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Performance and rumen fermentation of dairy calves supplemented with *Saccharomyces cerevisiae*[1077] or *Saccharomyces boulardii*[1079]

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Abstract

To evaluate supplementation with the yeast products *Saccharomyces cerevisiae* CNCM I-1077 (SC) and *Saccharomyces boulardii* CNCM I-1079 (SB) on performance of calves, 24 Holstein calves (12 males, 12 females) were randomly assigned to each of 3 treatments being: C (control treatment), SC (1 g/d); or SB (1 g/d). Calves were fed whole milk (4.5 l/d) and a starter feed *ad libitum* from 4 d of age until weaning. Female calves were weaned at 60 d of age. Neither yeast affected body weight, body weight gain or feed efficiency, although dry matter intake was higher (P<0.01) for SC *versus* control calves. The incidence of diarrhea and pneumonia was similar between treatments. Ruminal

Abbreviations: ADG, average daily gain; ADF, acid detergent fibre; BW, body weight; CP, crude protein; DM, dry matter; FE, feed efficiency; aNDF, neutral detergent fibre; SC, *Saccharomyces cerevisiae*; SB, *Saccharomyces boulardii*; VFA, volatile fatty acid

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ammonia N, propionate and butyrate increased with SC (P<0.05), but not with SB. Results suggest that SC modifies ruminal fermentation, but does not impact productive performance of calves.

Keywords: *Saccharomyces cerevisiae*; *Saccharomyces boulardii*; Yeast cultures

1. Introduction

Improvements in calf nutrition can decrease morbidity and mortality, as well as increase post-weaning rate of gain and genetic improvement due to the increased number of animals available for voluntary culling (Baldwin et al., 2004). Cultures of *Saccharomyces cerevisiae* (SC) are extensively used as feed additives in ruminant rations, principally for dairy cattle, to increase milk yield (Nocek and Kautz, 2006). However, studies on its use in preruminant calves are limited (e.g., Lesmeister et al., 2004). *Saccharomyces boulardii* (SB) is a non-pathogenic yeast extensively used in a lyophilized form as a biotherapeutic agent to treat a variety of intestinal diseases in humans and other monogastrics (Buts and De Keyser, 2006). However, studies of its use in preruminant calves are limited (e.g., Galvao et al., 2005).

SB incorporated into milk replacer (Galvao et al., 2005) improved dry matter (DM) intake, while addition of SC to a dairy calf starter (Lesmeister et al., 2004) increased DM intake and growth, but did not impact rumen development. Oeztuerk et al. (2005) reported that addition of live and autoclaved SB stimulated *in vitro* ruminal microbial metabolism, with only small differences between treatments, and concluded that ruminal microbes digested SB as a substrate rather than utilizing it as a probiotic. However, effects of SB might extend beyond the rumen, because a number of yeast cells remain alive during transit through the digestive tract (Durand-Chaucheyras et al., 1998).

The yeast I-1077 is recommended for ruminants while I-1079 is recommended for non-ruminants and young ruminants. For that reason, we speculated the SB could stimulate DM intake, rumen fermentation and growth early in life, while SC would be more efficacious close to weaning when the rumen is nearing full development. Therefore, this study was conducted to determinate effects of feeding SB or SC to preruminant dairy calves on DM intake, average daily gain (ADG) and ruminal fermentation.

2. Materials and methods

This experiment was conducted under the supervision and approval of the Academic Committee of the Animal Science Department of Colegio de Posgraduados-Montecillo México according to regulations established by the Animal Protection Law enacted by the Estado de México. The study was completed in the dairy facilities of the Universidad Autónoma Chapingo in Chapingo, México.

2.1. Animals, housing and diet

Twenty-four Holstein calves (12 males, 12 females) were separated from their dams 3 d after birth, randomly assigned within sex to treatment, and placed on experiment on