

Competitive Exclusion Dynamics of *S. typhimurium* and *S. flexneri* for the Carbon Source Sorbitol

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Abstract

Enteric bacteria are a group of Gram-negative small-rod bacteria that colonize the gastrointestinal (GI) tract in humans and animals (Madigan et al. 2005). In order to thrive in the GI tract, bacteria need a carbon source to grow and multiply. Sorbitol, a sugar alcohol derived from glucose, is commonly used as a carbon source. According to Hibbing et al. (2010) the competitive exclusion principle states that competition between organisms leads to decreased population densities for both organisms, and one organism will eventually dominate. In this study we examined competition for the carbon source sorbitol between the enteric bacteria *Salmonella typhimurium* and *Shigella flexneri*. The species capable of utilizing sorbitol more efficiently will outcompete the other organism for available nutrients. Carbon source utilization is determined by the genes the organism possesses; *Salmonella typhimurium* contains the enzyme Sorbitol-6-Phosphate Dehydrogenase (Berkowitz 1970) which allows it to efficiently utilize sorbitol as a carbon source.

Hypothesis:

When placed in direct competition with each other for minimal nutrients with sorbitol as the predominant carbon source, we predict *S. typhimurium* will outcompete *S. flexneri* due to its specialized enzyme.