



Examination of the effectiveness of provision of functional amino acids to enhance pig robustness

Dan Columbus, Prairie Swine Centre
Martin Nyachoti, University of Manitoba

Why is this project important?

The post-weaning period represents a critical time for pig development, and there is increased awareness today about the relationship between management of pigs during the perinatal period (i.e., from late fetal development to several weeks post-weaning) and subsequent performance and well-being. The combination of environmental, nutritional, and social stressors experienced by pigs at this time contribute to the post-weaning growth lag often observed in newly-weaned pigs. This lag is characterized by reduced feed intake and growth rate.

To complicate the matter, pigs are continuously exposed to microbial pathogens that negatively impact animal productivity. Pigs exposed to immune challenge, without exhibiting any clinical signs of disease, show reduced appetite and growth and less efficient use of nutrients compared to healthy animals. This decrease in performance can have a substantial impact on producer profitability.

Fortunately, it has been suggested that feeding a low protein diet fortified with adequate amounts of amino acids will improve gut health and function in piglets. Clearly, a better understanding of the interaction of nutrition and the pig's immune response will be a key component in efforts to reduce feed costs and antibiotic use. At the same time, it will improve animal robustness and profitability of the swine industry.

What did researchers do?

A prime focus for achieving the project's goals was amino acids and their potential for boosting health and growth in post weaning pigs without unduly raising feed costs.

Researchers addressed the downside of plant-based meals by including a mixture of functional amino acids at 120 per cent of NRC recommendations (Nutrient Requirements of Swine). Functional amino acids govern vital metabolic pathways to enhance development and health and are key components of many immune system proteins. Previous studies have shown that this approach boosts growth and immunity of pigs facing a disease challenge such as Salmonella.

To gauge the relative merits of a plant-based diet versus the more common animal-based

approach, researchers employed a 31-day feeding program with 32 weanling pigs. At the end of the 31-day nursery phase, pigs received a common grower diet. After seven days on that diet, they were inoculated with Salmonella and monitored for seven days following the inoculation.

Over the course of the program, pigs were given one of four diets: plant-based with a basal (essential for maintaining the animal’s fundamental vital activities) amino acid profile; plant-based supplemented with the amino acids, methionine, threonine, and tryptophan at 120 per cent of daily requirements; and two animal-based diets with one of the two amino acid regimens used for the plant-based diets.

What will be the benefit of this research?

Identifying dietary strategies for reducing the cost of nursery diets without compromising growth performance and gut health would be of great benefit to profitability. Previous research showed that feed costs during the nursery phase can be reduced by more than \$2.00 per pig without compromising growth performance and carcass quality up to slaughter weight. While reducing nursery feed costs offers potential to reduce overall cost of production, feeding programs in the nursery must also maintain or improve performance. Previous work has indicated that poor performance in the post-weaning period is associated with poor overall wean-to-finish performance.

Producer profitability is an important focus in the pork value chain, as is the ability to maintain consumer demand for pork and pork products. Thus, developing and optimizing cost-effective post-weaning feeding strategies will enhance efficiency at the production level. As well, utilizing nutritional strategies to augment gut health and function in weaned pigs will eliminate the need for in-feed antibiotics.

Based on the results of this project, producers now have options. In some operations, the animal-based diet may be preferable for its ability to improve pig health. In other cases, switching to plant-based meals could help to offset rising feed prices and keep more dollars in producer pockets. For those choosing the latter approach, supplementing diets with the functional amino acids methionine, threonine, and tryptophan in amounts that exceed current industry levels can help guard against the negative impact of plant-based strategies on disease resistance. Those amino acids become even more effective in safeguarding pig health the further out they are used from a disease challenge.

Collaborators

Denise Beaulieu	University of
Andrew Van Kessel	Saskatchewan

Vahab Farzan	
Robert Friendship	
Brandon Lillie	University of Guelph

Joshua Gong	AAFC Guelph
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Ehsan Khafipour	
Song Liu	
Karmin O	University of Manitoba

Project status

Completed in 2023.



Additional resources and information about this project

R&D Featured Articles by Swine Innovation Porc

- [Science Taking Bite out of Feed Costs](#)
August 13, 2020

Farmscape interviews

- [Adding Amino Acids to Swine Rations Stimulates Growth But Also Improves Health](#)
December 22, 2022
- [Including Amino Acids in Swine Rations Improves Gut Health, Gut Development and Immune Function](#)
December 7, 2022
- [Supplemental Amino Acids Increase Resistance to Infection](#)
April 17, 2020
- [Scientists Evaluate Health Benefits of Functional Amino Acids](#)
March 24, 2020

Additional resources

- Clark, J. (2021, August 24). Improving post-weaning pig nutrition. *Farms.com*.
<https://www.farms.com/ag-industry-news/improving-post-weaning-pig-nutrition-794.aspx>
- Rodrigues, L., Columbus, D. (2020, April) How to enhance pig robustness. *Better Pork*. pp 35-38.
<https://www.betterfarming.com/flippingbook/better-pork/2020/april/#35/z>

Related subprojects

The work presented in this fact sheet is one of three subprojects that make up a larger, nation-wide and multi-institutional Swine Cluster 3 project titled: *Development of innovative strategies to reduce feed costs in the post-weaning period while maintaining optimal performance and health*. The three subprojects are as follows:

- [Examination of the effectiveness of provision of functional amino acids to enhance pig robustness](#) (*this fact sheet*)
- [Strategies for detoxifying vomitoxin \(DON\) using innovative chemical and biological approaches in post-weaning piglets](#)
- [Pulse grains and organic acids to control growth performance and health of young pigs](#)

Financial support for this project

This project is part of the Swine Cluster 3 (2018-2023) research program, made possible through financial support from Agriculture and Agri-Food Canada's Canadian Agricultural Partnership, eight provincial pork producer organizations and over 30 industry partners. [Click here to learn more about the financial partners for Swine Cluster 3.](#)