

UNIVERSITY OF SZEGED FACULTY OF AGRICULTURE

in cooperation with

UNIVERSITY OF LIFE SCIENCES "KING MIHAI I" FROM TIMISOARA

HUNGARIAN ACADEMY OF SCIENCES REGIONAL COMMITTEE IN SZEGED

**COMMITTEE ON AGRICULTURAL BIOTECHNOLOGY OF HUNGARIAN
ACADEMY OF SCIENCES**

**FOUNDATION FOR AGRICULTURAL MODERNIZATION AND RURAL
DEVELOPMENT**

and

**SCIENTIFIC COMMITTEE, AGRICULTURAL AND BIOSYSTEMS
ENGINEERING OF HUNGARIAN ACADEMY OF SCIENCES**



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SZTE SZEGEDI TUDOMÁNYEGYETEM
UNIVERSITY OF SZEGED



20th Wellmann International Scientific Conference Online Conference

PROGRAM

03th April 2023

Hódmezővásárhely

FOOD PROCESSING AND SAFETY, RURAL AND SUSTAINABLE DEVELOPMENT

COMPARATIVE ANALYSIS OF MEAT PRODUCTS MADE FROM DIFFERENT MEAT RAW MATERIALS

Tamás Kulcsár, Bálint Erdei, Eszter Szőke-Trenyik, József Mihalkó, Balázs P. Szabó

FERMENTATION OF EGG WHITE DRINK BY BIFIDOBACTERIUM WITH DIFFERENT CARBOHYDRATE SOURCES

Reem Mourad, Zsombor Tóth, Barbara Csehi, Erika Bujna

IDENTIFICATION OF BIOACTIVE COMPOUNDS USING RP-HPLC ANALYSIS OF SOME HAWTHORN SPECIES EXTRACTS (CRATAEGUS PINNATIFIDA BGE., C. MONOGYNA JACQ., C. CRUS-GALLI) AND ANTIOXIDANT ACTIVITY EVALUATION.

Areej Alsobh, Gyula Vatai, Szilvia Bánvölgyi

MONITORING THE SPOILAGE PROCESS OF DAIRY PRODUCTS BY DIELECTRIC MEASUREMENT

Réka Dobozi, Zoltán Jákói, Anita Vidács, József Csanádi, Sándor Beszédes

THE EFFECT OF ENZYMATIC PRETREATMENT OF CHICKPEA ON PROPERTIES OF PREPARED PROTEIN NANOPARTICLES

Milica Perović, Maja Milošević, Mirjana Antov

THE INFLUENCE OF CONTENT OF OREGANO ESSENTIAL OIL ON MICROSTRUCTURAL, ANTIOXIDANT, BARRIER AND ANTIMICROBIAL PROPERTIES OF CITRUS PECTIN-BASED EDIBLE FILMS

Marija Kostić, Branimir Bajac, Jelena Bajac, Ljiljana Janjušević, Mirjana Antov

XYLANASE AND CELLULASE ASSISTED ACID EXTRACTION OF PECTIC FIBER FROM BUTTERNUT SQUASH

Maja Milošević, Milica Perović, Mirjana Antov

COMBINED EFFECT OF NATURAL LEMON ESSENTIAL OIL AND LEMON JUICE PRESERVATIVES ON PEAR AND RASPBERRY MILKSHAKES

Waminee Niramit, Aruzhan Otegenova, Aulia Putri Srie Wardani, Balázs P. Szabó, Judit Krisch

PROBIOTIC FERMENTATION OF MIXED FRUIT AND VEGETABLE JUICES

Aruzhan Otegenova, Aulia Putri Srie Wardani, Waminee Niramit, Balázs P. Szabó, Judit Krisch

THE COMBINED EFFECT OF LEMON ESSENTIAL OIL AND LEMON JUICE AS NATURAL PRESERVATIVES IN APPLE AND GRAPE JUICES

Aulia Putri Srie Wardani, Aruzhan Otegenova, Waminee Niramit, Balázs P. Szabó, Judit Krisch



