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BOOK OF ABSTRACTS



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Continuous cultures subjected to a sudden shift-up in the dilution rate showed that the glucose uptake rate increased immediately to the new feeding rate, but that the oxygen consumption could not follow fast enough to ensure a completely oxidative metabolism. Thus, part of the glucose assimilated was degraded by the reductive metabolism, resulting in a temporary decrease of biomass concentration (Sonnleitner and Hahnemann, 1994). Based on a model for the dynamic increase of the specific oxygen consumption rate, a time-dependent feed flow rate function was derived that should permit an increase in the dilution rate from one value to another without provoking the appearance of reductive metabolism. Corresponding feed-profile experiments showed that deviations in the reductive metabolism could not be completely suppressed due to variability in the model parameters. Therefore, a proportional feedback controller using heat evolution rate measurements was implemented. Calorimetry provides an excellent and rapid estimate of the metabolic activity. Satisfactory control was achieved and led to much higher biomass yields as compared to shift-up experiment to the same final dilution rate without on-line control.

Duboc, P., Cascão-Pereira, L., von Stockar, U. 1997, submitted.

Sonnleitner, B., Hahnemann, U. 1994. *J. Biotech.* 38:63-79

MO 6305

PREVENTION OF AEROBIC DETERIORATION OF SILAGE BY RECOMBINANT KILLER *KLUYVEROMYCES* STRAIN

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The aerobic deterioration of silage degrades silage quality. The growth of lactate utilizing yeasts which contaminated silage seem to involve the deterioration. To prevent the growth of these yeasts, the killer yeast *Kluyveromyces lactis* IFO 1267 was selected for a silage additive. *K. lactis* IFO 1267, however, may also be involved in aerobic deterioration because of its lactate assimilating ability (1).

We bred a *K. lactis* strain which is defective in growth on lactate by gene disruption of its phosphoenolpyruvate carboxykinase (PEPCK) gene of the strain (2,3).

The effect of prevention of silage aerobic deterioration by addition of recombinant *K. lactis* killer strain was studied by using a silage fermentation model system. The killer strain prevents pH increase caused by the growth of target strain accompanying the aerobic deterioration of silage. The effective culture population of the killer cells were ten to the fifth and ten to the sixth against ten squared target cells inoculum per gram (wet wt.) of the sterilized Italian-rye grass and maize powder with 70% water content, respectively. Growth was examined after ensiling at 30 degrees for 3 weeks.

1) H. K. Kitamoto et al., *J. Dairy Sci.* 76, 803 (1993)

2) H. K. Kitamoto et al., ECB7 abstract IV p62 (JEP72) (1995)

3) H. K. Kitamoto et al., 9th meeting on "Biology of *Kluyveromyces*" abstract p23 (1996)

MO 6306

EFFECT OF SALT CONCENTRATION AND LIGHT INTENSITY ON CAROTENOGENESIS OF *HAEMATOCOCCUS PLUVIALIS*

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Haematococcus, carotenogenesis, astaxanthin, salt tolerance

H. pluvialis is a freshwater microalgae which synthesizes and accumulates astaxanthin in the cytoplasm when submitted to stress conditions that inhibit cellular division, e.g. high salt levels, nutrient depletion, high light intensities and temperatures in excess of 22 °C. Astaxanthin is a ketocarotenoid used in aquaculture for salmonid pigmentation, and can also be used as anti carcinogenic agent.

With these experiments we have studied the interaction between salt concentration and light intensity on carotenogenesis in *H. pluvialis*, using a statistical approach: Response Surface Methodology. The cultures were grown in modified BBM at 26 °C. Total pigments were determined by UV/Vis and HPLC. The results indicated that the optimum conditions for carotenogenesis, are 10.0-12.0 mM NaCl and a light intensity of 145 $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$. The highest concentration of total carotenoids obtained was 30 μg per ml for a culture with a cellular density of $1.08\text{E}10$ (90 % of the total carotenoid was astaxanthin).

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