

Growth, acidification, proteolysis and survival of probiotics *Bifidobacterium animalis* and *Lactobacillus acidophilus* in goats milk



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Introduction

Such fermented foods as milk dairy products have played important roles worldwide in the human diet for many centuries. In addition, the latest half a century has witnessed accumulation of a body of knowledge on the benefits of certain microorganisms – Lactic Acid Bacteria and probiotic gut microflora (e.g. *Bifidobacterium* spp. and *Lactobacillus acidophilus*) upon human health. Consumption of probiotic foods – defined as “foods containing live microorganisms which, when administered in adequate amounts, confer a health benefit to the consumer”, has increased as their health-fostering properties become scientifically established. However, at the industry level these bacteria are still difficult to cultivate – which represents a bottleneck towards large scale exploitation of those microorganisms in foods. Complex technical improvements – may therefore be required for successful commercial use of probiotic bacteria.

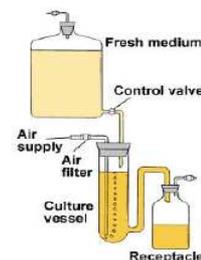
On the other hand, the use of small ruminant’s milks for manufacture of probiotic foods has not been taken advantage of to a sufficient extent. Products manufactured from goats’ or ewes’ milks are considered to possess a potential for increase in consumption rates in the European Union. In Mediterranean countries, in particular, the production of said milks plays important social and economic roles. Hence, the manufacture of probiotic foods from these milks represents an opportunity, and eventually an alternative to their cows’ milk counterparts – for a matter of taste, economic reasons or physiological constraints (e.g. allergies).

The aim of this research work was to produce fundamental and applied data related to the exploitation of goats milk as a suitable medium for growth of *Lactobacillus acidophilus* and *Bifidobacterium animalis* in a bioreactor.

Materials and Methods

Batch and continuous cultures of *Lactobacillus acidophilus* and or *Bifidobacterium animalis* in goats milk, were performed in a glass Biostat B bioreactor with temperature and oxygen control and connected to a computer for online data acquisition.

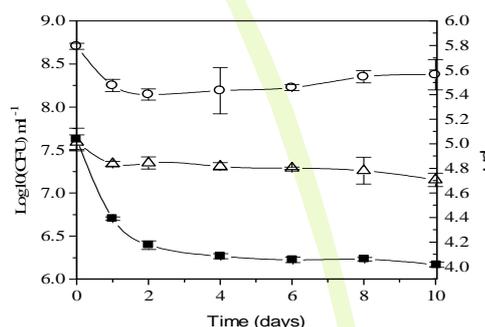
Samples were taken at pre-set times and analyzed for bacterial concentration by total counts method, lactose and metabolites concentration by using an HPLC, proteolysis by SDS-PAGE electrophoresis and acidification by the amount of NaOH pumped into the culture vessel



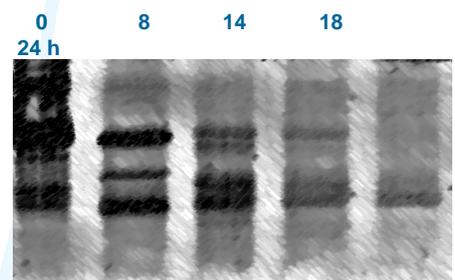
Results and Discussion



1. Fermented goats milk



2. Survival at 5°C (Δ , *Lb acidophilus*; \circ , *Bif animalis*; \blacksquare , pH)



3. Proteolysis by *Bif. animalis*

✓ Maximum biomass yield in goats milk was obtained at 22 h after inoculation with a 2% preculture, pH set at 6.5, temperature at 37 °C under complete anaerobiosis.

✓ Both, *Bif. animalis* and *L. acidophilus* were able to hydrolyse milk caseins and showed a good survival during refrigeration for 10 days.

✓ The sensorial evaluation indicated that goats milk fermented by a mixed culture had an acidic taste, had a pleasant aroma and a yogurt-like texture.

✓ Goat's milk can be considered as good as cows' milk as an alternative feedstock for cultivation of *Bif. animalis* and *Lb. acidophilus* because the maximum viable cell numbers, growth rates and rates of release of acid and survival at refrigeration are not inferior to those reported for cow's milk-based media.

References: Kurmann (1991); Gomes (1995); Calleja (2002); Rancort (2006).