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# SWiNe
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## In This Edition

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# Remodeling Grow/Finish Barns for Large Groups

Harold W. Gonyou, Ph.D.

Large groups (more than 100 pigs/pen) require less total space and have lower penning and other equipment costs than conventional groups of less than 50 pigs. Other potential advantages to large groups include the ability of pigs to choose a better microenvironment, and the possibility of automated sorting. These advantages may be slightly offset by a reduction in growth rate of 1 – 1.5%. While new operations can implement large groups quite easily, existing operations must ask how feasible it would be to remodel their rooms. Major considerations when remodeling to achieve large groups are the dunging patterns of the pigs and provision for good animal handling, weighing and sorting.

Rooms designed for small groups have ventilation that encourages good dunging patterns. Once the penning is removed, the dunging patterns of pigs are less predictable. Pigs in a large group typically concentrate their dunging in one area of the pen. In partially slatted facilities, the dunging area will run onto the solid floor, creating dirty pens and high levels of ammonia. It is very difficult to remodel a partially slatted room into one that functions well with large groups.

*Continued on page 5*

# Dietary Manipulation to Reduce Nutrient Excretion

Ruurd T. Zijlstra, Ph.D.

Careful nutrient management is needed to deal effectively with the increased density of the pork industry in some areas and the increased public concerns regarding nutrient excretion and odour emissions. Successful management of nitrogen and phosphorus is key for sustainable pork production to address these public concerns. For example, nitrogen excretion in the form of ammonia is a concern because of its impact on the work environment inside the barn and also outside the barn for its potential impact on the environment. Swine production has been recognized as a major source of ammonia, which is a noxious gas for humans and animals and contributes to bad odour. The main component of ammonia emission originates from excretion of nitrogen in the form of urea in urine. Faecal nitrogen is less volatile than urinary nitrogen, because faecal nitrogen is bound chemically within proteins or other compounds. Phosphorus is excreted in urine and faeces, and could have a major impact on the environment if not managed properly.

Two projects are discussed in this article, and each project was focussed toward specific dietary manipulations to alter nutrient excretion. Specific actions to improve nutrient digestibility should coincide with a reduced nutrient excretion in the faeces. Over-supplementation of diets with nutrients to ensure maximum pig performance may cause excessive amounts of nutrients excreted in faeces and urine, and pigs should be fed closer to their requirement to reduce nutrient excretion. Finally, the ratio of nitrogen excreted in urine versus faeces can be affected using dietary manipulations. Project 1 investigated two nutritional strategies, dietary particle size reduction and enzyme supplementation, as a means to increase nutrient digestibility and thereby reduce nitrogen and phosphorus excretion. Project 2 investigated reducing dietary protein and fermentable fibre as means to alter nitrogen excretion.

## Project 1: Particle size and enzyme supplementation

Three dietary particle sizes (400 mm, fine, 4/64"-screen; 700 mm, medium, 8/64"-screen; 850 mm, coarse, 10/64"-screen) were obtained by grinding barley and field pea samples across different hammermill screens. Four enzyme treatments (control; carbohydrase [ -glucanase with xylanase], CHO; phytase, PHY; and PHY + CHO) were also compared in the same study. Phytate and fibre (including -glucans and xylans) can be regarded may reduce nutrient digestibility. Diets were based on barley (70%) and peas (25%).

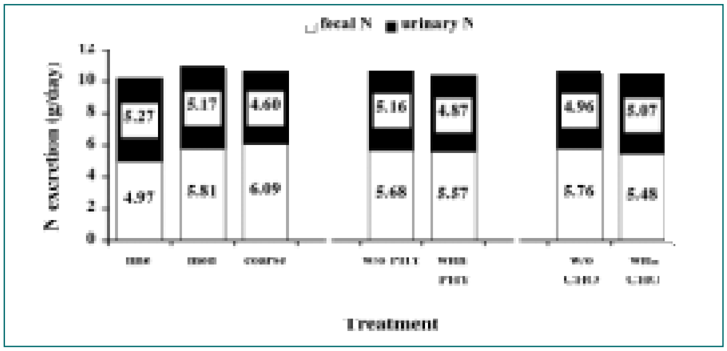
A fine particle size reduced faecal nitrogen excretion by 15 and 18% compared to the medium and coarse particle size, respectively.

