NUTRIOSE®, a soluble fibre with a prolonged colonic fermentation and oxidation pattern in humans contributing to a prolonged energy supply for whole-body metabolism

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STUDY OBJECTIVES

ROQUETTE has developed solutions contributing to the prevention of major health concerns worldwide. Among these solutions, NUTRIOSE® is a soluble non-viscous fibre produced from wheat or maize starch with a fibre content of 85% (on D.S).

The objectives of the present research works were to demonstrate in healthy volunteers that NUTRIOSE® displays a prolonged energy supply, with:

- a **prolonged breath hydrogen** excretion profile,
- a **prolonged oxidation profile** of colonic metabolites.

METHODS

Short-term study

- Cross-over study (**CRNH Rhône-Alpes**)(1)
- Healthy volunteers (n=12)
- Standardized breakfast with 50g of NUTRIOSE® or maltodextrin enriched in ^{13}C to follow their metabolic fate
- 1-day study
- Breath hydrogen excretion, Breath $^{13}CO_2$ excretion (a marker of the oxidation of colonic metabolites)

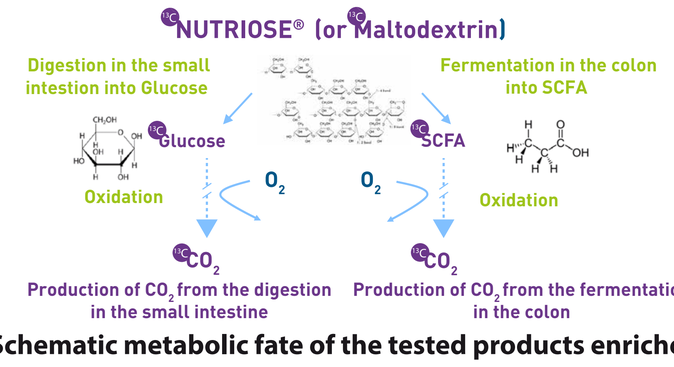

Fig. 1 : Schematic metabolic fate of the tested products enriched in ^{13}C

Long-term study

- Cross-over study (**TNO**)(2)
- Healthy volunteers (n=10)
- 15g/day intake NUTRIOSE® or maltodextrin as a control
- 7-day study
- Breath hydrogen excretion (a marker of the colonic fermentations)

RESULTS

SHORT-TERM SUSTAINED FERMENTATION PROFILE

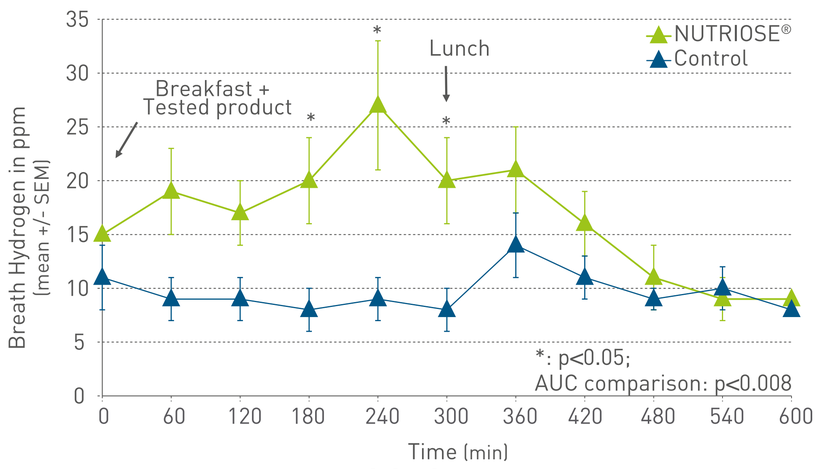

Fig. 3 : Breath hydrogen response

- Significant increase in breath H_2 excretion
- Demonstration of prolonged colonic fermentations

