Challenge testing kefir made with a lyophilized starter against four common foodborne pathogens

Maria Margarida Aguiar, Marília Ferreira, António Salvador Barreto, Ana Rita Henriques
CIISA – Centre for Interdisciplinary Research in Animal Health, Faculty of Veterinary Medicine, ULisbon

BACKGROUND & STUDY AIM

Kefir: fermented dairy beverage; joint action of many species of lactic acid bacteria and yeast in milk.
Long consumption history in Eastern Europe and Asia.
Current consumers require healthy , functional foods, together with a growing preference for homemade food products.

The objective of this work was to assess the inhibitory activity of lyophilized kefir starter cultures against common foodborne pathogens, drawing attention to the potential risk of contamination at the household level.

METHODS

1. Kefir preparation & inoculation

Test samples:
UHT semi-skimmed milk milk **+**
5 log cfu ml-1 of a single pathogen suspension **+**
Commercial lyophilized kefir starter (N-NA, Rezé, France)

- *Listeria monocytogenes* CECT 935
- *Staphylococcus aureus* ATCC 25923
- *Escherichia coli* DSMZ 682
- *Salmonella* Enteritidis CECT 4300^T

Positive and negative control samples were prepared and monitored over time
All samples were incubated at 20°C (Frilabo, France) simulating room temperature

2. Challenge testing

Samples monitored every 6h for 120h after kefir preparation, using ISO 6887-2:2003 and:
- *L. monocytogenes* in Ottavianni Agosti Listeria agar (ALOA) (Scharlau Chemie S.A.) by spread plating,
- *S. aureus* in Baird-Parker agar (Scharlau Chemie S.A.) by spread plating,
- *S.* Enteritidis in Hectoen agar (Scharlau Chemie S.A.) by spread plating,
- *E. coli* in tryptone bile glucuronic (TBX) agar (Scharlau Chemie S.A.) by incorporation,
- AMC in TGA (Scharlau Chemie S.A.) by incorporation.

3. Calculations

Gradients of celular growth and death were estimated together with the percentage of inhibition

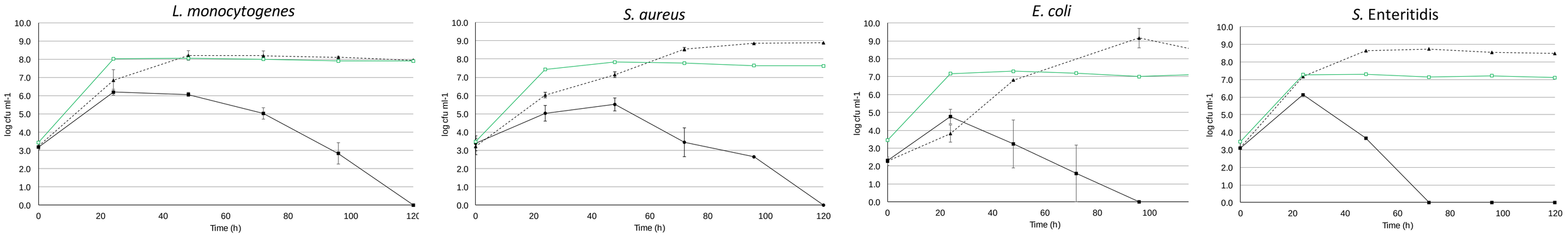
$$\ln(cfu.ml^{-1})_t = \ln(cfu.ml^{-1})_{t_0} + \mu_{(t-t_0)}\left(t - t_0\right) \quad (=)$$

$$(=) \quad \mu_{(t-t_0)} = \frac{\ln(cfu.ml^{-1})_t - \ln(cfu.ml^{-1})_{t_0}}{(t-t_0)}$$

$$\%\ Inhibition = \left|\frac{\mu_{(t-t_0)_{milk}} - \mu_{(t-t_0)_{kefir}}}{\mu_{(t-t_0)_{milk}}}\right| \times 100$$

RESULTS

All strains exhibited a growth peak at 24h of fermentation
S. Enteritidis exhibited the most prompt inhibition, followed by *E. coli, L. monocytogenes* and *S. aureus*



Filled squares (■) correspond to counts of pathogens in kefir samples, unfilled squares *(□)* to AMC counts in kefir samples and filled triangles *(▲)* to samples of inoculated UHT milk.

CONCLUSION

All pathogenic strains were inhibited when experimentally inoculated in kefir, revealing the inhibitory activity of this dairy product, when prepared with a commercial starter cultures.
All strains exhibited a growth peak at 24h of fermentation, coinciding with the end of the recommended fermentation, in which the beverage is ready for consumption, thus presenting a potential hazard for the consumer in case of contamination.

The 1st International Electronic Conference on Antibiotics – The Equal Power of Antibiotics and Antimicrobial Resistance (ECA-2021), 08-17 May 2021 ONLINE