

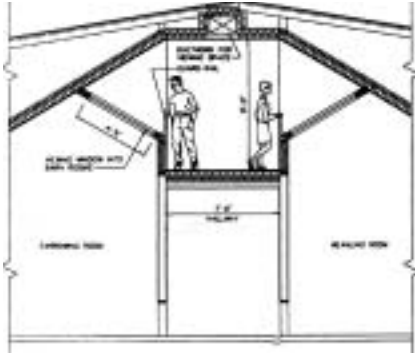
Special Elstow Research Farm Edition

Lee Whittington, BSc MBA

Welcome to this, the seventh year of Centred on Swine. As opposed to looking back on this publication and the industry, this Special Edition is devoted to looking ahead. Today a new research facility is being constructed near Elstow Saskatchewan, approximately 25 miles east of Saskatoon, and three miles north of highway 16. The new farm became necessary when critical questions about production and the environment could not be satisfactorily answered using the

current more intensive production facilities at Floral, Saskatchewan. The features and research objectives of the new barn are discussed in detail on pages 2 and 3.

This new barn is styled off of the current production barns being developed in western Canada, so that it has the capability to simulate commercial production while at the same time allowing research needs to be fulfilled. The process in developing a new research plan and facility began in the fall of 1997. A new research infrastructure grant was established in Saskatchewan for which the Centre applied and was one of the projects approved. The Saskatchewan government through Saskatchewan Agriculture and Food, provided \$3 million dollars for construction, approximately 50% of the estimated cost of building and operating the structure through to the first sales of stock. The additional capital required has been borrowed from Agricoll Research Investments Inc. and a commercial lender. The agreement with Saskatchewan Agriculture and Food



Cross-section of viewing gallery located in the barn's attic.

further provides \$300,000 a year for 3 years in new research monies.

Planning the new facility didn't begin with a draftsman but with several producer and industry meetings held across the prairies. After holding a total of six meetings (two in each province), the goals and capabilities of this new facility began to take shape. These meetings involved pork producers, including those working independently as well as those producing pigs for a production system. Veterinarians, feed and pharmaceutical representatives and breeding companies as well as swine

Continued on page 3

**February 29 - March 1, 2000
Saskatchewan Pork Expo**
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In This Edition

More Answers, More Quickly 2

Determining Amino Acid Requirements for the Sow in Lactation 4

Baseline Environmental Data Collection for Research and Production Facility 5

Inside this issue you will find facts about construction, research plans, and even some of the research projects that have already started at Elstow before the barn is opened.

Program funding provided by





More Answers, More Quickly

PSC Elstow Research Barn Inc.

Objectives of Elstow Research Barn Inc.:

*To provide research, education and technology transfer services to the pork industry,
To allow all pork producers, irrespective of size or structure, equal access to knowledge,
To lower the cost of production,
To address local opportunities (eg. feeding, housing, etc.),
To solve producer problems (eg. performance, productivity, nutrition, etc.)*

Producers can expect answers to more questions once Prairie Swine Centre's \$4.37 million Elstow facility comes online in March, 2000.

"It expands the range of research that we do," says Dr. John Patience, president of PSCI. "It expands the number of experiments as well as allowing a broader array of experiments in terms of animal welfare and the environment."

Located 40 km east of Saskatoon, the new barn will complement existing facilities at Floral. A full slate of research will continue at both sites, with programs assigned to the most appropriate location.

The project is the culmination of extensive planning and consultation with local and provincial government, the community and one-on-one meetings with local people. Patience says this ground work has paid off with strong community support.

The location was carefully chosen for its environmental safety. PSC was also able to lend weight to a local push to get access to a SaskWater pipeline as well as natural gas for 22 area businesses and residences. The result was a lower cost for these services for community members than if PSC Elstow wasn't involved.

A commercial research barn

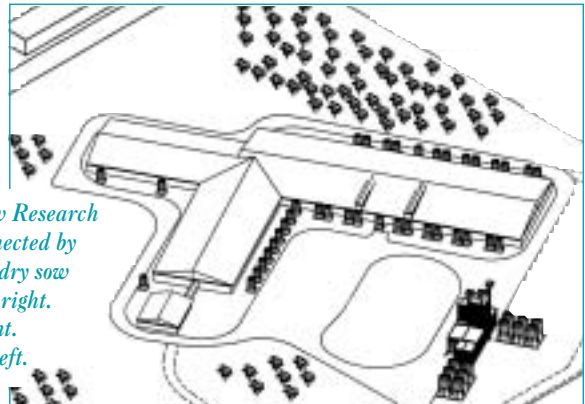
PSC Elstow is designed very much like a commercial facility, even to the funding of its operating budget through sale of stock. However, there are some important differences, according to Franklin Kains, project engineer.

