

FERMENTATION OF GLUCOSE AND RAFFINOSE IN *BIFIDOBACTERIUM BREVE* AND *BIFIDOBACTERIUM ANIMALIS*

Fermentace glukózy a rafinózy
u *Bifidobacterium breve* a *Bifidobacterium animalis*

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Souhrn, klíčová slova

Cílem práce bylo sledování parametrů růstové křivky u *B. breve* a *B. animalis* kultivovaných v přítomnosti glukózy, rafinózy a na směsi obou cukrů. Oba kmeny rostly významně rychleji na rafinóze než na glukóze. Zatímco *B. breve* využíval oba cukry současně, *B. animalis* vykazoval atypický diauxický růst, při němž rychlá spotřeba rafinózy byla následována pomalou utilizací glukózy.

Bifidobakterie, růstové křivky, diauxie

Summary, keywords

The aim of the present work was to investigate *B. breve* and *B. animalis* for their growth parameters with either glucose, raffinose or a mixture of glucose and raffinose. Both strains grew significantly slower on glucose compared to raffinose. *B. breve* utilized glucose and raffinose simultaneously. *B. animalis* displayed atypical diauxic growth in which rapid utilization of raffinose was followed by slow utilization of raffinose after the raffinose depletion.

Bifidobacteria, growth curves, diauxi

Introduction

Bifidobacteria are normal inhabitants of the human and animal hindgut exhibiting positive health effects to their hosts. Raffinose-series oligosaccharides are major components of many food legumes. In lower intestine these oligosaccharides are preferentially metabolised by bifidobacteria, exhibiting so called bifidogenic effects (Crittenden, 1999). Although little is known about the coutilization of different carbon sources in bifidobacteria, substrate preferences have been shown to occur in variety of human colonic bifidobacteria growing on mixtures of different monosaccharides (Degnan and Macfarlane, 1991). On the contrary, the preferences for mono and oligosaccharides have never been studied. Hence, the aim of the present work was to investigate the utilization of glucose and raffinose in *Bifidobacterium breve* and *B. animalis* to determine the dual-substrate utilization pattern in these bacteria.

Methods

B. breve ATCC 15700 was obtained via Deutsche Sammlung von Mikroorganismen und Zellkulturen (Braunschweig, Germany). *B. animalis* was isolated from fermented milk products. The isolate was identified using API 50 CHL and API ID 32A kits (BioMérieux, France). Turbidimetric methods was used for the determination of specific growth rates. Enzymatic method (Raffinose-series oligosaccharides assay procedure, Megazyme, Ireland) was used for the determination of the dual substrate utilization patterns.

Results - discussion

Both strains grew significantly ($P < 0.05$) slower on glucose compared to raffinose (Tab.1). While there were no difference in the growth of *B. animalis* on raffinose and mixture of glucose and raffinose, *B. breve* grew significantly ($P < 0.05$) more rapidly on the mixture of glucose and raffinose compared to raffinose. *B. breve* utilized glucose and raffinose simultane-

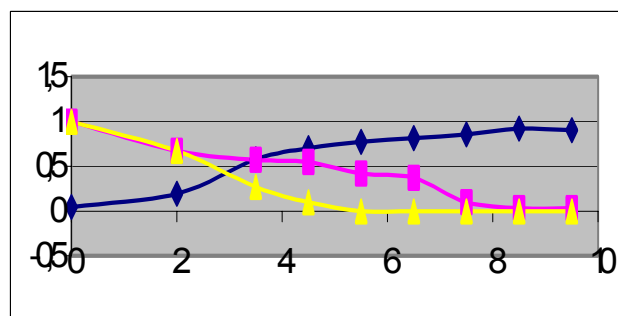
ously. On the contrary, *B. animalis* displayed atypical diauxic growth in which rapid utilization of raffinose was followed by slow utilization of glucose after the raffinose depletion (Fig 1).

Tab.1 Specific growth rates in bifidobacteria

Sugar (2 g/l)	<i>B. breve</i>	<i>B. animalis</i>
Glucose	0.17 ± 0.01^a	0.18 ± 0.02^a
Raffinose	0.41 ± 0.01^b	0.44 ± 0.02^b
Glucose+raffinose	0.47 ± 0.04^c	0.44 ± 0.03^b

Values in columns ($n=6$) with no common superscripts differ ($P < 0.05$)

Fig.1. Utilization (in g/l) of glucose (□-) and raffinose (▲-), and OD_{640nm} (◇-) in *B. animalis*. The scale of x-axis is in hours.



References

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