"A fine particle size reduced faecal nitrogen excretion by 15 and 18% compared to the medium and coarse particle size"

Grinding ingredients more finely will thus improve nitrogen digestibility, but it will be at the expense of increased energy costs and time required to grind ingredients. Practical aspects of feeding diets with finely-ground ingredients have not been determined, for example wear of the hammers or bridging of feeders. Unlike the decreasing effect on faecal nitrogen, urinary nitrogen excretion increased by 13 and 15% with medium and fine particle size, respectively, compared to coarse particle size (Figure 1).

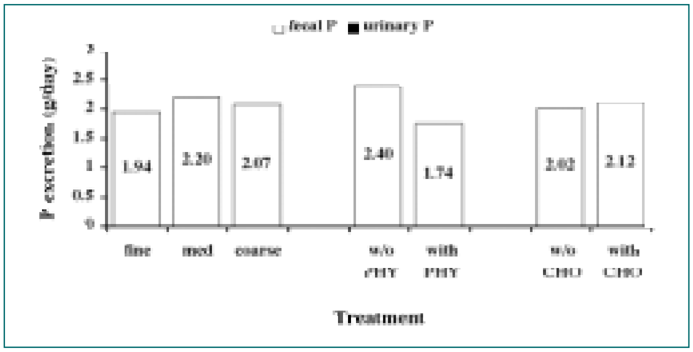
Overall fine particle size reduced total nitrogen

***Figure 1. Total nitrogen excretion (g/day) partitioned by excratory route (Project 1).***




Treatments include: diet particle size (fine, med(ium), and coarse), dietary phytase (PHY) and dietary carbohydrase (CHO).

***Figure 2. Total phosphorous excretion (g/day) partitioned by excratory route (Project 1).***




Treatments include: diet particle size (fine, med(ium), and coarse), dietary phytase (PHY) and dietary carbohydrase (CHO).

*Figure 3. Effect of dietary protein level on faecal and urinary nitrogen excretion and retention (in g/d; Project 2).*

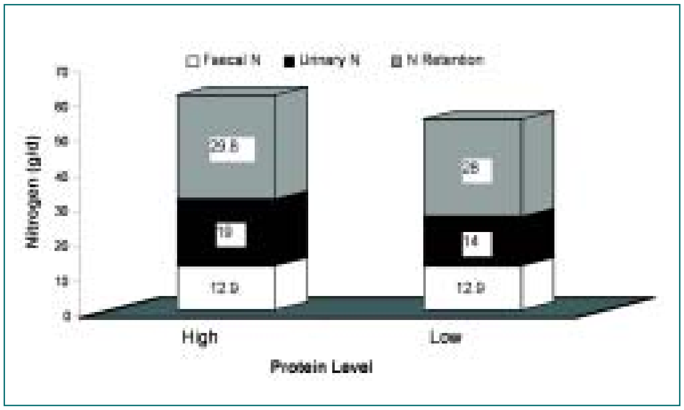
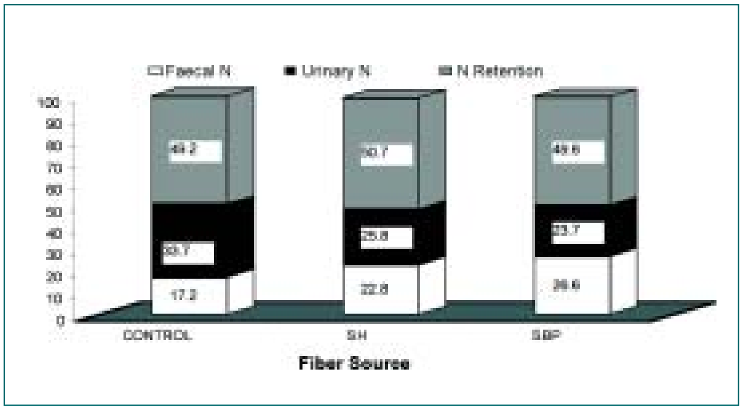



*Figure 4. Effect of dietary fibre source (SH is soy hulls, SBP is sugar beet pulp) on faecal and urinary nitrogen excretion and retention (as % of nitrogen intake; Project 2).*




excretion by 7 and 4% compared to medium and coarse particle size, respectively. Together, results indicate that finer grinding will improve nitrogen digestibility, but that only part of the increase in digested and absorbed nitrogen is indeed retained by the pig.