For example, the eight-foot stud walls were prefabricated and lifted onto a six-foot foundation. This yields a barn ceiling 12 feet high — two feet higher than standard.

"This extra height will give us more flexibility for the addition of equipment on the ceiling, such as feeding equipment and video cameras," Kains says. "It will also give better sight lines for the proposed viewing gallery in the attic."

Another feature at the new barn is earthen manure storage. This will add research capability not available at Floral, where manure is stored in

Perspective view of PSC Elstow Research Farm. Office in foreground connected by link to farrowing/nursery wing; dry sow wing to left, grow finish wing to right. Feed mill complex in bottom right. Earthen manure storage in top left.



concrete tanks. Elstow is designed with 400 days capacity to ensure manure can be applied to the fields at the best time. It has a compacted clay liner on the floor and walls to prevent leakage and three feet of freeboard above the maximum design height of the manure to avoid overtopping.

Production, welfare and environment first on research list

Topping the list of research priorities at Elstow are production efficiency, animal welfare, and environment.

Production efficiency research will

focus on nutritional needs, water use, how to improve feed intake and how to reduce variability.

On the animal welfare front, studies will first look at group housing of dry sows. This area was given a high priority during consultation meetings in Alberta, Saskatchewan and Manitoba with producers, researchers and other industry stakeholders.

The traditional practice of housing sows in gestational pens is being questioned, according to PSCI researcher Dr. Harold Gonyou. Some European countries have already banned the management practice. Closer to home, the Winnipeg Humane Society has also called for a ban.

"It's a trend world wide and something we need to be aware of,"

Gonyou says. "Canada is the world's third largest exporter of pork, so we need to look at what potential markets are demanding. It comes down to the issue that gestation stalls don't provide freedom of movement, and if that's an important welfare consideration, we need to be looking at alternatives."

The Elstow barn will also have gestational pens for research, but in three different size widths of 22", 24" and 26" to accommodate sows as they mature.

Another primary research focus will be manure management and odour control.

"It's a societal concern," Gonyou

says. "It's the major issue we have in terms of satisfying the public that we are being environmentally responsible."

Two finishing rooms at PSC Elstow will be devoted to manure studies, with fully slatted floors and specially designed gutters. These features will accommodate pit additive, feed additive and air sampling studies.

Room for a manure handling and research facility will also be on site. Work here could include work on composting, solid-liquid separation and manure handling techniques.

Ten local farmers have signed up to take the manure. All lands receiving manure will require a nutrient management plan to be completed. Such a plan determines an appropriate application rate based on the nutrient content of the soil, of the manure and the expected uptake by the crop to be grown.

Another feature of the project is the Off-Site facilities. This consists of a nursery and a finishing barn each holding 260 pigs located one mile to the northwest of the main site. Newly weaned pigs can be brought from the main site for trials to emulate two site or three site production systems. It will also accommodate trials on pigs brought in from outside the PSC Elstow herd with specific genetic traits. For reasons of biosecurity, this can not be done on the main site. 🐷

A first hand look

It's hard to get a first-hand look at a functioning pig barn, unless you happen to own one.

A proposed viewing gallery at the PSC Elstow facility will allow visitors to bypass the stringent biosecurity measures that keep the herd healthy and disease-free.

Currently, producers cannot be in contact with pigs for 60 hours before a visit to the Floral barn. With the viewing gallery, they will be able to see various production systems side-by-side, and see research in progress without the need to take a couple of days off before their visit.

For the public, the gallery will allow access to first-hand education and information, and convey that the industry is open and accountable.

Funding for the viewing gallery will be raised separately from those used for the barn. Companies are currently being invited to sponsor this initiative.

