University of Manitoba. He was then employed for three years as a research technician in the Andrology Laboratory of the Human Infertility Clinic at the Health Sciences Centre in Winnipeg. He completed his Ph.D. in swine reproduction at the University of Guelph in 1997. His areas of research were sperm physiology and




Dr. Murray Pettitt

cryopreservation. From 1995 to 1999 he was employed as a post-doctoral fellow at the Ontario Veterinary College, investigating embryo transfer and sperm preservation in swine.

Murray works with

Dr. Eduardo Beltranena in the External Research Services

Program of Prairie Swine Centre Inc. He provides support to the program through his involvement in the design of experiments, study conduct, data analysis and the preparation of reports. He is also involved in GLP/GCP regulatory studies, where the research results are submitted to Canadian and/or American regulatory agencies in support of product registration. 



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