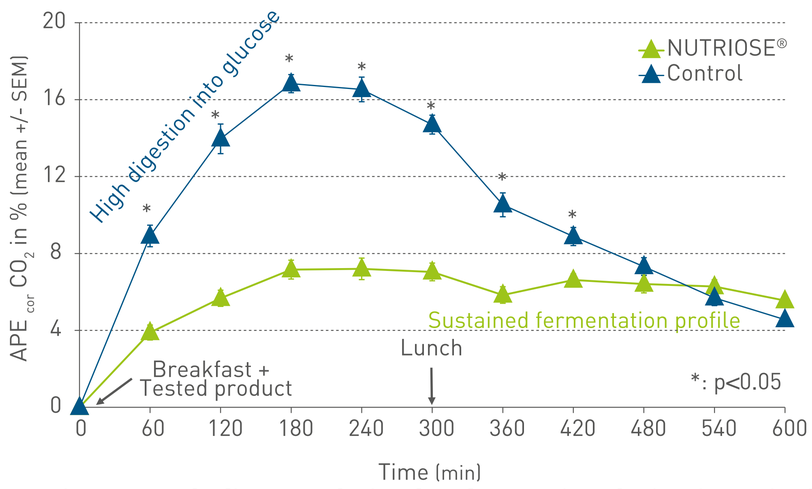

Fig. 4: Metabolites oxydation levels occuring during intestinal digestion and colonic fermentation through $^{13}CO_2$ expired

- Control group: Breath $^{13}CO_2$ increase shortly after breakfast ingestion, reflecting intestinal digestion into glucose and further glucose oxidation with maltodextrin

- NUTRIOSE® group:
  - Immediate slight $^{13}CO_2$ appearence reflecting a poor digestion in the small intestine
  - Followed by a steady and prolonged $^{13}CO_2$ appearence, parallel to the H_2 increase, reflecting the prolonged colonic fermentation pattern, possibly through the oxidation of NUTRIOSE® metabolites

LONG-TERM SUSTAINED FERMENTATION PROFILE

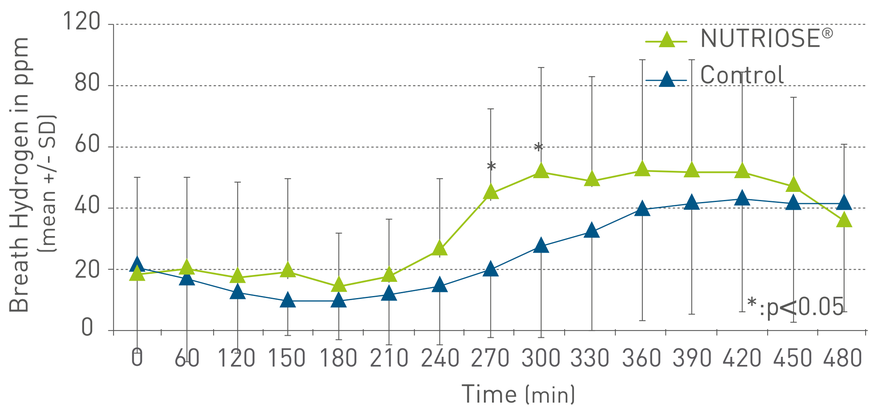

Fig. 2 : Breath hydrogen response at day 7

- Significant increase in breath H_2 excretion
- Demonstration of prolonged colonic fermentations

PUTATIVE INTERPRETATION OF THE RESULTS

- **Short Chain fatty Acids** (SCFA) produced by the fermentation of NUTRIOSE® in the colon could be used as **neoglucogenic substrates** before being **oxidized**.
- The **^{13}C-labeled SCFA** produced could be **oxidized in colonocytes** or **other tissues**.

Thus, the colonic fermentation of NUTRIOSE® provided a more sustained overall energy supply for oxidation.

CONCLUSION

NUTRIOSE® is a soluble fibre displaying a **specific colonic fermentation** and **oxidation pattern**. **Sustained colonic fermentations** from NUTRIOSE® may contribute to a **prolonged daily energy supply for whole-body metabolism**.

REFERENCES:
(1): Nazare et *al.*, 2011, J Am Coll Nutr ; (2): van den Heuvel et *al.*, 2004, Eur J Clin Nutr

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