

E-Zine



Top Ten Developments in Swine Nutrition, 1991-2012

As part of celebrating Prairie Swine Centre's 20th Anniversary, a special seminar "Advancing the Science of Pork Production" was held in conjunction with the Saskatchewan Pork Industry Symposium. Bringing together the original research team, Dr. John Patience (Iowa State University) presentation focused on the Top Ten Developments in Swine Nutrition

In 1975, one sow in the USA produced 720 kg of pork per year, but by 2009 it was 1816 kg per sow, points out Dr. John Patience, from the Department of Animal Science at Iowa State University. In 2009, the US produced 10.4 billion kilos of pork from about 5.8 million sows. "Using 1975 productivity, it would require 14.5 million sows, an increase of 8.7 million, to produce 2009 quantities of pork," he says. "At an average sow feed cost of \$336/sow/year, the added cost of these sows, just for feed would be \$2.95 billion per year, adding \$26 to the cost of each pig sold." The industry has been very focussed on doing its job well. Technology has changed our world. Improvements in nutrition have made a major contribution to higher output per sow and improved efficiency in the nursery and grow-finish phase. Dr. Patience lists the 10 top developments that have had the biggest impact over the last 20 years.

1. Transitioning from ingredient-based formulation to nutrient and energy-based formulation. "We are supplying nutrients to the pig, not corn or soybean meal," notes Dr. Patience. "This has made a huge difference to the industry!"

2. Transitioning from empirical definition of requirements to factorial definition of requirements, leading to growth modelling. "The factorial approach says that the pig requires lysine for maintenance and lean growth, and calculates requirements based on assumptions about genetic capability, feed intake etc.," explains Dr. Patience. "The new NRC model takes into account many variables when making recommendations.

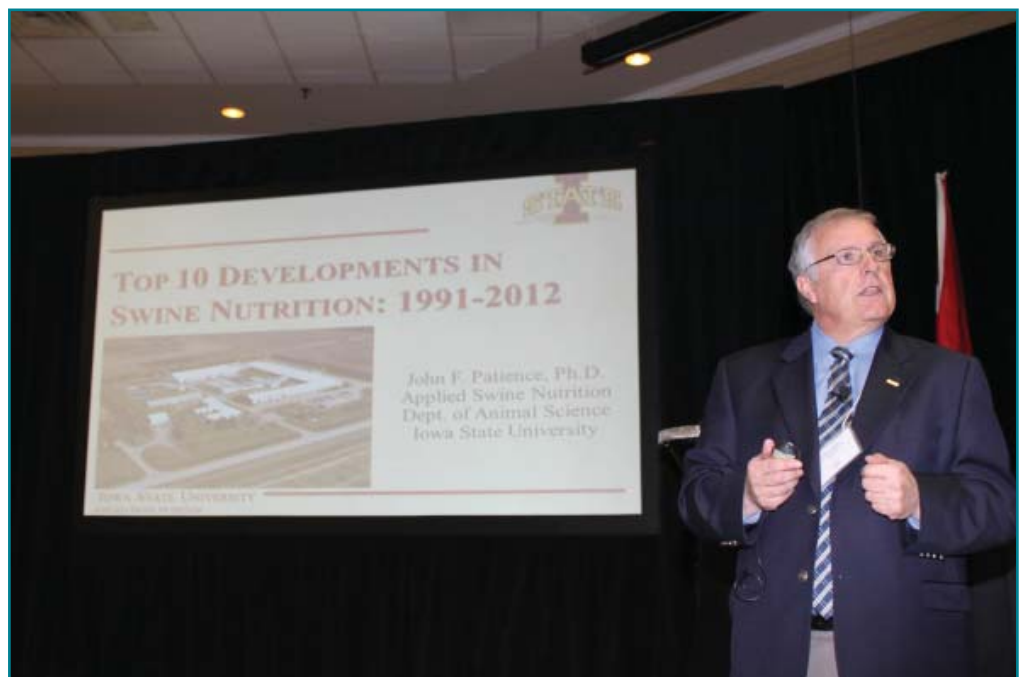
3. Formulating diets on the basis of amino acids rather than protein, then later on the basis of Apparent Ileal Digestibility

