Can Micro-Nutrients make a Macro Difference for Piglets?

By Geoff Geddes, for Swine Innovation Porc

Given how piglets scramble for a teat like Boxing Day shoppers at Best Buy, they clearly need their nutrients. Yet in light of the demands of the weaning phase, are piglets getting enough through natural means to ensure optimal health and performance? Addressing that question and possible solutions was the focus of the research project "Nutrients with extra-nutritional value for newborns: Micronutrients and colostral biofactors."

As a result of larger and larger litter sizes depressing average birth weight and litter weight consistency, there has been some concern in recent years about the adequacy of pre- and post-natal nutrient transfer from sows to piglets.

Nutrients and Mother Nature

"We rely a lot on Mother Nature for the nutrients pigs require," said Dr. Jacques Matte, research scientist at the Sherbrooke Research and Development Centre for Agriculture and Agri-Food Canada. "In fact, the period of nutritional dependence of piglets to their mother (in utero + colostrum + milk) at 135 days, is equivalent to the whole post-weaning period (starter + grower + finisher)."

While no one likes to criticize a mother, all of this begs the question: Is Mother Nature efficient enough in actual husbandry conditions?

To find an answer, Dr. Matte and Dr. Frédéric Guay - professor in the Department of Animal Sciences at Laval University - screened plasma blood concentrations of micronutrients in sows and piglets during the neonatal period. Micronutrients are essential elements required by organisms in small quantities throughout life to support a range of physiological functions that maintain health.

In this study, researchers screened plasma blood concentrations of micronutrients in both sows and piglets.
Photo: AAFC Sherbrooke Research & Development Centre

Through this process, three critical micronutrients were identified: vitamin A, vitamin D and copper.

"In nature, the transfer of these micronutrients may not have been critical for evolution of the species because they were abundant in the environment of newborn piglets," said Dr. Guay. "For example, UV light provided vitamin D, there were plants rich in vitamin A, and the soil was a source of trace minerals like copper."

With the realities of modern pig production, however, those sources are no longer an option. Researchers thus looked at the best route of administration of the three selected micronutrients, in-

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cluding transmitting them directly to the piglets themselves and/or indirectly through the sow diet.

Cocktails anyone?

During the trials, four cocktails of vitamin A (70 MIU), vitamin D (12 MIU) and copper (12 mg) were given within the litter, with two piglets sharing each cocktail. Modes of transmission included oral, intramuscular and UVB in the case of vitamin D. As well, two piglets in each litter were given an oral saline solution to act as the control group.

Though no long term benefits from the additional micronutrients for piglets were detected that persisted after weaning, the trials did determine that the best strategy for supplementation was oral administration at 2 and 8 days of age, along with UVB exposure every second day during lactation.

The trials were also carried out on 14 control sows and 14 others fed daily extra supplements of vitamin D (4 MIU), vitamin A (24 MIU) and copper (45 mg) from 90 days of gestation to end of lactation (21 days).

At 23 days of age, 50 piglets were measured for nutrient metabolism, antioxidation, immune system and gut microflora. Researchers concluded that supplementation of micronutrients to sows improved both the consistency of birth weight and the microflora of the piglets.

Based on these results, planning is already underway to study micronutrients in more depth to determine the optimal amounts, uses and methods that will yield macro results for producers.

“The next step is to develop innovative nutritional strategies for pre- and post-weaned piglets that optimize metabolic status and efficiency of copper (Cu), zinc (Zn), vitamin D and vitamin A,” said Dr. Matte. “In the process, we hope to enhance health and robustness, improve environmental sustainability and maximize profits based on performance up to market weight.”

“Micro” might mean small, but if researchers can unlock the full potential of micronutrients for piglets, it could pay off big-time for the pork industry.

Learn more….

For more information about the work described in this article, please contact Dr. Jacques Matte (Jacques.Matte@agr.gc.ca) or Dr. Frédéric Guy (Frederic.Guay@fsaa.ulaval.ca).

This research was part a larger national project titled *Innovative piglet management strategies for optimum performance up to slaughter weight and profitable pork production*.

You may find additional resources related to the project by consulting our website:

swineinnovationporc.ca/research-animal-nutrition

The work presented in this article was part of Swine Innovation Porc’s Swine Cluster 2: Driving Results Through Innovation research program. Funding was provided by Agriculture and Agri-Food Canada’s AgriInnovation Program, provincial producer organizations and industry partners.