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Colonic fermentation of an indigestible carbohydrate (Polydextrose®): interest and limits of a faecal batch incubation system. A Auffret, JL Barry, A David, C Bonnet, J Delort-Laval (*INRA, Laboratoire de Technologie Appliquée à la Nutrition, BP 527, 44026 Nantes Cedex 03, France*)

Introduction

During *in vivo* colonic fermentation studies of indigestible polysaccharides, substrate degradation or end-product formation is not easily determined. Therefore an *in vitro* system was developed with Polydextrose® as a model substrate.

Material and Methods

During each of 3 separate experiments, faeces were collected from 3 donors and 3 inocula were prepared according to Barry *et al* (1989). Mean inoculum was obtained by mixing the 3 inocula in equal parts. Polydextrose® was incubated, under nitrogen atmosphere for 6 h according to Barry *et al* (1989). The gas production was measured every h. The pH of the medium, production of short-chain fatty acids (SCFA) and hydrogen (H₂) and the amount of residual substrate were estimated 2, 4, 6 h after the start of the incubation. Theoretical fermented organic matter (TFOM) was calculated from total SCFA production according to Van Nevel and Demeyer (1977).

Results and Discussion

Always higher than 6, the pH did not affect SCFA and gas production, as shown earlier by Edwards *et al* (1985). Moreover, TFOM values were very close to the amounts of really disappeared substrate ($y = 0.90 x - 2.03$; $r = 0.93$): the SCFA production, was reliably quantified in the developed system. Except for H₂, variations were more important for one donor between different assays than between donors in the same experiment. With mixed inocula the results were very close to the average of data obtained by each individual inoculum ($y = 0.97 x + 6.8$; $r = 0.97$). The pH change (x_1 , 1/100) and the total gas production (x_2 in ml) were good predictors of the substrate fermentability (%) ($y = 0.30 x_1 + 23.06$; $r = 0.89$ and $y = 6.02 x_2 + 1.03$; $r = 0.89$ respectively) and of TFOM (g/l) ($y = 0.06 x_1 + 1.50$; $r = 0.95$ and $y = 0.21 x_2 - 1.84$ $r = 0.92$ respectively).

Conclusions

As shown by the results obtained in the present study, fermentability and SCFA production are easily and rapidly obtained by *in vitro* system in nearly physiological conditions.

References

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