### Phytase and Diet Costs

Phytase supplementation reduced total nitrogen excretion by 4%, while carbohydrase supplementation lowered faecal excretion by 5%. Apparently, nitrogen digestibility was reduced by phytate and fibre, and these limitations were partly overcome by adding supplemental enzyme. Surprisingly, fine particle size reduced faecal phosphorus excretion by 12% compared to medium particle size (Figure 2). As expected, phytase supplementation reduced faecal phosphorus excretion by 28%, indicating that phosphorus digestibility in a diet including field peas and barley is limited by phytate. In this study, phytase released 0.54 kg available phosphorus per tonne of diet. Di-calcium phosphate presently costs around $473/tonne and each tonne provides 18.5 kg phosphorus; in other words, available phosphorus costs around $25/kg. Based on these assumptions, the value of the phosphorus released by phytase per tonne of feed may thus be as high as $13.50/tonne of feed.

### Project 2: Reduced dietary protein and fermentable fibre

Two levels of dietary protein (high, 18.5% and low, 15.6%) and three sources of fibre (control, soy hulls (SH; 15%), and sugar beet pulp (SBP; 20%)) were tested. Diets (wheat, barley, soybean meal, and corn starch) were supplemented with synthetic amino acids to meet an ideal digestible amino acid profile.

Urinary nitrogen excretion was 26% lower for low protein compared to high protein diets (Figure 3), with a similar nitrogen retention or protein deposition. Urinary nitrogen excretion is therefore a reflection of excess nitrogen absorbed by the pig. Reduction of protein content while balancing for digestible amino acids is an effective way to reduce nitrogen excretion, especially urinary N and therefore ammonia emissions. Although average daily gain was not affected by reducing dietary protein, further research is required to maintain nitrogen retention.

Faecal nitrogen excretion was increased 6% for soy hulls and 9% for sugar beet pulp compared to control (expressed as a percentage of nitrogen intake; Figure 4). Percentage urinary nitrogen excretion was reduced 8% for soy hulls and 10% for sugar beet pulp compared to control. Soy hulls and sugar beet pulp contain fermentable fibre and this fibre functions as an energy source for bacteria in the large intestine. These bacteria use excess nitrogen in the pig as their nitrogen source, and nitrogen excretion is therefore shifted from urine to feces. The reduced urinary nitrogen excretion will be directly related to a reduction in ammonia emissions. Voluntary feed intake and body weight gain and feed efficiency were not affected by adding sugar beet pulp to the diet. Using fibre sources high in fermentable carbohydrates can shift nitrogen excretion from urine (urea N) to faeces (protein-bound N), thereby reducing chances of ammonia emission.

For both the dietary treatments, there is a diet cost involved to reduce urinary nitrogen excretion. The actual cost will depend on the starting point for implementing the treatment. Using the diet price achieved with accurate nutrient requirements and least-cost diet formulation and the present ingredient prices as starting point, reducing dietary protein by 1%-unit in a wheat-based finisher pig diet may cost up to $10 per tonne of diet, and inclusion of 10% sugar beet pulp will cost $14 per tonne of diet. Clearly, dietary manipulations to reduce urinary nitrogen excretion work to reduce the environmental impact of the swine industry; however, the present cost to apply these strategies may hamper their implementation.

### The Bottom Line

Nutrient management is becoming increasingly important for sustainability of the swine industry. Reducing particle size below 700 mm proved effective in altering nitrogen excretion patterns, while the addition of phytase proved very effective in improving digestibility of dietary phosphorus. The addition of carbohydrase showed little evidence of reducing total nitrogen or phosphorus excretion. A reduction of dietary protein content while balancing for digestible amino acids will especially reduce nitrogen excretion in urine. With dietary fermentable fibre, part of urinary nitrogen excretion can be shifted toward nitrogen excretion in faeces, and thus reduces volatile nitrogen that contributes to bad air quality. . Together, results indicate that nitrogen and phosphorus excretion patterns can indeed be altered by diet manipulation.

# Optimum versus maximum lysine levels for weanling pigs

T.F. Oresanya, E. Beltranena, J.F. Patience, and A.D. Beaulieu

Rapid improvements in lean growth potential, health status and management of the weaned pig have resulted in changes in the energy and amino acid requirements such that previous recommendations or diet formulations used in the past may no longer result in maximum performance. In addition, recent research showing that extra weight gain in the nursery results in doubling of the gain by marketing, places even greater importance on maximizing weight gain of the weanling pig. So, we ask the question: how much lysine is enough and how much is too much, and how much lysine in the starter is economical?