(AID) and now Standard Ileal Digestible (SID) lysine. This has made a huge difference as it is much more accurate. "For example, if we take the value for protein, total lysine and SID lysine in wheat as a baseline with the value 100, the comparative value of crude protein in corn would be 61, but the value for SID lysine would be 71. This illustrates how much the value is underestimated by using crude protein," says Dr. Patience. "Similarly, for protein sources, if we take soybean meal as having values of 100, canola meal has a value of 75 for crude protein, but only a value of 60 for SID lysine, indicating that formulating on the basis of crude protein significantly overestimates its value to the pig."

4. The adoption of more sophisticated energy systems, which is currently Net Energy (NE). Traditionally, Digestible Energy (DE) or Metabolizable Energy (ME) has been used in formulation. DE is the



**PRAIRIE
SWINE
CENTRE**



gross energy in the ingredient less the energy in the faeces and is about 85% of the GE. ME is the DE less the energy lost in the urine or gases emitted from the pig, which means we have about 82% of GE. NE accounts for the energy lost by the pig as heat resulting in only 56% of GE. "As we move towards NE we are removing most of the variation related to the ingredient and the variations after that are related to the pig and how it uses that energy," comments Dr. Patience. "Ideally we need to know how much energy goes for lean growth and how much goes into fat deposition, but often we don't know that."

5. Adoption of the phytase enzyme and formulation of diets on the basis of available phosphorus.

6. The release of the 2012 NRC requirements, with a stronger emphasis on factorial as opposed to empirical approach to defining nutrient requirements. "This publication is now 400+ pages and has grown hugely, with a greatly expanded database of ingredient information," points out Dr. Patience. "It attempts to make ingredient nutrient content more robust and places a greater emphasis on net energy and effective NE. Also, it tells you how many sources of data there are for each ingredient, so you can see how much validity to put on the data." In addition, he notes, it has an expanded emphasis on modelling to define nutrient requirements. A greatly expanded explanation of the scientific and philosophical basis of the recommendations presented in the book, helps you determine whether the approach is right for your farm.

7. The widespread availability of synthetic amino acids: lysine, methionine, threonine and tryptophan. "The use of synthetic amino acids reduces the quantity of soybean meal and other protein sources in the diet," explains Dr. Patience. "It has been estimated that the widespread adoption of synthetic amino acids has reduced the quantity of land required to feed the US pig herd by 14 - 15%."

8. Marker-assisted technology and hyper-prolific lines. "This has led to advances in productivity that could only have occurred if nutritional management was up to the task," believes Dr. Patience. "Nutrition has kept up with genetics, and we have been able to feed a sow that is producing 30 PSY and also feed for the pig's better growth potential."

9. Adoption of increasingly sophisticated record keeping systems, which have driven the decision making process. "This has had a profound influence on the industry. Producers ask a lot more questions when they have better data," says Dr. Patience. "They ask: If I'm below average or below target, what is going on nutritionally?"

10. The increasingly rapid change in emphasis from maximizing productivity to maximizing financial returns. A good example is a big focus on barn throughput while meeting weight targets.

"How did we ever operate without using these developments?" asked DR. Patience. "Producers have adopted most of these, although the NE system is not being used as much as it should. Least cost formulation is only one step along the way, we need to know the pig's response so we can optimise its nutrient intake based on performance."



Saskatchewan
Ministry of
Agriculture



ONTARIO PORK

For more Information, please contact

Prairie Swine Centre

Box 21057, 2105 8th Street East
Saskatoon, Saskatchewan CANADA
S7H 5N9

Phone: (306) 373-9922

Fax: (306) 955-2510

E-mail: lee.whittington@usask.ca

Website: www.prairieswine.com

Prairie Swine Centre is an
affiliate of



UNIVERSITY OF
SASKATCHEWAN