

The health benefits of NUTRIOSE® soluble fiber

The soluble fiber NUTRIOSE® attenuates the blood glucose impact of a high carbs intake and displays a prolonged colonic fermentation pattern through gut microbiota modulation in healthy volunteers

Guérin-Deremaux L¹, Hobden MR², Thabuis C¹, Vazhappilly R¹, Vercruyse AS¹, Kennedy OB²

¹: Roquette, Lestrem, France; ²: University of Reading, Department of Food and Nutritional Sciences, Reading, UK

STUDY OBJECTIVES

ROQUETTE has developed solutions contributing to the prevention of major health concerns worldwide. Among these solutions, NUTRIOSE® is a soluble non-viscous fiber produced from wheat or maize starch with a fiber content of 85% (on D.S). The objectives of the present research was to demonstrate in healthy volunteers that NUTRIOSE® shows:

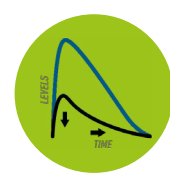
- a modulation of gut microbiota
- an attenuation of blood glucose spikes following a carbs challenge
- a sustained release of energy through colonic fermentations



METHODS

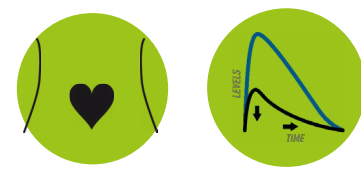
Short term impact on glucose management (study 1)

- Cross-over study (**Eurofins Optimed**)
- Healthy volunteers (n=6)
- 50g intake of NUTRIOSE® or glucose
- 1-day study



Long term impact on microbiota and glucose management (study 2)

- Cross-over study (**University of Reading**)
- Normal weight (n=20) and overweight (n=16) volunteers
- 14g/day of NUTRIOSE® or an energy-matched placebo as a mid-morning and mid-afternoon drinks
- 28-day study



Sustained energy release (study 3)

- Cross-over study (**CRNH Rhône-Alpes**)
- Healthy volunteers (n=12)
- Standardized breakfast with 50g of NUTRIOSE® or maltodextrin enriched in ¹³C to follow their metabolic fate
- 1-day study

