



# Production of antibacterial compounds from fermented dairy products using kefir grain microflora

**Agata Biadala<sup>1</sup>, Tomasz Szablewski<sup>1</sup>, Renata Cegielska-Radziejewska<sup>1</sup>, Małgorzata Lasik-Kurdyś<sup>2</sup>, Nornaizna M. Adzahan<sup>3</sup>**

<sup>1</sup>Department of Food Quality and Safety Management, Faculty of Food Science and Nutrition, Poznan University of Life Sciences; agata.biadala@up.poznan.pl

<sup>2</sup>Department of Food Technology of Plant Origin, Faculty of Food Science and Nutrition, Poznan University of Life Sciences

<sup>3</sup> Department of Food Technology, Faculty of Food Science and Technology, University Putra Malaysia

## The aim of study

The aim of the study was to evaluate antibacterial properties of active compounds released during the fermentation of goat milk and whey from goat milk by selected bacterial strains from kefir grain microflora:

- *Lactiplantibacillus plantarum*,
- *Limosilactobacillus fermentum*,
- *Lacticaseibacillus rhamnosus*,
- *Lactobacillus acidophilus*.

## Results

Assessment of inhibition of indicator microorganisms showed that fermented goat milk by *Limosilactobacillus fermentum* or *Lactobacillus acidophilus* is characterized by the most versatile antibacterial properties against the assessed *Proteus*, *Escherichia coli*, *Micrococcus* and *Salmonella*. The lowest antibacterial properties against indicator microorganisms were found for fermented whey by *Lactiplantibacillus plantarum* and *Limosilactobacillus fermentum*. The results were confirmed by optical density tests (Bioscreen C) and by plating on selective media. Whey has been found to be a less significant medium for the production of compounds with antibacterial properties than milk.



Measurements of the changes in electrical impedance in milk and whey were used to assess the metabolic activity of selected strains of kefir grain microflora. Comparing the detection time of impedance changes at 5% in whey and goat's milk, it was found that a significantly lower detection time occurred in whey from goat's milk. Based on these experiments, a significantly lower detection time of changes in whey was found in comparison with milk. The shortest detection time was found for *Limosilactobacillus fermentum* inoculated whey from goat's milk. The longest time was found for *Lactobacillus acidophilus* inoculated goat's milk. Performing experiments on goat's milk and whey from goat's milk allowed to assess whether the greatest number of substrates for the release of antimicrobial substances is in the whey or in the casein protein fraction

## Material and methods

Two milk sources were used *i.e.*, goat milk and whey from goat milk from the Organic Farm in Poland. Antibacterial activity was examined by the evaluation of the reduction of indicator microorganisms (*E. coli*, *Salmonella*, *Micrococcus luteus* and *Proteus mirabilis*) checking by:

- plating on the selective medium (VRBG medium, nutrient agar),
- impedance changes measured by BacTrac 4100 Automatic Microorganism Growth Analyzer,
- optical density changes analysed by Bioscreen C.

Goat's milk and whey from goat's milk were used in the experiments after the pasteurization process for 15 seconds at the temperature of 80°C.

Tab.1 The antimicrobial activity of whey and goat's milk fermented by single strains of kefir grain microflora against indicator microorganisms expressed as late growth

	Proteus	E. coli	Micrococcus luteus	Salmonella
<b>goat's milk fermented by</b>				
<i>Lactiplantibacillus plantarum</i>	II	I	0	I
<i>Limosilactobacillus fermentum</i>	I	I	0	0
<i>Lacticaseibacillus rhamnosus</i>	I	II	I	I
<i>Lactobacillus acidophilus</i>	0	I	0	I
<b>whey from goat's milk fermented by</b>				
<i>Lactiplantibacillus plantarum</i>	II	II	II	II
<i>Limosilactobacillus fermentum</i>	II	II	II	II
<i>Lacticaseibacillus rhamnosus</i>	0	II	I	II
<i>Lactobacillus acidophilus</i>	II	I	I	I

0 - No growth of the microorganisms  
 I - very slight microorganism growth  
 II - growth of the microorganism, smaller than the standard  
 III - growth of the microorganism as a standard