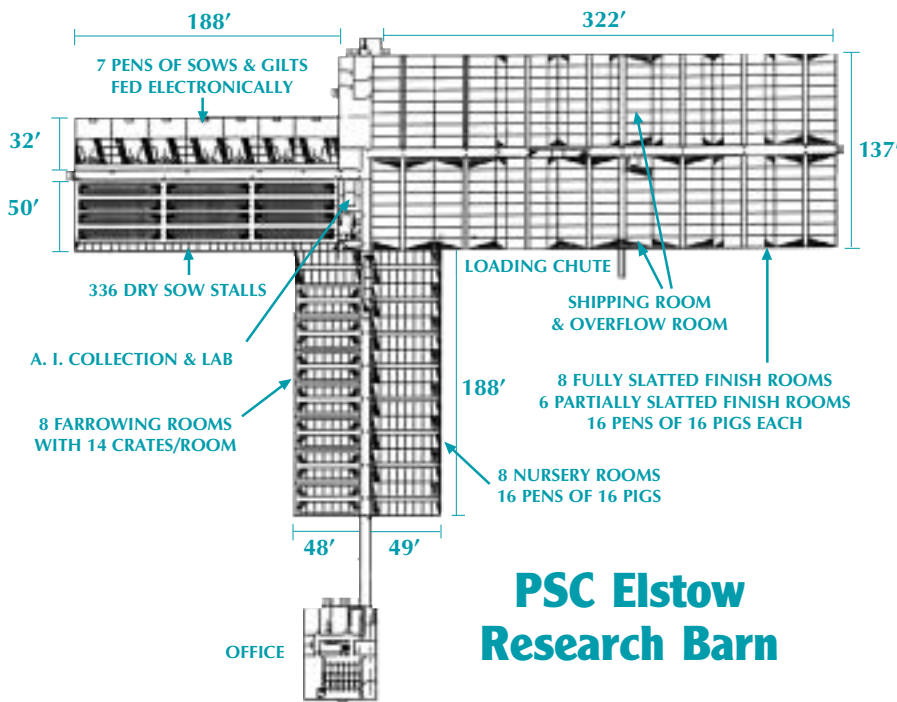
Special Elstow Research Farm Edition

Continued From Page 1

specialists and other researchers all gave their suggestions in helping to define the most important issues to be addressed with a new production research unit. The goal was to define the research plan first, with building plans to follow. In this way the research plan defines the barn, not visa versa.

The consultation process contributed significantly to defining the current and anticipated needs of an industry undergoing growth and change in structure. Although the original advisory groups in 1987 defined Prairie Swine Centre as developing new ideas, information and not being a demonstration farm, it became apparent at each of the 1998 meetings that there was a demonstration role to play. The audience however was not necessarily other pork producers but the general public.

The various groups consulted indicated that their lenders, neighbours, detractors, and investors across the region would benefit tremendously from being able to get into a pig barn. This however is not very feasible given our biosecurity measures such as 48-60 hours pig free and shower-in rules for example. A plan is now in place to provide a biosecure access to the facility for the wide range of individuals and groups which may want to view modern pork production first-hand. A gallery and interpretive centre is being planned to complement the research role of the new barn. Although fundraising for this part of the project is still on-going, the plans include providing a biosecure hallway in the attic with observation windows allowing visitors to see each area of production. An interpretive centre is envisioned to complement the gallery so that visitors will gain an understanding of the entire industry and some of its history. Individuals or organizations wishing to know more about the viewing gallery can contact Lee Whittington or John Patience at 306-477-7447. 🐷



Determining Amino Acid Requirements for the Sow in Lactation

Dana R. Cooper, BSA. and John F. Patience, PhD.

Defining and meeting the amino acid requirements of the lactating sow maximizes milk production and thus, litter weaning weights. Daily amino acid requirements of the sow during lactation include a requirement for maintenance and a requirement for milk production. In the lactating sow, amino acids can be supplied either in the diet or if amino acids are deficient in the diet, from body reserves in the sow.

The first limiting amino acid in most commercial swine diets is lysine. Therefore it is important to formulate diets that meet the lysine requirement. Total dietary lysine required for maintenance is 39 mg lysine/kg BW.75. The lysine required for milk production has been estimated at 26 g lysine/kg litter gain. For example, a 142.5 kg sow with a litter gaining 2.25 kg/day would require 60.1 g dietary lysine/day $[(39 \times 142.5.75)/1000 + 26 \times 2.25 = 60.1 \text{ g/d}]$.