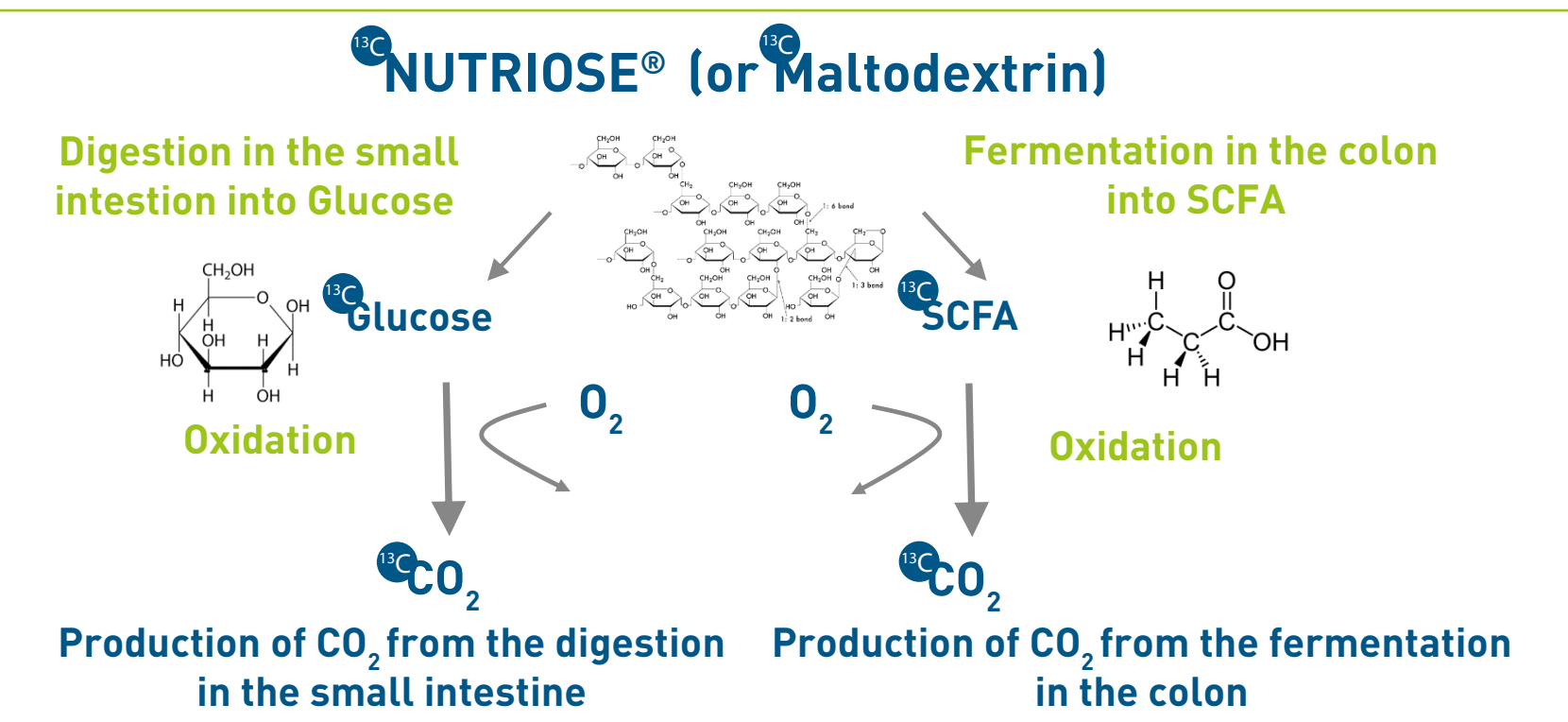
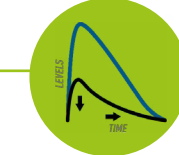