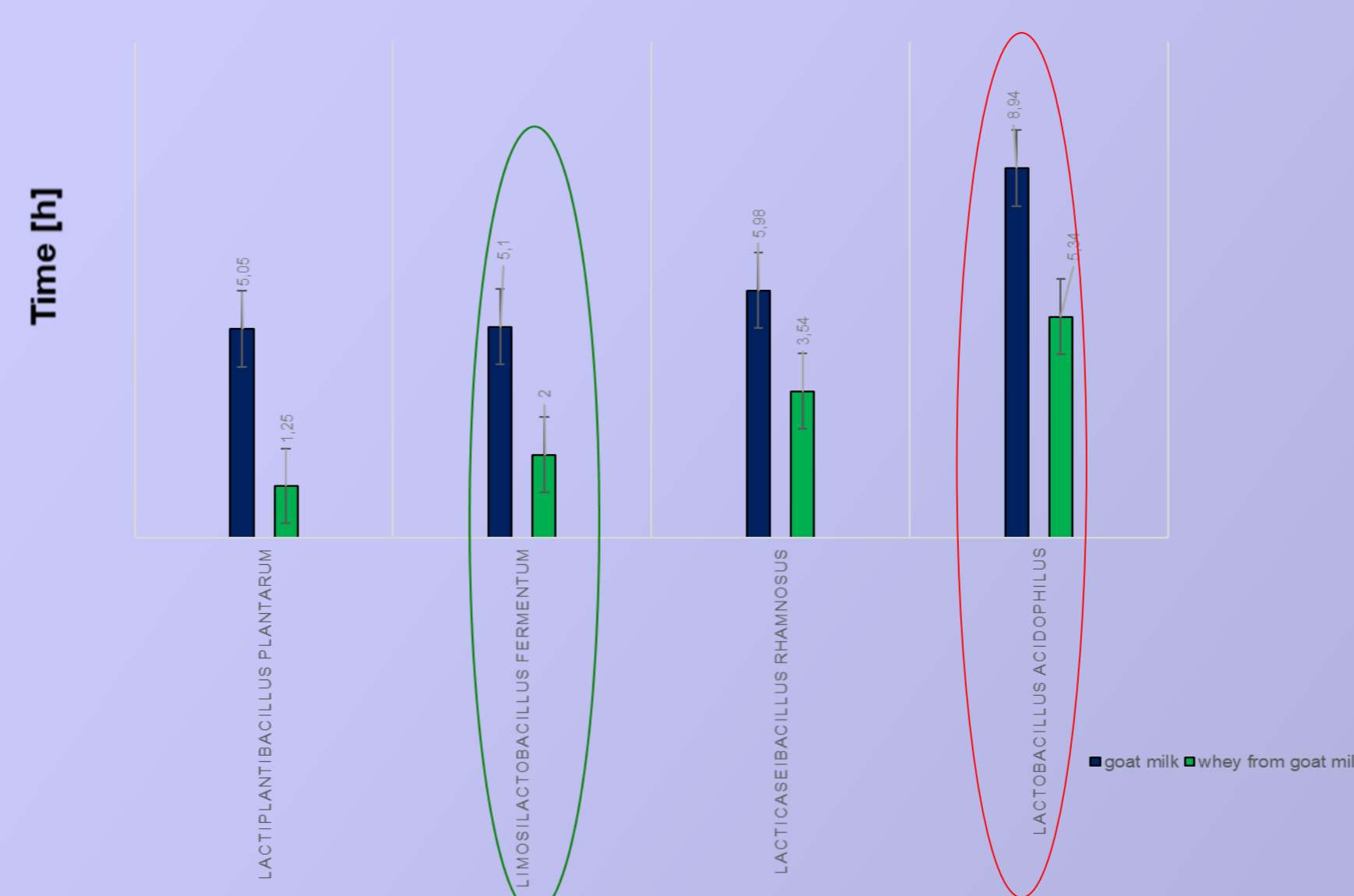


Fig. 1 The detection time of impedance changes at 5% in the medium

## Conclusion

These experiments show that during the fermentation of goat's milk and whey from goat's milk with individual microorganisms of kefir grains, bioactive substances are formed, which have antibacterial properties against the most deadly strains in the field of food hygiene. Accordingly, further studies are in progress to characterize in greater detail what kind of substances are responsible for this antimicrobial activity. Milk has also been found to be a more suitable medium for the release of bioactive ingredients than whey. The casein fraction is crucial for the production of the analyzed bioactive substances.

## References:

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