> "The existing recommended Lysine/DE ratios for the weaned pig are inadequate to support its full growth potential"

There is clearly a need for a re-evaluation of amino acid requirements. Currently, recommended lysine:energy ratios vary from as low as 2.8 to as high as 5.0 g total lysine/Mcal DE (digestible energy) for pigs up to 25 kg. The NRC (1998) recommended 3.5 g total lysine/Mcal DE for pigs above 5 kg live weight.

### Experiment 1

A total of 240 pigs (14.4 ± 0.2 d; 5.0 ± 0.12 kg; mean ± SEM) at weaning were fed a standard commercial SEW diet for 5 days followed by a transition diet for 8 days. Pigs were then fed the experimental diets for a 28-day period starting on day 13 postweaning. The six experimental diets (3.5 Mcal DE/kg) contained total lysine/DE ratios of 2.7, 3.0, 3.3, 3.6, 3.9 or 4.2 g total lysine/Mcal, equal to 0.95%, 1.05%, 1.16%, 1.26%, 1.37% and 1.47% total lysine, respectively. Diets were based on wheat, soybean meal, lactose, fish meal and sufficient synthetic amino acids to maintain acceptable ideal protein ratios. Growth rate and feed efficiency increased with increasing lysine/DE ratio (linear $P < 0.05$). There was no effect of lysine/DE on feed intake. Because growth rate increased linearly to the highest level (4.2 g/Mcal; 1.47 % total lysine), we concluded that the required lysine/DE ratio for the weaned pig is at or above this level and thus may be higher than most literature values and current recommendations. A second experiment was therefore necessary.

### Experiment 2

A total of 240 pigs (20 ± 0.1 d; 6.5 ± 0.06 kg; mean ± SEM) were fed two levels of DE; low energy (LE, 3.4 Mcal DE/kg) or high energy (HE, 3.6 Mcal DE/kg), at 5 lysine/DE ratios (3.7, 4.0, 4.3, 4.6, and 4.9 g total lysine/Mcal). Thus, 10 diets, ranging in total lysine content from 1.26% to 1.76%, were investigated. The lysine/DE ratios were selected to bracket existing literature values for the weaned pig and included higher values than those used in experiment 1. Pigs were fed one of the 10 experimental diets starting on day 7 postweaning for a 28 day period.

Growth rate increased (quadratic $P < 0.10$) and feed efficiency improved with increased lysine/DE ratio. Overall, the level of DE did not influence growth rate. However, pigs fed the high energy diets ate 13% less feed than those fed the low energy diets in week 1 and had 12% lower growth rate ($P < 0.05$). Overall feed intake was 4% lower on the high energy diets, but DE intake was similar for both DE levels. The lysine/DE ratio that maximized performance was calculated from the regression equation. We concluded that for pigs growing from 7.5 to 22.5 kg, the requirement is 4.65 g total lysine/Mcal DE, equal to 1.60% total lysine. The existing recommended ratios for the weaned pig are inadequate to support its full growth potential, so the results of experiment 1 were confirmed.

Increasing the lysine level of a starter diet from 1.30% to 1.60% will cost about $80 per tonne using current feed costs. With actual total feed intake of pigs on lysine:DE levels for this period, the feed cost per pig will increase by $1.86 at the optimum lysine level. Assuming this additional lysine increases nursery exit weights by 1 kg, and assuming, based on previous research at the Prairie Swine Centre, that this improvement will increase weights at 20 wk of age by 2 kg, we calculated the change in net income per pig by using ratios above 3.7 g/Mcal. The maximum benefit is obtained at 4.30 g/Mcal (1.5% total lysine) when hog market prices are above $1.75/kg (Table 3), but lowers levels of 1.3% to 1.4% optimized financial returns at lower market prices. Clearly, hog market prices dictate the benefit of using optimum versus maximum lysine:DE ratio in the starter diet and provide further support for the logic that feeding programs must be developed in the context of changing economic conditions.

### The Bottom Line

To maximize performance in the nursery, starter diets should contain 4.65 g total lysine per Mcal DE (approx. 1.60%). The cost benefit of this lysine level should be carefully considered.