Figure 1: Metabolic fate of the tested products enriched in ¹³C

RESULTS

BLOOD GLUCOSE MANAGEMENT



Study 1

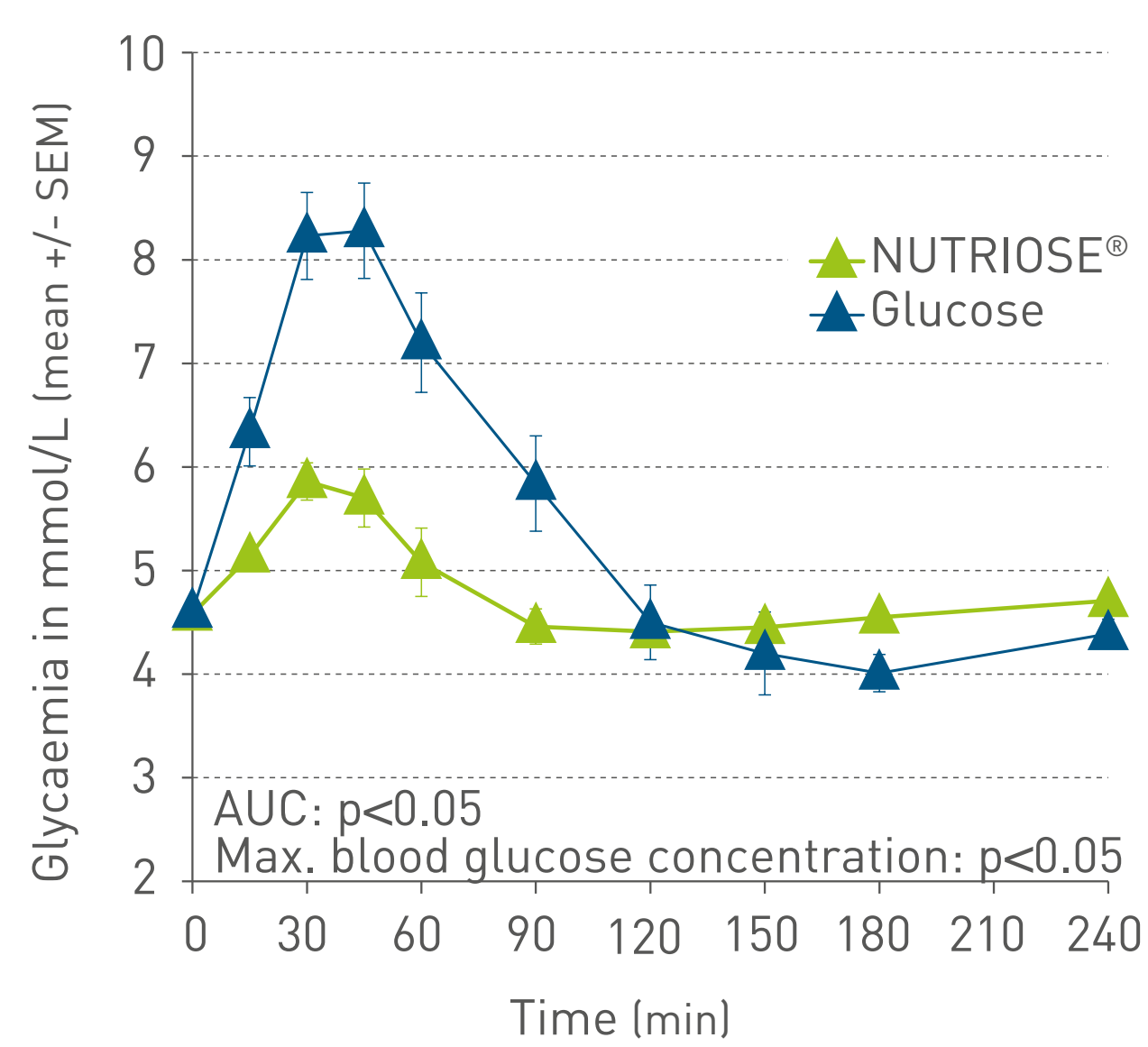


Figure 2: Evolution of Glycaemia after product intake

- Glycaemic response of NUTRIOSE®: 25%

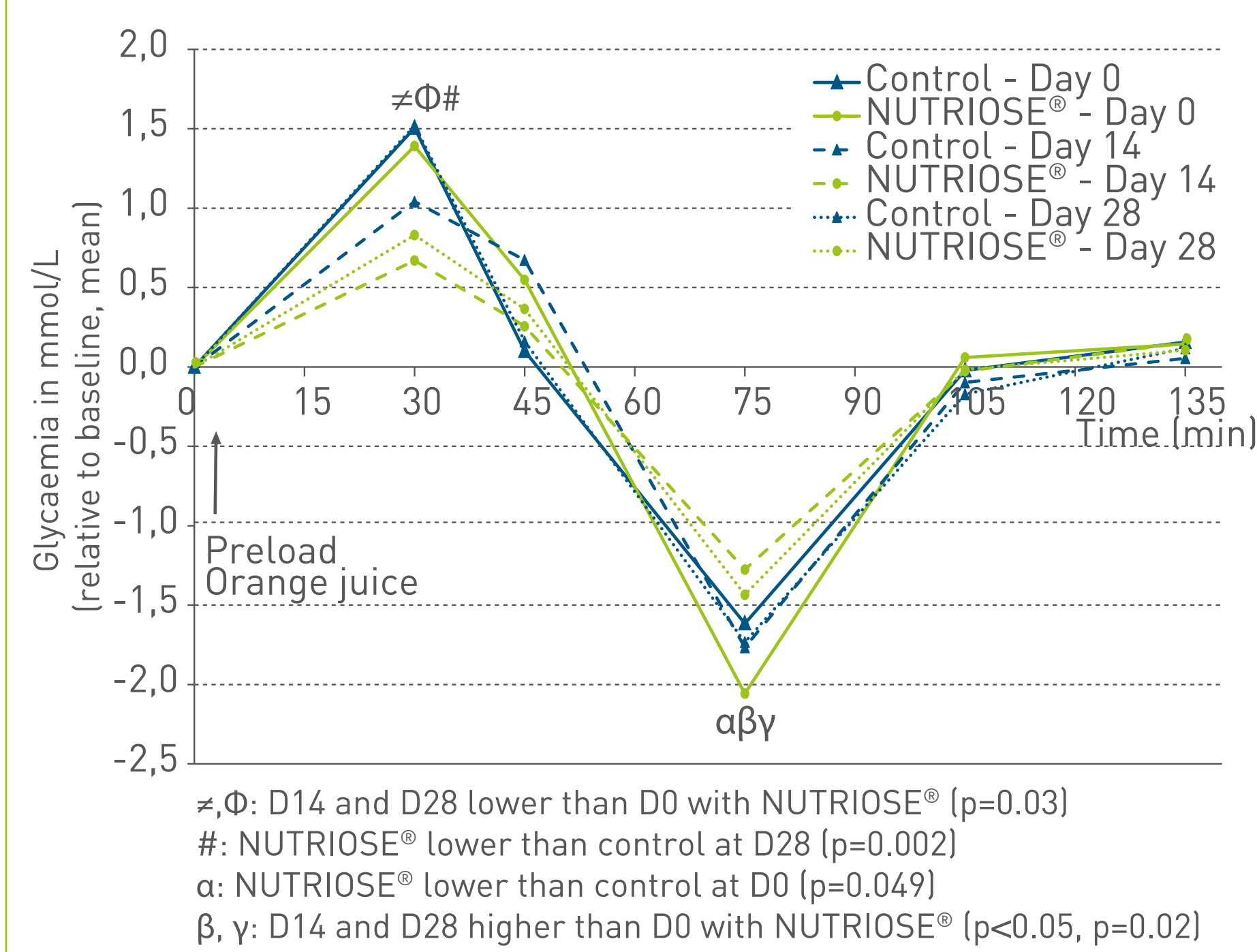


Figure 3: Evolution of Glycaemia after carbohydrates challenge

- After 14 and 28 days of NUTRIOSE® consumption, attenuation of the maximum blood glucose concentration following orange juice intake
- AUC (from 0 to 30 min) different at day 14 and day 28 between groups (p<0.05) and within the NUTRIOSE® group over time (p<0.05)

NUTRIOSE® limits hyperglycaemic peaks and attenuates the blood glucose impact of a carbohydrates intake

