Innovative piglet management strategies for optimum performance up to slaughter weight and profitable pork production

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Overview

The swine industry will face a number of challenges in the foreseeable future. Among these is the high cost of feed ingredients, which has historically represented the largest portion of operating costs. Furthermore, increasing public demand and regulatory restrictions on antibiotic use are also anticipated. Therefore, novel nutritional strategies must, in addition to minimizing costs, maintain or even possibly promote animal health and resistance to infectious challenges. To address these challenges researchers are working on three focus areas:

1) Nutritional strategies for newborn piglets
2) Low cost post-weaning nutritional strategies
3) Novel bioactive feed supplements

Highlights

1 Nutritional strategies for newborn piglets (J. Matte and F. Guay)

Previous research, supported by Swine Innovation Porc (Swine Cluster 1), has demonstrated that, as for iron, piglets are likely to suffer from a deficit in vitamin A, vitamin D, and copper shortly after birth and until weaning. Results from a first trial have showed that, among the tested supplementations, oral supplementation of copper and vitamins A and D was the best way to increase the status of these micronutrients in piglets. Exposure to UV light was also an efficient method for increasing vitamin D in piglets. Two other trials, one in a research barn and one in commercial conditions, started in 2015-2016. Their aim is to study the impact of the oral supplementation of copper and vitamins A and D or exposure to UV light combined with a supplement of colostrum whey on piglets' oxidative status, immune system, gut microflora and growth.

2 Low cost post-weaning nutritional strategies

- Pre-treatment of feed ingredients to enhance value (D. Beaulieu, A. Van Kessel, M. Nyachoti)

A series of experiments are underway to establish the efficacy of ensiling or direct acidification of high moisture cereal grains and protein co-products to reduce anti-nutritional factors and improve nutritive value, health and performance of pigs. First results have showed that ensiling allowed the effective conservation of high moisture barley and wheat. In vitro experiments, where the high moisture barley and wheat were acidified, have showed that the use of propionic acid reduced the pH more than the use of a commercial blend of acids. Feeding trials using the ensiled grains are underway and the ones with acidified grains will follow. Another feeding study has been conducted comparing different fermented soy bean meals. Analysis is ongoing to try to explain these results.

- High residual protein and fermentable carbohydrates (R. Zijlstra and A. Van Kessel)

Several Canadian crops and plant-based co-products may serve as an alternative to soybean meal in nursery pig feed. However, due to their lower protein digestibility, the residual protein content in the gut lumen and the abundance of toxic fermentation products will increase. It is hypothesized that such protein alternatives will increase disease susceptibility and reduce growth performance, especially in diets without antibiotics.
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2. Low cost post-weaning nutritional strategies
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3. Novel bioactive feed supplements
   - High residual protein and fermentable carbohydrates
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Ability to deal with disease stress

Researchers are performing a number of studies to evaluate the impact of feeding inexpensive nursery diets on the piglet’s ability to deal with disease stress and on how to improve their robustness.

Wheat bran

Previous studies have showed that the incorporation of wheat bran in the weaner pigs’ diets enhances gut health. Initial results of this trial suggest that improved volatile fatty acids production may be a contributing factor to this better gut health. Indeed, including 4% of coarsely milled wheat bran in piglets’ diets has improved the production of total volatile fatty acids in the piglet gut.

Algae meal

Researchers have found that including 3.12% of algae meal in a nursery pig diet had no effect on the palatability of the feed, but provided omega-3 fatty acid enrichment, promoted normal growth and improved piglets’ health status. As more research is conducted, algae meal, compared to fish oil, may become a more cost-effective way to boost nursery diet quality without having to use expensive protein sources.

Epidemiology study: impact of simple nursery diet under commercial farming conditions

Eight farrow-to-finish farms with different health statuses are currently involved in this study. On each farm two cohorts of piglets are selected. One cohort is assigned with a simple nursery diet, i.e. low-level animal protein without in-feed antibiotics, and one cohort to a conventional feed. Up to now, a total of 832 pigs have been studied. Preliminary results suggest no difference regarding body weight, carcass characteristics, Salmonella shedding or colonization between pigs being fed the simple diet and the ones receiving conventional feed. However further research is required to ensure that the pigs’ ability to face disease is not compromised by the simple nursery diets.

3 Novel bioactive feed supplements

- Epidermal growth factor (J. Li)

Researchers have refined a methodology to produce porcine epidermal growth factor (EGF) using yeast, which is a powerful bioactive peptide that stimulates gut health and development in newly-weaned piglets. This novel yeast strain will allow commercial production of EGF without encountering intellectual property issues.

- Probiotics and oral vaccination (R. Friendship)

Experimental challenge studies have been conducted to determine the efficacy of plant-based vaccines against enterotoxigenic Escherichia coli (ETEC), which causes porcine post-weaning diarrhea. A first ETEC vaccine has been produced and evaluated but has not provided protection for the piglets. Research is continuing.

Implications for the swine industry

Effective feeding strategies will be developed for newborn and newly weaned piglets that:

- Maximize profits based on performance up to market weight
- Minimize reliance on in-feed antibiotics
- Improve pig robustness and health.

Collaborators

Nathalie Bissonnette
Jerome Lapointe
Martin Lessard
Guylaine Talbot

Sherbrooke Research and Development Centre, AAFC
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Financial support for this project

This project is part of the Swine Cluster 2 (2013-2018) research program, made possible through financial support from Agriculture and Agri-Food Canada, eight provincial pork producer organizations and over 30 industry partners.

- [Click here to learn more about the financial partners for Swine Cluster 2.](#)
- [Click here to learn more about the Swine Cluster 2 research program.](#)