The second limiting amino acid in most commercial swine diets is threonine. Recently research has been conducted at Prairie Swine Centre Inc. to determine the threonine requirement of the high-producing lactating sow. Four hundred and eighteen single and multi-parity sows were assigned to lactation diets containing graded levels of threonine. Production parameters such as sow body weight changes and litter growth were carefully measured and statistical analysis were carried out to determine the level of threonine that produced maximum lactation performance. Total dietary threonine for maintenance has been estimated at 41 mg/kg BW.75, a slightly higher requirement than that of lysine. Based on the results of the research conducted at PSCI, 14.3 g total threonine is required per kilogram of litter gain in lactation.

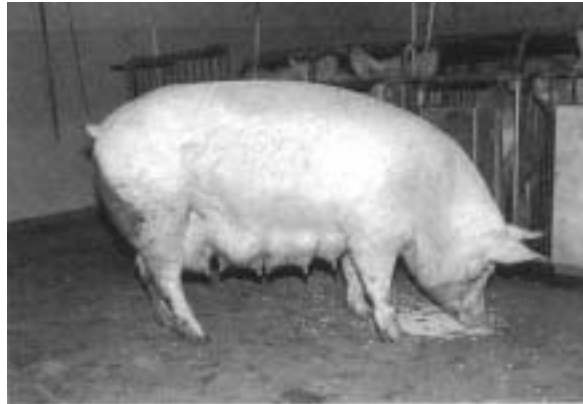


Table 1 provides the daily amino acid requirements for maintenance as well as the requirement for milk production. The sum of these two requirements is the overall requirement for the amino acid.

Average overall body weight of the sows in lactation, average daily litter growth of the

Thus, the threonine requirement of the 142.5 kg sow used in the previous example would be 33.9 g dietary threonine/day $[(41 \times 142.5.75)/1000 + 14.3 \times 2.25 = 33.9 \text{ g/d}]$.

If the average daily feed intake of the sows in the herd is 7.0 kg, then the diet would need to provide 0.86% total lysine (60.1 g/7000 g = 0.86%) and 0.48% (33.9 g/7000 g = 0.48%) total threonine for the 142.5 kg sow used in the above example.

The requirements for the other essential amino acids can be calculated from the ratios of amino acids required for maintenance and the ratios of amino acids found in sow's milk.

piglets and the average daily feed intake of the sows should be determined for the herd based on parity. These measurements could then be used in the equations presented in this paper to determine the amino acid requirements for the sow herd. It would then be possible to formulate lactation diets that would meet the requirements of the sows in lactation. It is recommended to formulate two rations to be fed in lactation. Because of the lower daily feed intake of gilts and parity 2 sows, one diet should be formulated for these parities and a second diet should be formulated for the remaining sows.

		Daily Amino Acids Required (g/d)				
Sow Weight (kg)		142.5		230.0		
Litter Growth (kg/d)		2.00	2.25	2.00	2.25	
	Required for maintenance	Required for for milk protein				
Amino Acid	mg/kg⁷⁵	AA:lys				
Lysine	39	1.00	53.6	60.1	54.3	60.8
Threonine	41	0.55	30.3	33.9	31.0	34.6
Sulfur Amino Acids	61	0.45	26.6	29.6	27.6	31.0
Tryptophan	14	0.18	10.2	11.4	10.4	11.8
Valine	25	0.73	40.2	44.9	40.5	45.9
Arginine	0	0.66	35.4	39.7	35.2	40.1
Isoleucine	20	0.55	30.3	33.9	30.6	34.6

Table 1

For Your Information . . .

PSC Welcomes It's Latest Addition To The Technology Transfer Team

The Prairie Swine Centre Inc. welcomes its latest addition to the technology transfer team. On November 1st, 1999, Ken joined the staff in the position of Assistant Manager – Information Services. Ken was raised on a mixed cattle and grain farm near Carmel, Saskatchewan. Active in the family farm from an early age, Ken presently works closely with his father in the day-to-day operations of the family farm.

Ken's education background is unique, including two years at St. Peter's College in Muenster, Saskatchewan, prior to completing his degree in Agricultural Economics from the University of Saskatchewan in 1995. While attending the University of Saskatchewan, Ken studied several hog feasibility models including PorkPLAN and TOPRISK, while closely examining all in - all out and continuous flow operations.

Prior to joining the Centre Ken was employed as a Coordinator-


Commodities at Quadra Group of Outlook, Saskatchewan. While there he gained diverse experience within the industry with particular involvement in areas including: commodity procurement, in establishing types of commodities purchased, relative pricing relationships, and quality control; risk management through establishing guidelines for risk management strategies and comparing various marketing alternatives; transportation, involving coordination and monitoring of breeding stock and market hog delivery and sales; nutrition, with the use of least cost feed formulation and cost-benefit analysis of alternative feedstuffs; and database development, new program



Kenneth Engele, BSA, A.A.G

development used for tracking multiplier gilt sales and grain purchases.