DIGESTIVE HEALTH



Study 2

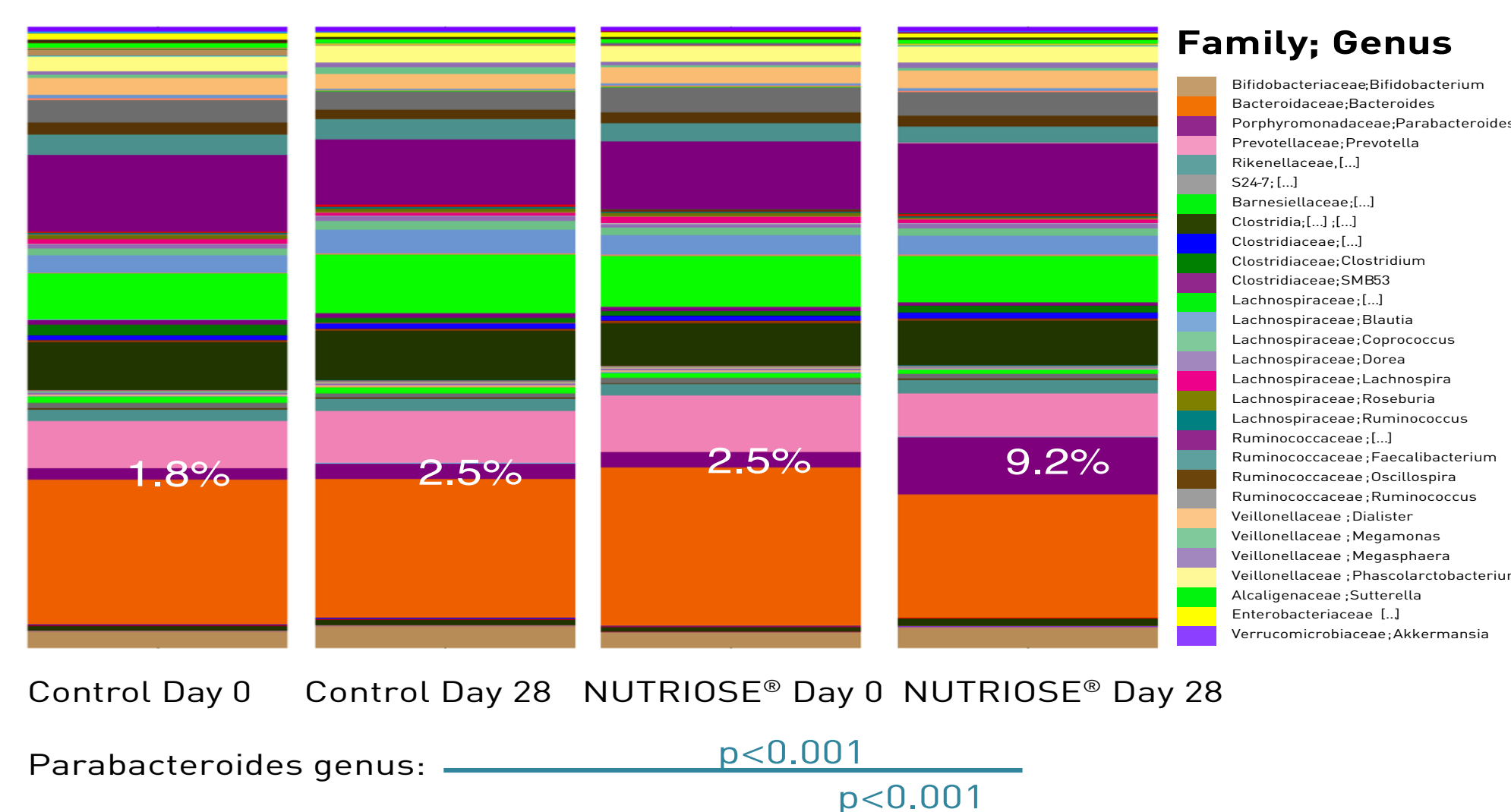


Figure 4: Relative abundance using faecal 16S rRNA sequencing

- Increase in the saccharolytic *Parabacteroides* genus (a *Bacteroides* subgroup of the phylum *Bacteroidetes*)
- Lower microbial diversity (Shannon Index) in normal weight volunteers (p<0.003); data not shown