20th Wellmann International Scientific Conference



MONITORING THE SPOILAGE PROCESS OF DAIRY PRODUCTS BY DIELECTRIC MEASUREMENT



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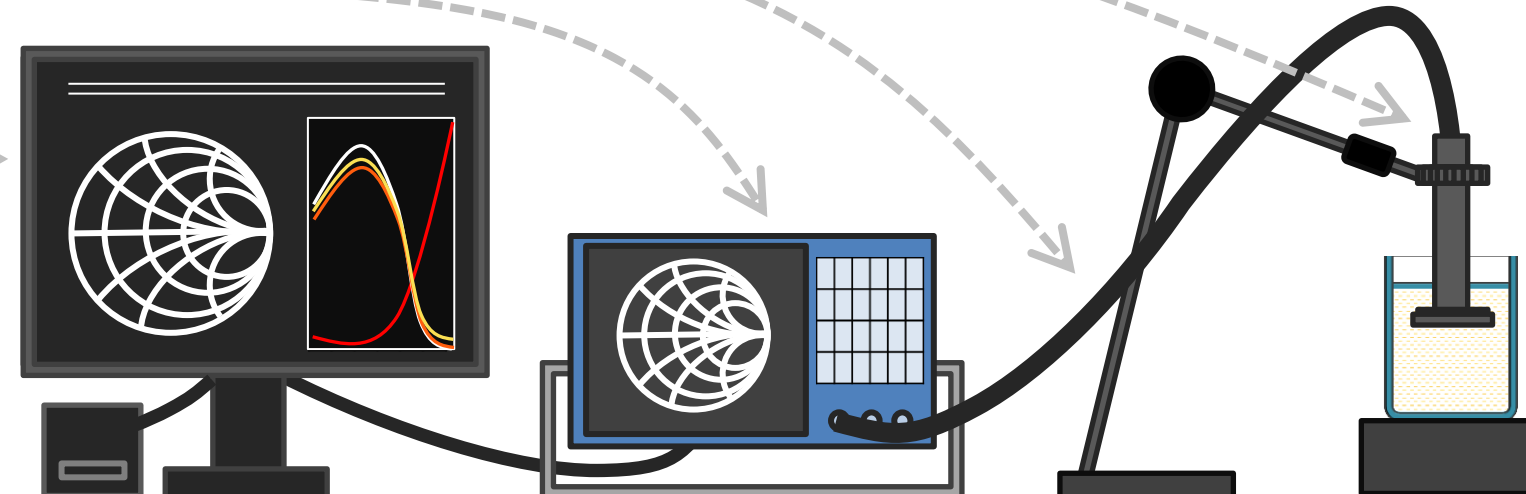
ABSTRACT

In our study, the changes of dielectric constant and dielectric loss factor were measured during the storage and spoilage process of fermented dairy products. The dielectric parameters were determined in the frequency range of 200-2400 MHz with an open-ended coaxial dielectric probe. During the deterioration, the number of viable lactic acid bacteria (*Lactobacillus spp.*) was also determined by using the standard plate count technique. Our aim was to determine whether the changes in dielectric parameters are correlated with the microbiological properties of yoghurts during storage at 20 °C.

MATERIALS AND METHODS

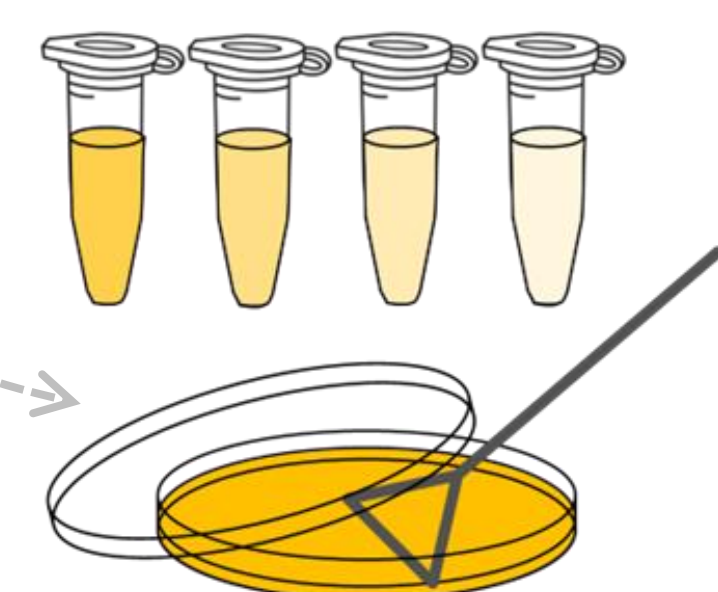
Measuring dielectric parameters:

- dielectric sensor (SPEAG DAK 3.5)
- open-ended 50Ω coaxial cable
- vector network analyzer (Rhode&Schwarz ZVL-3)
- DAK software



