TITLE: TITLE: SUBSTRATE PREFERENCES OF HYPER-AMMONIA PRODUCING BACTERIAS ISOLATED FROM THE BOVINE RUMEN

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ABSTRACT:

Nitrogen metabolism is critical for ruminant nutrition. Several species of ruminal microorganisms are involved in the degradation of dietary protein, but the ruminal hyper-ammonia-producing bacteria (HAB) appear to have a major role in amino acid deamination. Although originally described as obligate amino acid-fermenting bacteria, we recently identified a new group of HABs isolated from Nellore steers that were also able to metabolize carbohydrates as sole carbon source. The objective of this study was to investigate if these isolates exhibited substrate preferences and differences in growth parameters when using different sources of carbon and energy. Three isolates (C114, C116, and C118) were grown in anaerobic batch cultures with carbohydrates (4 $g.l^{-1}$) or a mixture of peptides and amino acids sources (15 $g.l^{-1}$). The specific growth rate (μ), optical density (OD), consumption of carbohydrates and end-products (ammonia, organic acids) accumulation were monitored over time. The isolates showed greater preference for glucose, with an average growth rate of 1.470 h^{-1}. Isolate C114 showed greater range of carbohydrate assimilation compared to the other isolates. Glucose was metabolized in up to 5 h, and the average maximum OD was 1.210. The specific growth rates of the HAB isolates growing with trypticase, casamino acids, casein peptone, soybean flour peptone, and proteose peptone as sole carbon and energy sources were always lower (average $\mu = 0.786\ h^{-1}$) than growth in the presence of glucose. The average ammonia production accumulated after 24 h was 28 mmol. l^{-1}. The specific activity deamination varied from 228.86 to 872.11 nmol NH_3.mg $protein^{-1}.min^{-1}$ with isolates C114 e C118 respectively. The main fermentation end-products produced by the HAB isolates were acetate, propionate, and lactate in the presence of glucose, while acetate, propionate, butyrate, isobutyrate, fumarate, and isovalerate predominated in batch cultures grown with amino acids and peptides. These results suggest that carbohydrate-fermenting HABs can have a competitive advantage in niche colonization in the rumen compared to the obligate amino acid-fermenting HAB.

KEYWORDS: Rumen, ammonia, hyper-ammonia-producing bacteria.

DEVELOPMENT AGENCY: CNPq, FAPEMIG, CAPES, INCT CIÊNCIA ANIMAL