NUTRIOSE® selectively modulates the gut microbiota composition

SUSTAINED ENERGY RELEASE



Study 3

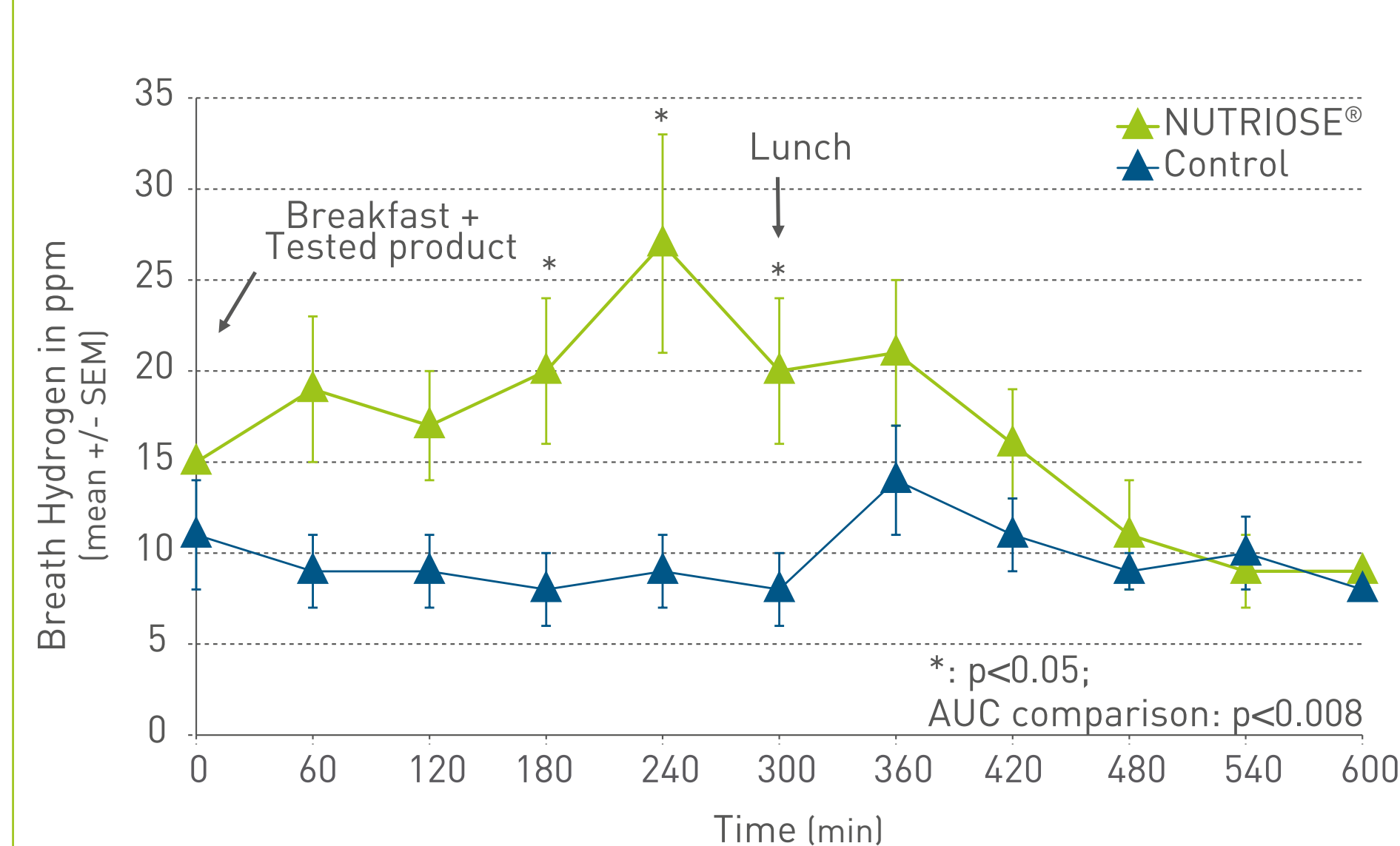


Figure 6: Breath hydrogen response

- Significant increase in breath H₂ excretion
- Demonstration of prolonged colonic fermentations

NUTRIOSE® displays prolonged colonic fermentations and subsequent prolonged metabolites oxidation

