MICROBIAL ECOLOGY OF POZOL, A MEXICAN MAIZE FERMENTED BEVERAGE

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Introduction. Pozol is an acid refreshing beverage of Mayan origin, consumed by the Indian and Mestizo population in Southeastern Mexico. It is prepared from fermented nixtamal (heat and alkali treated maize dough), through a natural fermentation, as no inoculum is intentionally added. A complex microbiota participates, including lactic acid bacteria, from which the most frequently found is *Streptococcus infantarius*. This species had not been detected, until culture independent PCR-DGGE was used (1). Other important genera are *Lactococcus* sp*., Enterococcus sp., Weissella* sp. and *Leuconostoc* sp. and unlike other cereal substrates, *Lactobacillus* species are not the predominant at the end of fermentation. Amylolytic lactic acid bacteria are relevant, as starch is the main carbohydrate in nixtamal and the predominant amylolytic lactic acid bacterium (ALAB) is *S. infantarius,* which has a cell-bound low amylolytic activity, but higher specific growth rate, compared with other ALAB (2)). Although the proportion of ALAB is high at the beginning of the fermentation, mostly non-amylolytic LAB predominate from 24 h.. This suggests the presence of interactions among LAB.
The objective of this work was to determine interactions among LAB and ALAB in MRS-starch broth and in gamma radiation sterilized nixtamal dough.

Methods. Amylolytic (*S. infantarius*) and non amylolytic (*W. confusa*) isolated from pozol and a highly amylolytic (*Lactobacillus plantarum* A6) isolated from a cassava food were used. MRS-starch broth and nixtamal dough were inoculated with pure strains and mixed cultures of amylolytic or amylolytic-non amylolytic strains and the fermentations were carried out as in (2). Microbial growth was assessed by optical density, biomass and RT-PCR in the broth and by plate counts in a selective medium where the strains are differentiated.

Results. In MRS-starch broth inoculated with: the mixed culture of both amylolytic strains (*S. infantarius* and *L. plantarum* A6), *S. infantarius* started to grow before than L. plantarum A6, and at pH 5 *L. plantarum* A6 took over. The advantage of the mixed culture compared with L. *plantarum* pure culture was the faster acidification. *W.. confusa* did not grow better in mixed culture with each of the amylolytic bacteria. In sterile nixtamal dough: *L. plantarum* A6, had a longer lag period compared with the liquid culture in MRS-starch, in contrast with *S. infantarius,* that grew faster and *W. confusa,* that had not grown on MRS-starch broth, grew better than the other two amylolytic bacteria (Figure 1). Growth of *Lb. plantarum A6* was also lower than the strains isolated from pozol (Figure2).

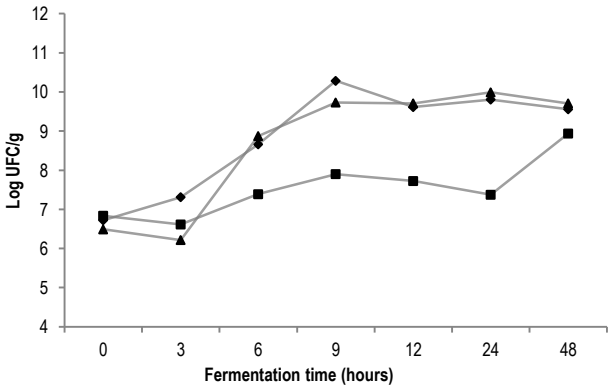

Figure 1. Growth in commercial nixtamalized maize dough pure cultures*: Lb. plantarum* A6 (■), *S. infantarius* 25124 (◆) and *Weissella confusa* L9 (▲).

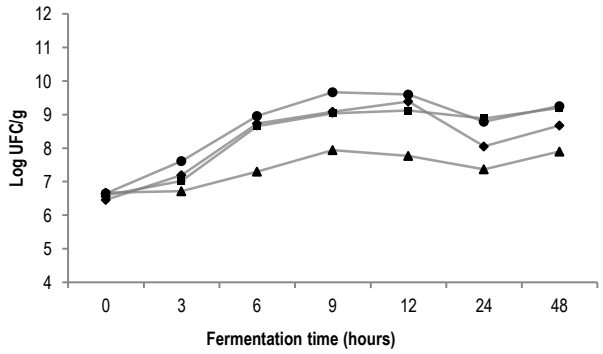

Figure 2. Growth in commercial nixtamalized maize dough mixed cultures: *S. infantarius* 25124 (◆), *Lb. plantarum* A6 *(▲), Weissella confusa* L9 *with S. infantarius* 25124 (•) and *Weissella confusa* L9 with *Lb. plantarum* A6 (■).

Conclusions. Although amylolytic lactic acid bacteria are important, lactic acid bacteria are able to grow on other substrates from nixtamal dough. In spite of having a high amylolytic activity, *L. plantarum* A6 didn't grow as well as expected in nixtamalized maize dough. This demonstrates how strains are adapted to their environment.

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References.

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