

## Early prebiotic supplementation induces long-lasting consequences on microbiota composition and metabolic health in adult pigs consuming an unbalanced diet.

C. Le Bourgot<sup>1</sup>\*, B. Taminau<sup>2</sup>, S. Ferret-Bernard<sup>3</sup>, A. Cahu<sup>3</sup>, L. Le Normand<sup>3</sup>, F. Respondek<sup>1</sup>, E. Apper<sup>1</sup>, I. Le Huërou-Luron<sup>3</sup>, S. Blat<sup>3</sup>

<sup>1</sup>Tereos, France; <sup>2</sup>University of Liège, Belgium; <sup>3</sup>INRA, INSERM, University Rennes 1, France

Cindy.lebourgot@tereos.com

Perinatal nutrition, a key factor controlling gut bacterial colonization, may have long-lasting consequences on metabolic health. We investigated whether early short-chain fructooligosaccharide (scFOS) supplementation, a prebiotic well-known to positively modulate gut microbiota, impacted adult metabolic responses to a deleterious nutritional environment.

Sows were supplemented with scFOS or not for the last 4 weeks of gestation and the entire lactation. scFOS supplementation was maintained in piglets weaned from scFOS sows during one month. Pigs were then fed a standard diet for 5 months, followed by a high-fat (HF) diet for 3 months. The entero-insular axis function and the microbiota profile were evaluated in adult pigs.

Early scFOS supplementation enhanced the entero-insular axis function by increasing the caecal L-cell density ( $P=0.03$ ) and the GLP-1 plasma concentration ( $P=0.09$ ), such parameters being positively correlated ( $P=0.05$ ). Insulin response to a glucose challenge (IVGTT) tended to be higher in scFOS group ( $P=0.09$ ), with no change in insulin sensitivity of peripheral tissues. These results were associated with persistent microbiota changes in adulthood. Metagenomic analysis revealed an increase in relative abundance of *Prevotella* and a decrease in *Ruminococcaceae\_unclassified* genus in scFOS group. Transient differences between groups in faecal short-chain fatty acid (SCFA) concentration were also observed 3 weeks, but not 9 weeks, after HF diet feeding. Spearman correlations showed that *Prevotella* and plasma GLP-1 concentration were positively correlated to SCFA concentration. Interestingly, insulin resistance indice was negatively correlated to *Prevotella*. By favouring microbial fermentative capacity, perinatal scFOS supplementation enhanced adult gut endocrine function and pancreas sensitivity to glucose. Ongoing metabolomic analysis will give more insights on microbial metabolic activity as well as on host metabolism.

Our results underline an interesting early nutritional strategy to stimulate the intestinal endocrine function through microbiota modulation, that may prevent metabolic disorders in adults faced with an unbalanced diet.