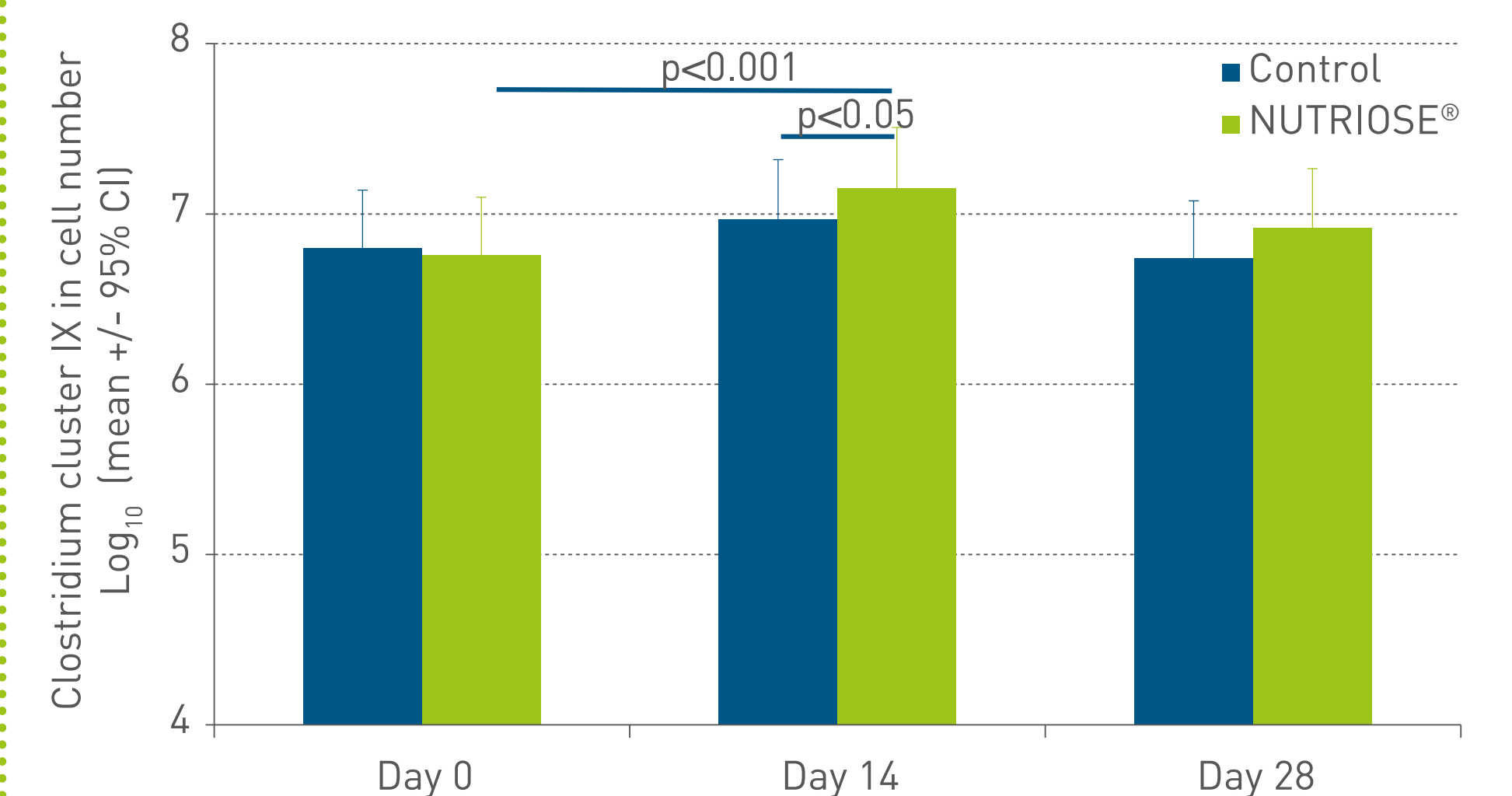


Figure 5: Faecal bacterial data from FISH analysis

- Increase in *Clostridium* cluster IX, a propionate producing bacterial group
- Increase in faecal propionate within the NUTRIOSE® group (p<0.05); data not shown