*Table 1. The effect of lysine/DE ratio on pig performance (Experiment 1)*

| | Lysine/DE ratio, g/Mcal | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2.7 | 3.0 | 3.3 | 3.6 | 3.9 | 4.2 | SEM |
| Weight gain, g/d | 413 | 393 | 463 | 451 | 489 | 513 | 0.01 |
| Feed intake, g/d | 775 | 755 | 781 | 760 | 741 | 768 | 0.03 |
| Gain:feed | 0.54 | 0.52 | 0.60 | 0.61 | 0.66 | 0.67 | 0.01 |

*Table 2. The effect of DE and lysine/DE ratio on pig performance (Experiment 2)*

| DE, Mcal/kg | Weight gain, g/d | Feed intake, g/d | Gain: feed |
|---|---|---|---|
| 3.4 | 539 | 856 | 0.63 |
| 3.6 | 540 | 826 | 0.65 |
| **Lysine/DE ratio, g/Mcal** | | | |
| 3.7 | 515 | 842 | 0.61 |
| 4.0 | 533 | 857 | 0.61 |
| 4.3 | 548 | 850 | 0.65 |
| 4.6 | 554 | 839 | 0.66 |
| 4.9 | 549 | 817 | 0.67 |
| SEM | 0.01 | 0.01 | 0.01 |

*Table 3. The economics of lysine:DE ratio in weaned pig diet*

| | Hog market price ($/kg) | | | | | |
|---|---|---|---|---|---|---|
| Lysine: DE ratio at current ingredient price | 0.75 | 1.00 | 1.25 | 1.50 | 1.75 | 2.00 |
| 4.9 | -2.30 | -1.87 | -1.45 | -1.04 | -0.63 | -0.21 |
| 4.6 | -1.93 | -1.46 | -0.98 | -0.51 | -0.04 | 0.44 |
| 4.3 | -1.39 | -0.93 | -1.23 | -0.18 | 0.22 | 0.62 |
| 4.0 | -0.85 | -0.63 | -0.41 | -0.19 | 0.03 | 0.25 |
| Lysine: DE ratio at long term average ingredient price | | | | | | |
| 4.9 | -2.15 | -1.72 | -1.30 | -0.89 | -0.48 | -0.06 |
| 4.6 | -1.85 | -1.37 | -0.90 | -0.42 | 0.05 | 0.52 |
| 4.3 | -1.35 | -0.95 | -1.19 | -0.15 | 0.25 | 0.66 |
| 4.0 | -0.85 | -0.64 | -0.42 | -0.20 | 0.02 | 0.24 |

*Continued from page 1*

Three aspects of animal handling must be considered with large groups. The first is capture or restraint of individual pigs for health treatments. A good approach is to incorporate a capture area in the room, into which a small group of animals can be herded and caught. Once a pig has been captured for treatment, it should be placed in a small sick pen.

Moving pigs out of the pen is often difficult in large groups. Pens are too wide to prevent pigs from running back when being driven out of the pen. You may leave some penning in the room so that narrow, 'controllable' passages are formed. You may use a long 'gating' system attached to the wall at one end or carried by two people. A large inflatable tube can be rolled across the room with the pigs moving in front of it. Move several small groups out separately, as large groups tend to pile at the door or in the hallway.

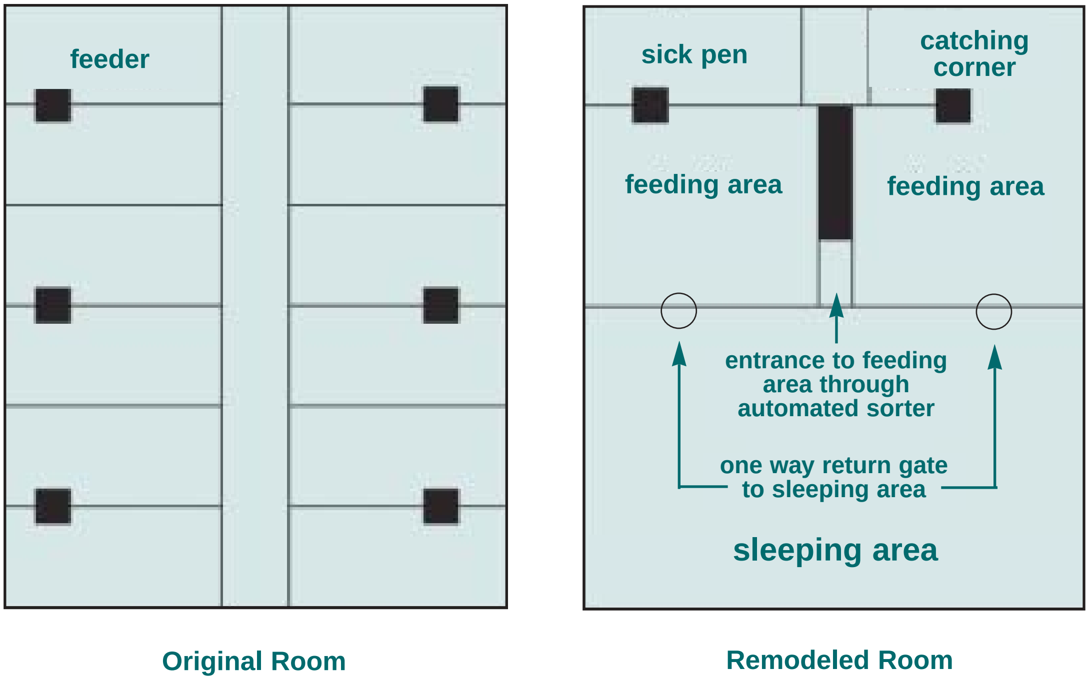
Someone that is at the back of a group of 50 pigs in a hallway cannot 'herd' the animals at the front. Wider hallways will accommodate larger groups of pigs, but this is not an option when remodeling a barn. Either move the pigs in small groups, or have a second person herding near the front of the pack.