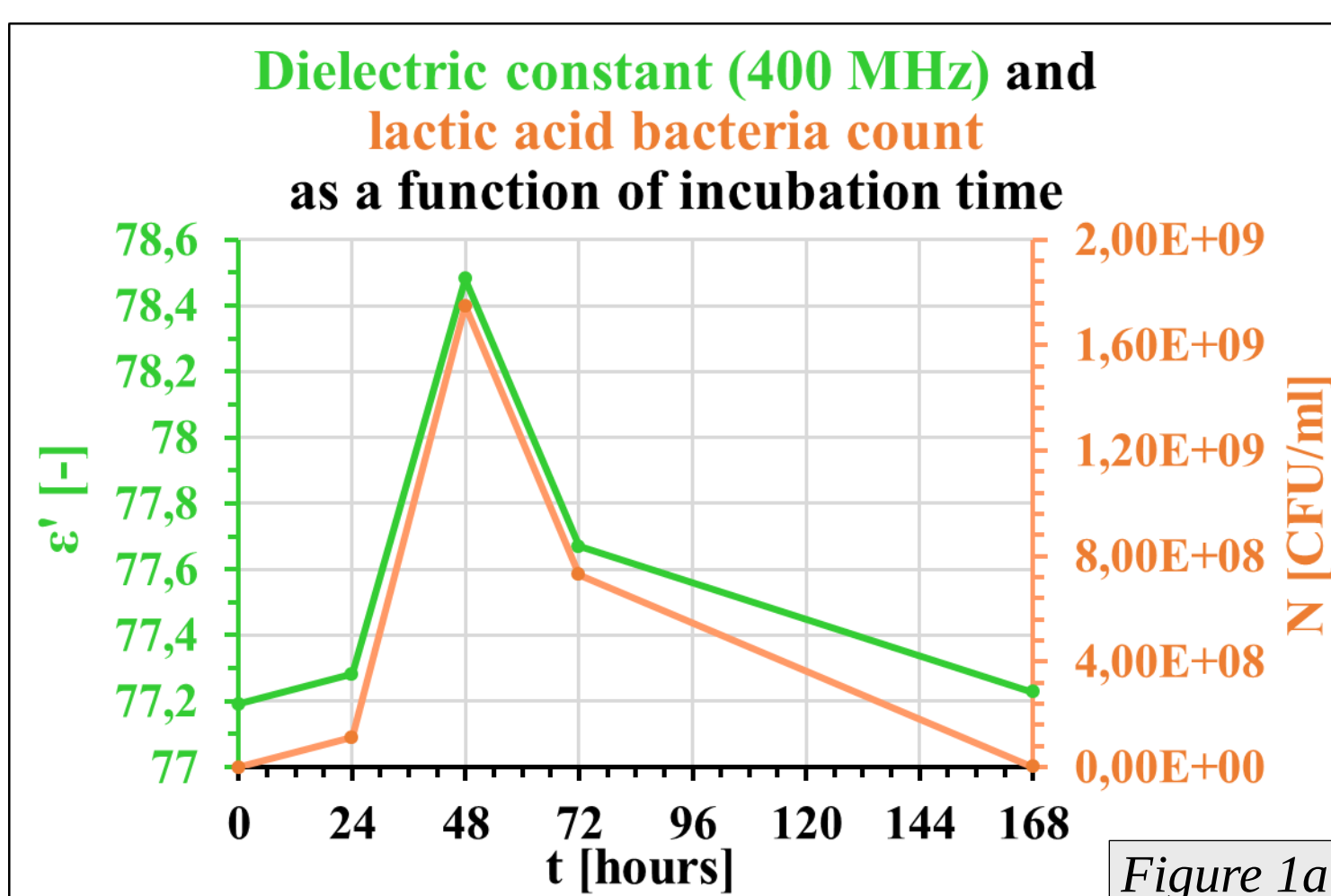
Measuring viable lactic acid bacteria

- Lactobacillus spp.*
- standard plate count technique