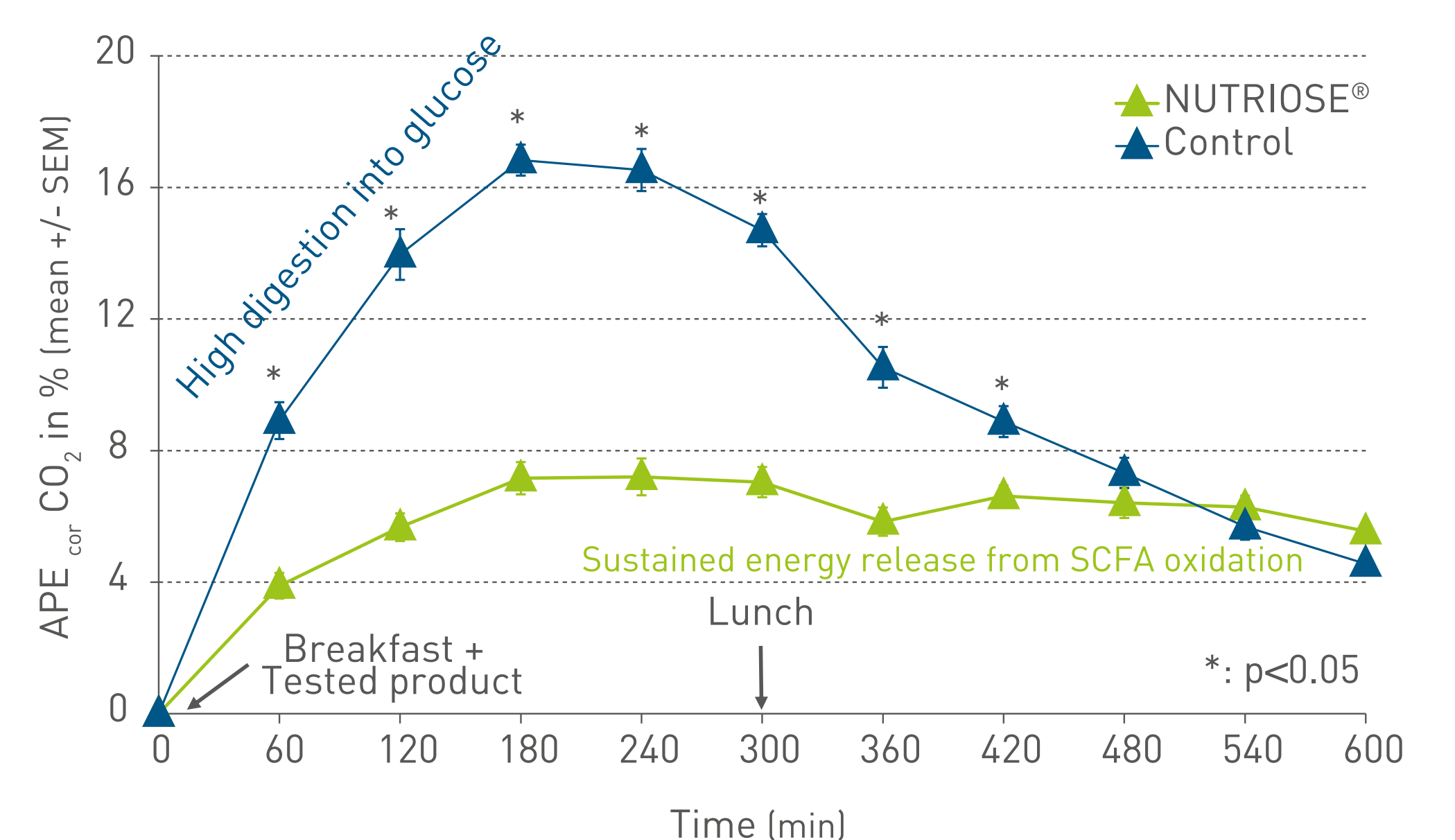


Figure 7: Metabolites oxidation levels occurring during intestinal digestion and colonic fermentation through ¹³CO₂ expired

- Control group: Breath ¹³CO₂ increase shortly after breakfast ingestion, reflecting intestinal digestion into glucose and further glucose oxidation
- NUTRIOSE® group:
 - Immediate slight ¹³CO₂ appearance reflecting a poor digestion in the small intestine
 - Followed by a steady and prolonged ¹³CO₂ appearance reflecting oxidation of Short Chain Fatty Acids from the prolonged colonic fermentation pattern

CONCLUSION

NUTRIOSE® acts as a highly targeting prebiotic. This soluble fiber may be used as an integrated solution to improve blood glucose management as NUTRIOSE® helps maintaining healthy blood glucose levels and controls fluctuations after a carbohydrates challenge. Sustained colonic fermentations from NUTRIOSE® contribute to the daily energy supply for whole-body metabolism, and may be a key factor in providing long-lasting energy. The potential health benefits of NUTRIOSE® may be attributed to a specific gut ecosystem modulation.

Conflict of interest: Roquette provided financial support for these studies. The authors declare that there is no conflict of interest.