With large groups, one pen of pigs will not fit on the scale, or even within the weighing area at one time. Pig flow during weighing may have to be reorganized. One solution is to use automated sorters within the pen. Pigs must pass through the sorter as they enter the feeding area. To achieve this the feeders and feed lines may have to be moved to one area of the pen.

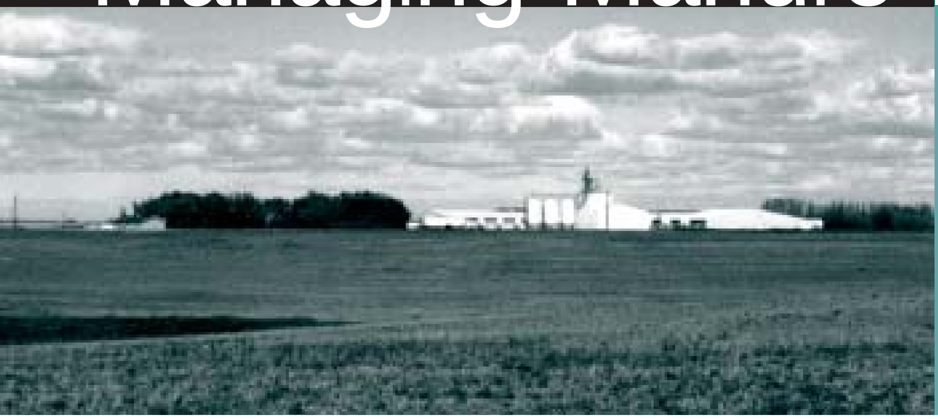
### The Bottom Line

Setting up large groups for grow/finish pigs is much easier when building new facilities, but it can be accomplished through remodeling. However, the project will require more than simply removing pen dividers, and is more difficult in partially slatted facilities.

*Figure 1. A potential configuration for a remodeled large group pen in a fully slatted facility.*



# Managing Manure Phosphorous



## Using a Systems Engineering Approach

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

The general advantages associated with the use of a systems approach to manure management issues have been outlined in a previous article (Centred on Swine 8 (2): 3 – 4). 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, can benefit from the use of such an approach. The proposed systematic approach has the merit of putting manure management options through a thorough analysis and to compare them against uniform sets of criteria. 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). 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 a given manure management system for a specific application. An effective 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 performance of each potential solution with respect to each of the evaluation / selection criteria
5. Identification of the optimal solution based on overall weighted performance

> "Survey respondents indicate the most important criteria of a manure management system is one related to protectionof ground and surface water from phosphorous contamination"

In this article, we provide a hypothetical example of the application of that systematic approach for a situation in which the driving performance criteria are related to the optimization of the use and value of one specific nutrient, phosphorous (P), that is contained in the manure.

**STEP 1: Determining evaluation / selection criteria**

Such criteria could include but not necessarily be limited to the following list:

C1: Minimizing P losses throughout the manure management chain (i.e. from production to final use).
C2: Minimizing the risks of surface or groundwater contamination by manure P.
C3: Minimizing total system costs (i.e. capital and operating).
C4: Minimizing the negative impact of the manure management chain on the animal production system.
C5: Minimizing the negative social impacts of the manure management chain on neighbours.
C6: Minimizing the negative health and safety impacts of the manure management chain on workers.
C7: Maximizing the value of manure P.
C8: Maximizing the flexibility of the manure management chain (i.e. capability to adapt to variable manure characteristics and quantities).