- MRS agar medium



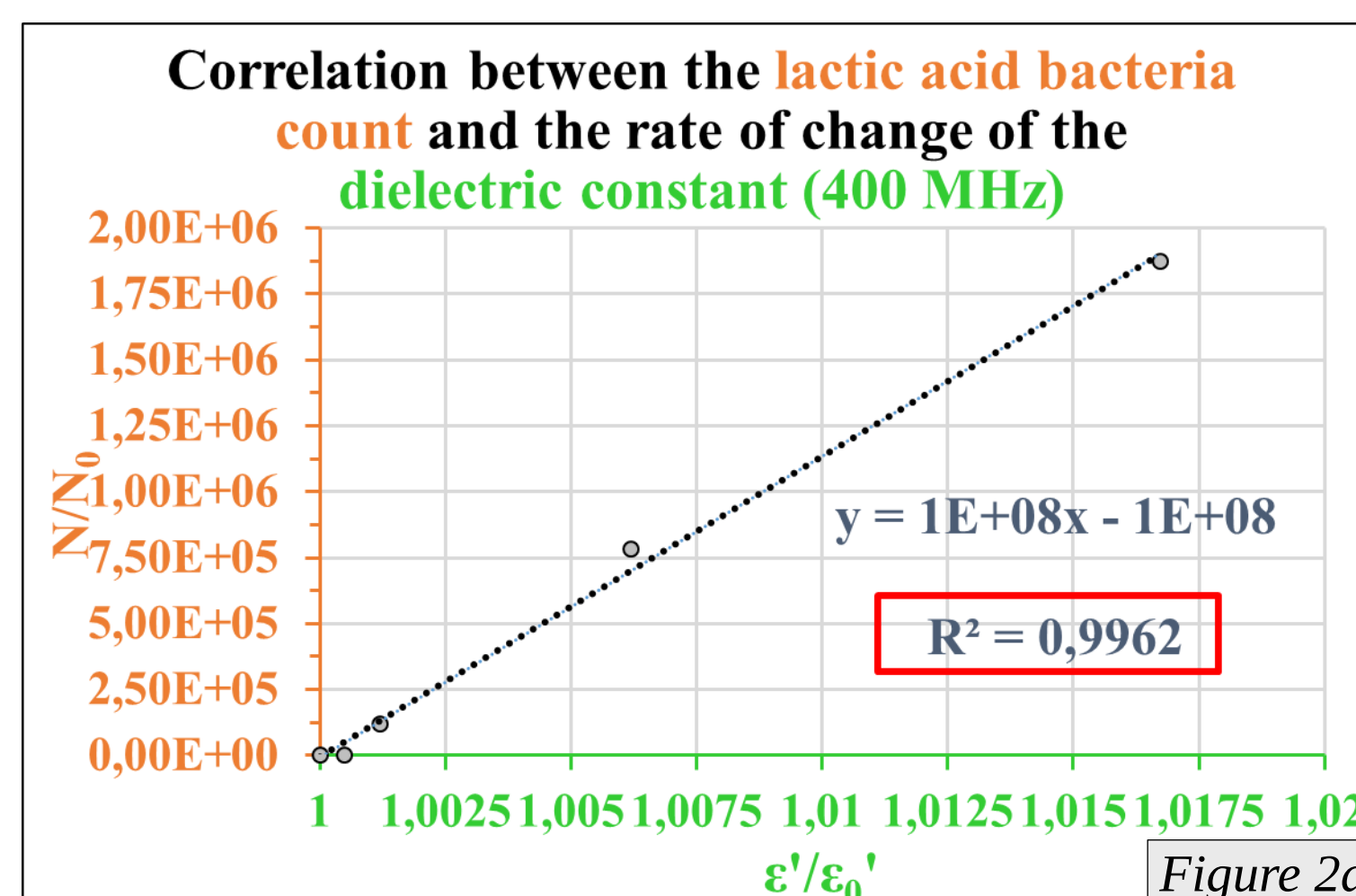
Natural yogurt sample
storage experiment (20 °C)

