



news digest #009

Microbiota of cheese and easy identification of bacteria, yeasts and molds with the MALDI Biotyper[®]

The great demand for cheese

Cheese has grown rapidly in popularity over the last 50 years, with consumption tripling in the USA since 1970.¹ Demand for different cheeses varies from country to country, ranging from high-fat varieties such as mascarpone, cheddar and parmesan, to low-fat cheese such as ricotta or cottage cheese. Across the globe, people are turning to cheese as part of a balanced diet for its beneficial nutrients, namely vitamin A, vitamin B12, zinc and calcium. This growth has given rise to new trends, including cheese made from the milk of 100 percent grass-fed animals and lower-fat alternatives.

Traditionally, cheese was made from raw milk (unpasteurized or non-thermized milk), often causing fever outbreaks due to the lack of regulations and storage in unclean and unsafe environments. That was until the process of pasteurization was invented, which kills off potentially harmful bacteria through heating. Nowadays, the dairy industry is well equipped to produce raw milk cheese in a safe way, with sophisticated laboratory testing employed to prevent pathogenic outbreaks, meaning all cheese can now be consumed safely.

The science behind the product

Cheese is one of the few foods that contains high numbers of living, metabolizing microbes.² These living organisms give cheese its variety and diversity, in terms of look, flavor and nutrient profile.

Starter cultures, often referred to as lactic acid bacteria, are central to the cheese manufacturing process. Lactic acid bacteria begin the process by degrading the lactose within the milk – critical in lowering the overall pH which makes the cheese more acidic, protecting it against other microbes. The proteases of the starter culture degrade milk proteins to produce free amino acids (FAA) and peptides. FAA are further converted by amino-acid-converting enzymes. Due to the metabolic diversity of different strains of lactic acid bacteria, their flavor forming qualities will also differ. Bacteria therefore play an important role in developing flavors and are highly relevant to the range of cheese products available.

Lactococcus lactis is a commonly used bacterium in cheese making, which includes the subspecies *lactis* and *cremoris*. *Lactococcus lactis* performs a bacte-

rial fermentation, producing lactic acid when breaking down lactose. Other lactic acid bacteria used in the dairy industry include *Lactobacillus*, *Streptococcus*, *Leuconostoc* and *Enterococcus*.

Some lactic acid bacteria also produce low levels of bacteriocins, which act as natural preservatives, preventing spoilage by other unwanted bacteria, yeasts and molds.

However, some bacteria can also be dangerous if consumed by humans, such as coliforms, *Listeria monocytogenes*, *Salmonella* and *E. coli*. Therefore, cheese made from raw milk must be tested for the presence of harmful bacteria, to allow for quality and hygiene to be assured. Bruker's MALDI Biotyper is used in dairy laboratories for quality control of starter cultures and identification of lactic acid bacteria and other strains. As the only ISO 16140-6 certified MALDI-TOF MS confirmation method on the market, the MALDI Biotyper allows rapid identification of yeasts and molds, plus confirmation of colonies of bacterial pathogens. Different types of microorganisms such as mold, *Salmonella* or *Listeria* can be measured in a single run on the MALDI Biotyper. The system also includes an easy-to-use, high-throughput workflow allowing for rapid microbiology testing across the dairy industry.

A quality control solution for the dairy industry

As demand for cheese continues to rise, with retail volumes of cheese up 13.5% compared to 2019 in the UK³, quality and safety must not be compromised. The MALDI Biotyper can be used across dairy laboratories to enable quality control and hygiene monitoring, which is evidently important in cheese production. The easy and fast workflow of the MALDI Biotyper allows rapid testing for microorganism identification, which is key for cheese manufacturers who want to retain their products' beneficial compounds.

For more information, visit

<https://www.bruker.com/en/applications/microbiology-and-diagnostics/food-beverage-microbiology/maldi-biotyper-for-food-microbiology.html>

References

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2. FAQ: Microbes Make the Cheese: Report on an American Academy of Microbiology Colloquium held in Washington, DC, in June 2014. Washington (DC): American Society for Microbiology; 2015. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK562892/> doi:10.1128/AAMCol. June 2014
3. Jack K., AHDB dairy market outlook report trends 2022 <https://ahdb.org.uk/dairy-market-outlook>



MALDI Biotyper® sirius

Not for use in clinical diagnostic procedures.
Please contact your local representative for availability in your country.

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