**STEP 2: Relative importance of criteria**

The next step consists of comparing these criteria to one another and to assess their relative importance. The results of that exercise are likely to vary from one livestock operation to another. As an example, the feedback provided by a sample of 100 individuals from Manitoba and Saskatchewan, some involved in livestock production and others not, that were presented with a generic list of 37 criteria has been adapted for the purpose of this hypothetical analysis. Based on those results, the eight criteria were placed by order of decreasing importance and by

*Table 1. Performances of the three potential solutions.*

| Criterion | Potential Solution | | |
|---|---|---|---|
| | S1 | S2 | S3 |
| C1 | 2.5 | 1 | 2.5 |
| C2 | 2.5 | 1 | 2.5 |
| C3 | 3 | 2 | 1 |
| C4 | 1 | 2.5 | 2.5 |
| C5 | 1 | 2 | 3 |
| C6 | 1 | 2.5 | 2.5 |
| C7 | 2.5 | 1 | 2.5 |
| C8 | 3 | 2 | 1 |

making use of the paired comparisons technique, the relative importance of the eight criteria, based on those rankings, was determined:

Ranking: C2 > C6 > C5 > C3 > C1 = C7 > C4 > C8

Relative importance (sum = 1.0): (0.22) (0.19) (0.16) (0.14) (0.11) (0.11) (0.05) (0.02)

These numbers indicate that the most important criterion is the one related to the protection of surface and groundwater from contamination by manure P (C2). Furthermore, the numerical assessment shows that the most important criterion, C2, is deemed to be twice as important as criteria C1 (minimization of P losses) and C7 (maximizing the value of manure P) since 0.22 / 0.11 = 2.

### STEP 3: Potential solutions

In light of the criteria identified above and of the assessment of their relative importance, possible manure management options can be identified. The fact that the main performance criterion for this specific case is recycling of manure P and that most of it is contained in the solid phase of the manure readily provides some directions as to the manure management systems that would be the most appropriate for this application. Let us assume that three potential manure management systems have been identified:

S1: Liquid management system including short term in-barn storage in shallow pits, transfer to long term outside storage in impervious storage facility and land application of stored manure by means of subsurface injection.

S2: In-barn daily mechanical removal of manure (scraper system), solids-liquids separation yielding a P-rich solids fraction (60% of total P), separate storage of solids and liquids fractions in impervious facilities and land application of both products (broadcast surface application for solids and subsurface injection for liquids).

S3: In-barn daily mechanical removal of manure (flushing system), continuous anaerobic digestion yielding energy, post treatment of digested effluent to yield nitrogen and phosphorous/potassium concentrates that are stored before being land applied (surface application followed by rapid incorporation) and brown water that is recycled inside the barn for flushing purposes.

### STEP 4: Performances of the potential solutions

This evaluation needs to be based on reliable information provided, whenever possible, by independent sources. Hypothetical results for this example are presented in Table 1. For each of the evaluation criteria, the potential solution that offers the best performance receives a score of 3, the second best gets a 2 and the one that performs the least is awarded a score of 1. In the case of ties, the scores are averaged so that the total score, for each criterion, is always equal to 6.

### STEP 5: Selection of optimal solution

At this stage of the process, the weighing factors for each criterion are introduced into the performance evaluation as presented in Table 2. Total scores in the bottom row show the overall performance of each solution in two ways. The absolute score has a maximum of 24 if the solution provided a perfect 3 for each criteria (Ct-C8). The most relavant score is the weighted score which multiplies the criterion weight times the absolute score. The perfect solution would have a weighted score of three on the bottom line. The comparison of these percentages indicates that potential solutions S1 and S2 scored lower due to the particular criteria weighing scheme used.

Potential solution S3 obtained the highest total absolute and weighted scores and should be selected as the optimal solution for this hypothetical example. Note that the criteria weighing scheme used allowed the gap to widenbetween the top two solutions S1 and S3 when the relative total weighted scores are compared (i.e. 78 vs. 66%). This makes this tool more valuable than using the relative total absolute scores only (i.e. 73 vs. 69%).

### The Bottom LIne

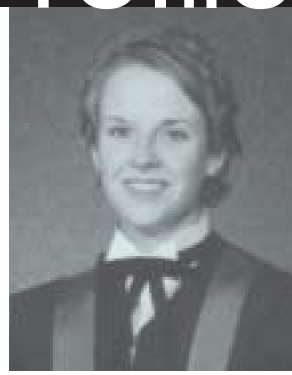
This example illustrates the benefits of a systems approach to manure management. It allows for the comparative evaluation of many alternatives in light of given sets of criteria. Those lists can be modified (e.g. focusing on top-5 criteria only) and the resulting outcomes in terms of optimal solutions compared. Following such analyses, the top two or three potential solutions can be further evaluated in more detail with respect to each performance criterion in order to confirm that initial selection.