RESULTS AND DISCUSSION & CONCLUSION

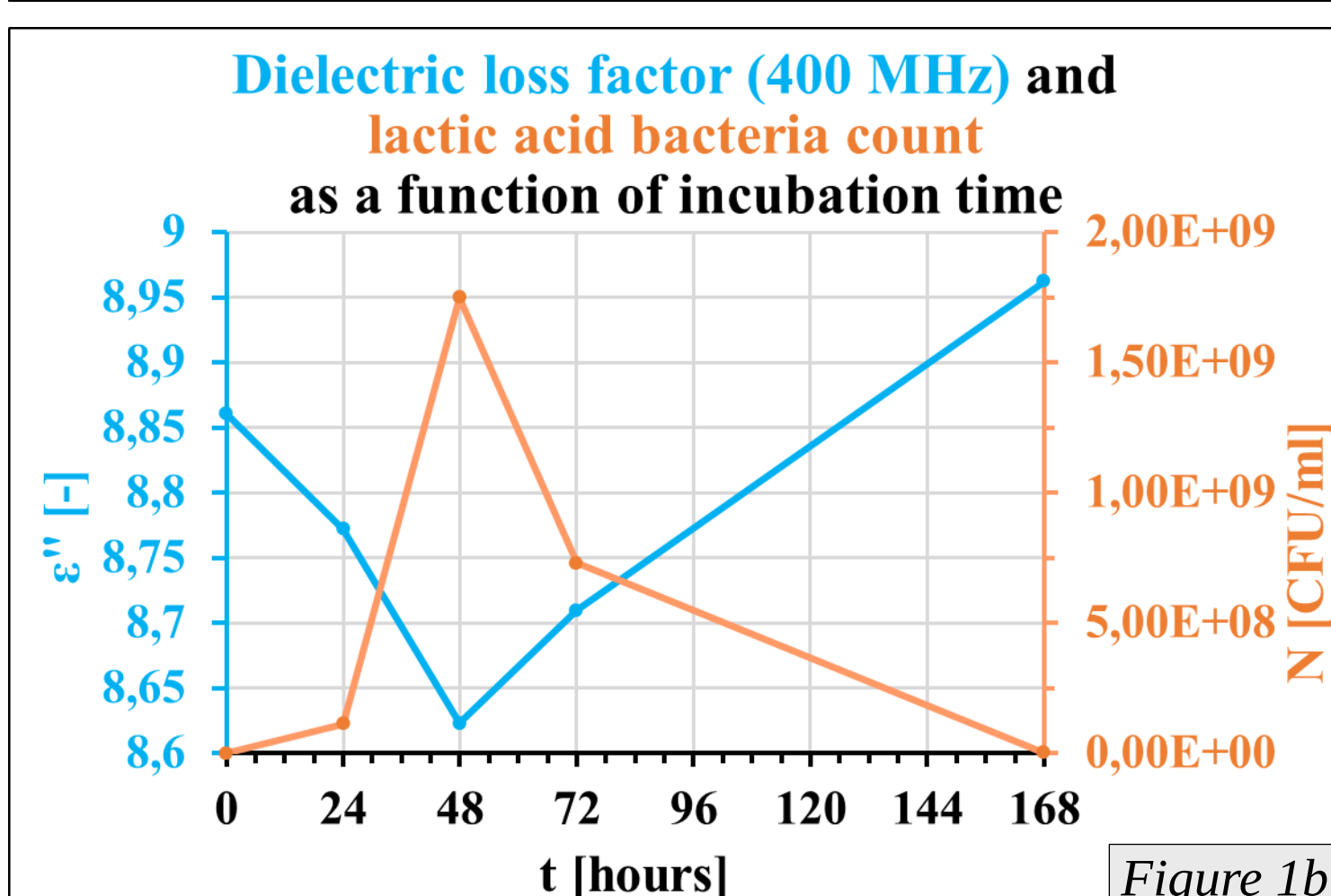


First-order
correlation

Standardization
to initial values

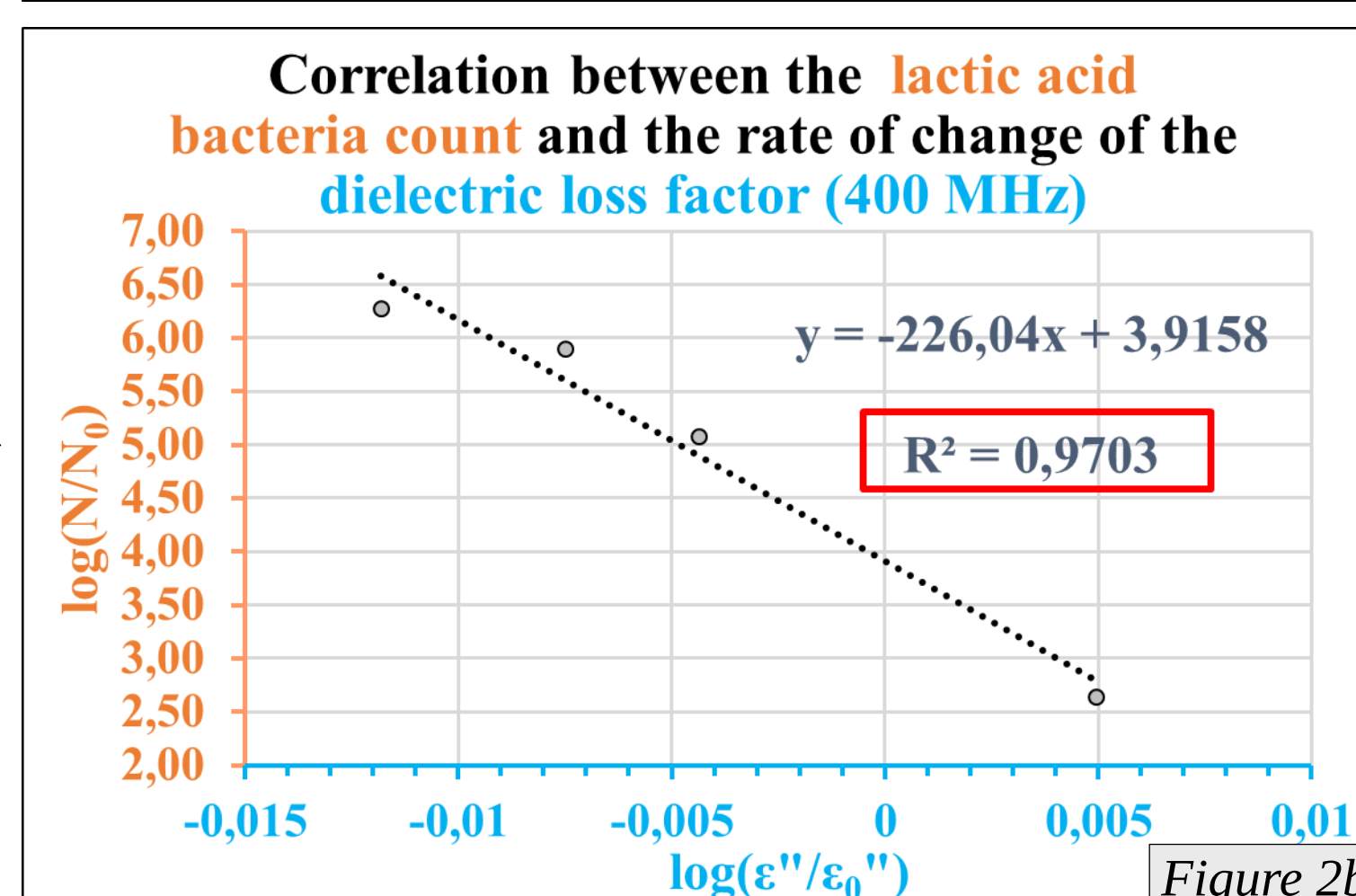


Time dependence of dielectric constant and lactic acid bacteria count (Fig. 1a) and the correlation analysis between trends of change (Fig. 2a)



Second-order
correlation

Logarithmic
transformation



Time dependence of dielectric loss factor and lactic acid bacteria count (Fig. 1b) and the correlation analysis between trends of change (Fig. 2b)

Our results show that physicochemical changes caused by the microbial metabolic activity are reflected in dielectric behaviour of the products. While the microbial growth is closely linearly related to the change in dielectric constant at 400 MHz frequency, second-order polynomial relationship was observed between the change of the dielectric loss factor and the number of viable cells. Our results verified, that the dielectric measurement method is suitable for monitoring the spoilage process and for determine the expressed deterioration rate of fermented dairy products.

ACKNOWLEDGEMENTS

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20th WELLMANN INTERNATIONAL SCIENTIFIC CONFERENCE

BOOK OF ABSTRACTS



3rd April 2023
Hódmezővásárhely

MONITORING THE SPOILAGE PROCESS OF DAIRY PRODUCTS BY DIELECTRIC MEASUREMENT

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The dielectric behaviour of biological materials has been studied for decades, as measurement methods based on dielectric properties offer promising new development opportunities in several fields of scientific research and industrial technologies due to its simple, quick and accurate useability. In our study, the changes of dielectric constant and dielectric loss factor were measured during the storage and spoilage process of fermented dairy products. The dielectric parameters were determined in the frequency range of 200-2400 MHz with an open-ended coaxial dielectric probe. During the deterioration, the number of viable lactic acid bacteria (*Lactobacillus* spp.) was also determined by using the standard plate count technique. Our aim was to determine whether the changes in dielectric parameters are correlated with the microbiological properties of yoghurts during storage at 20 °C. Our results show that physicochemical changes caused by the microbial metabolic activity are reflected in dielectric behaviour of the products. While the microbial growth is closely linearly related to the change in dielectric constant at 400 MHz frequency, second-order polynomial relationship was observed between the change of the dielectric loss factor and the number of viable cells. Our results verified, that the dielectric measurement method is suitable for monitoring the spoilage process and for determine the expressed deterioration rate of fermented dairy products.

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