

## In vitro study of the dose effect of *Saccharomyces cerevisiae* on rumen digestion of a mixed diet

JP Jouany <sup>1</sup>, B Lassalas <sup>1</sup>, G Bertin <sup>2</sup>

<sup>1</sup>INRA, SRNH, Theix, 63122 St-Genès-Champanelle ; <sup>2</sup>CSI, Direction R and D, 94, rue Edouard Vaillant, 92532 Levallois-Perret, France

Live yeasts, used as feed additives, have been suggested as a mean of stabilizing rumen microbial digestion in animals fed diets rich in starch (RJ Wallace and J Newbold, 1992, Probiotics. The scientific basis, Chapman and Hall, 317-353). Three doses of *Saccharomyces cerevisiae* (I-1077)\* (SC) were tested in Rusitec to study their effects on rumen digestive parameters. The four fermentors were first inoculated with mixed rumen digesta sampled from three sheep fed on grass hay (700 g/d), barley (400 g/d) and soybean meal (100 g/d). Each fermentor (1 l) was fed daily 10 g grass hay + 6 g barley + 2 g fishmeal + 1 g sucrose in a nylon bag 50 µm in mesh size, which was changed every 48 h. A Mc Dougall-type saliva with trace elements, urea (200 mg/d) and Na<sub>2</sub>SO<sub>4</sub> (90.4 mg/d), was infused continuously at the rate of 700 ml/d. Nylon bags were vertically agitated at a rate of 40 cm/min. Yeast were given in dry form, once per day, when the fermentors were fed.

The addition of SC significantly improved the digestibility of OM and cell wall components

whatever the dose ; the increase was greatest at the dose of 10<sup>5</sup> CFU. VFA production only increased with the 10<sup>5</sup> CFU ; the composition of VFA mixture was not influenced by SC. As a consequence, fermented organic matter (FOM) calculated from DI Demeyer and CJ Van Nevel (1975, Digestion and Metabolism in the Ruminants, University of New England Publishing Co, 366-382) was highest with the 10<sup>5</sup> CFU. Gas production and composition, NH<sub>3</sub>-N concentration and pH in fermentors were not altered by SC, nor the efficiency of microbial protein synthesis (EMPS). Administered at the concentration of 10<sup>5</sup> CFU/ml, SC had the highest effect on plant cell wall digestion and VFA production in Rusitec. Compared to results of *in vivo* studies, the response of microbial cellulolytic activities to SC in Rusitec was amplified. This suggests that Rusitec could not be suitable for probiotic studies.

(This work was supported by CSI Levallois-Perret, France. The authors thank M Fabre and P Journaix for their skilled technical assistance).

|                                  | Control           | Yeast supply (CFU/ml) |                   |                    |
|----------------------------------|-------------------|-----------------------|-------------------|--------------------|
|                                  |                   | 10 <sup>4</sup>       | 10 <sup>5</sup>   | 10 <sup>6</sup>    |
| NDF digestibility (%)            | 36.4 <sup>a</sup> | 42.8 <sup>b</sup>     | 47.5 <sup>c</sup> | 46.1 <sup>c</sup>  |
| VFA production (mMol/d)          | 63.6 <sup>a</sup> | 58.4 <sup>a</sup>     | 76.8 <sup>b</sup> | 69.9 <sup>ab</sup> |
| Acetate/propionate               | 2.4 <sup>a</sup>  | 2.5 <sup>a</sup>      | 2.5 <sup>a</sup>  | 2.3 <sup>a</sup>   |
| FOM (g/d)                        | 5.6 <sup>a</sup>  | 5.2 <sup>a</sup>      | 6.8 <sup>b</sup>  | 6.2 <sup>b</sup>   |
| Gas production (l/d)             | 1.9 <sup>a</sup>  | 1.7 <sup>a</sup>      | 2.0 <sup>a</sup>  | 2.0 <sup>a</sup>   |
| CO <sub>2</sub> /CH <sub>4</sub> | 4.5 <sup>a</sup>  | 3.9 <sup>a</sup>      | 3.8 <sup>a</sup>  | 4.1 <sup>a</sup>   |
| EMPS (g N/kg FOM)                | 22.9 <sup>a</sup> | 22.7 <sup>a</sup>     | 19.3 <sup>a</sup> | 23.3 <sup>a</sup>  |

\* registered at Institut Pasteur, Paris.