In his capacity at the Centre Ken will be working with Lee Whittington in the area of technology transfer. Ken's focus will include expanding the Centre's Environmental Resources database with information important to the

industry, development and updating the Centre's web site with current events and informative issues, and assisting the industry through increasing the information available to the industry through the Centre. The development of this new position is in direct response to the industry demand for reliable, high quality information provided by the Prairie Swine Centre. 

Baseline Environmental Data Collection for Research and Production Facility

*E. M. Barber, C. P. Maule, T.A. Fonstad, S.L.Perih, L.J.Ingram, and D.E. Meier
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Potential environmental impacts associated with intensive livestock operations are recognized as a major factor limiting their establishment of these operations in the Prairies. To determine the true environmental impacts of an intensive livestock operation, one must compare the change in environmental conditions before and after the facility is constructed and in operation.



The future PSC Elstow Research Farm Inc.

The Project:

To collect environmental data for a "pre-operation" analysis of the surrounding area including air, soil, and water. The sites for this project are the future PSC Elstow Research Farm Inc. and a second commercial barn. All future research at the sites can refer to the baseline data established by this project.

Continued on page 6

The Objectives:

- To collect pre-construction odour samples of the surrounding area within 2.4 km of the proposed sites and at neighbouring farmyards. Sampling will consider seasonal, wind, and temperature conditions.
- To collect data of current groundwater quality from sites of the proposed barns, earthen manure storage, and potential land to be used for manure application.
- To collect current well water quality data surrounding the proposed location of the facilities.
- To collect current surface water quality data around the proposed barns, earthen manure storages, and lands at the research facility to be used for manure application.
- To collect data of current soil conditions prior to pig production or manure application.

The following are the tasks required to accomplish our objectives.

Task I - Baseline Odour Data Collection:

Odour collection will involve data collection of the proposed facility and a selected group of neighbouring farmyards.

The air samples will be analyzed by Alberta Research Council. Air samples will be tested for Hedonic tone and tested using an Olfactometer.

To ensure that data collected includes annual variations in weather and activity, the samples will be collected in February, May, August, and November, for a total of two years. The last sampling date will coincide with the first emptying of the earthen manure storage.

Task II - Baseline Groundwater Quality Data Collection:

This phase will establish the quality of the ground water in the area of the proposed earthen manure storage and barn prior to construction. Data collected will establish the direction and flow rates of groundwaters as well as shallow groundwater chemistry.

With the assistance of the geotechnical division of Prairie Farm Rehabilitation Act we will install three nests of 4 piezometers at depths of 30, 22, 16, 12, and 8 meters below grade. These nests will be approximately 400 meters apart. Two additional nests will

be installed to create two triangles with side dimensions of approximately 900 m. These nests will have piezometers at depths of 22, 16, 12, and 8 meters below grade.



PFRA installing piezometers.

Installation of the piezometers will give the geological cross-section of the area as well as the water table horizontal gradient. The 22 m piezometers will monitor the sandy layer for gradient and chemistry. The upper piezometers (8, 12 and 16 m) will monitor vertical gradient through the glacial till.

Task III Baseline Well Water Data Collection:

Well monitoring stations will be established at approximately 10 of the surrounding private water wells to determine current water quality. This will include a complete chemical analysis of the well water at the beginning and the end of the project.

Task IV - Baseline Surface Water

Surface water bodies will be identified and monitored for current water quality prior to the first manure application. We will collect water samples three times a year for two years.

Task V - Baseline Soil Data Collection:

Task V Baseline Soil Data Collection: A soil survey will establish the soil characteristics prior to manure production. The soil survey (through field descriptions of soil, lab analysis, and aerial photo interpretation) will establish soil type, soil chemistry, and soil fertility. Soil cores will be taken to determine the physical and chemical analysis (texture, ions and nutrients). This baseline data will prove valuable for future comparisons on soil characteristics.

Key Results Expected

The key results will be an environmental assessment of the areas prior to operation of the facilities. This will include odour trends, ground and surface water conditions, well water and soil conditions prior to operation of the intensive livestock operations.

We would like to acknowledge Saskatchewan Agriculture Development Fund for funding.



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