*Table 2. Weighted performances for the three potential solutions.*

| Criterion | Potential Solution | | | | | |
|---|---|---|---|---|---|---|
| | S1 | | S2 | | S3 | |
| | Absolute Score | Weighted Score | Absolute Score | Weighted Score | Absolute Score | Weighted Score |
| C1 (weight = 0.11) | 2.5 | 0.275 | 1 | 0.110 | 2.5 | 0.275 |
| C2 (weight = 0.22) | 2.5 | 0.550 | 1 | 0.220 | 2.5 | 0.550 |
| C3 (weight = 0.14) | 3 | 0.420 | 2 | 0.280 | 1 | 0.140 |
| C4 (weight = 0.05) | 1 | 0.050 | 2.5 | 0.125 | 2.5 | 0.125 |
| C5 (weight = 0.16) | 1 | 0.160 | 2 | 0.320 | 3 | 0.480 |
| C6 (weight = 0.19) | 1 | 0.190 | 2.5 | 0.475 | 2.5 | 0.475 |
| C7 (weight = 0.11) | 2.5 | 0.275 | 1 | 0.110 | 2.5 | 0.275 |
| C8 (weight = 0.02) | 3 | 0.060 | 2 | 0.040 | 1 | 0.020 |
| **Total Scores** | **16.5 (69%)** | **1.980 (66%)** | **14.0 (58%)** | **1.680 (56%)** | **17.5 (73%)** | **2.340 (78%)** |

# Personal Profiles

## Erin Welford



*Erin Welford*

Originally from North Battleford, SK, Erin completed her B.Eng. in May 2002 at the University of Saskatchewan with a specialization in Agricultural and Bioresource Engineering. After working as a summer student with the Engineering group for a couple of summers as an undergrad, Erin decided to do a Master's program under the supervision of Dr. Stéphane Lemay.

Environmental pollution from intensive livestock facilities has become a hot topic for research and discussion. This Master's project is to model ammonia emissions from a grower-finisher room. The model will look at emissions from urine puddles and the slurry pit. With the model, the user will be able to simulate the ammonia concentration in the room and the emission to the environment. By changing feed composition or pen design parameters, the user can predict how changes may impact worker safety and ammonia emissions to the environment.

The bottom line is that by predicting ammonia emissions using a model, changes in diet and pen design can be simulated to see if the change will have a significant impact on the indoor environment and emission levels.

## Karen Stewart:

*Karen Stewart*

Stéphane Lemay (faculty advisor) and Ernie Barber (Dean of Agriculture) have NSERC funding to study the effects of air quality on pigs and the people working in the barn. I began working on my Masters degree in May 2002, using the manure portion of the clean room project as my thesis project.

The clean room project is designed to study the potential for growth and health of pigs and the health of humans working in the barn without the challenges of air quality that have traditionally been part of swine housing. Two small grower/ finisher rooms are presently being built in the Floral barn to study specialized air quality. The rooms will be provided with warm filtered air, and the air quality leaving the rooms will be closely monitored. I am designing two manure handling systems that will be installed in the rooms and tested to find out which of the two can keep the contamination in the air as small as possible. This system will then be used for further testing in the clean rooms.

I graduated from the U of S with a B. Sc. in mechanical engineering in 1979. We farmed near Milden and near Outlook, and I have worked at Elite Stock Farms near Outlook for parts of the last 11 years. I have 4 boys, aged 19 to 27.

# Coming Events

**Sask Pork Expo**
February 25-26, 2003
Prairieland Exhibition Hall
Saskatoon, Saskatchewan

**Focus on the Future Conference**
March 25-26, 2003
Travelodge Hotel
Saskatoon, Saskatchewan

**Air Quality and Odour Management Seminar**
February 4, 2003
PSC Boardroom
Saskatoon, Saskatchewan

**Swine Behaviour Seminar**
March 4, 2003
PSC Boardroom
Saskatoon, Saskatchewan

**Alberta Pork Congress**
March 12-13, 2003
Red Deer, Alberta
Westerner Park

**Pork Industry Interpretive Centre Grand Opening**
March 26, 2003
PSC Elstow Research Farm

**Manitoba Swine Seminar**
January 29-30, 2003
Winnipeg, Manitoba
Best Western – Victoria Inn

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