

DESCRIPTION FOR THE GENERAL PUBLIC

Do you know what is the link between the emmentaler, sweat and a cake? It sounds a little unpleasant, but for the smell of two first ones and durability of the latter, the same chemical is responsible. Its name is propionic acid. The smell is a complex matter and there are other substances involved, however, this acid takes an important role. It is used not only to defend cakes against fungi, but also as a preservative for both animal and human food. More than half of the propionic acid production is used to preserve animal forage!

Nowadays, the vast majority of propionic acid is produced by chemical methods. It is neither healthy nor safe for the environment. Unfortunately, attempts to apply natural methods to obtain this acid are not fully successful. *Propionibacteriaceae* are the main known producers of the propionic acid. Although they are able to efficiently produce it, however, these are poor biomanufacturers on a big scale. *Propionibacteriaceae* grow very slowly and slowly reproduce, are sensitive to acidification, demand rich and expensive media to grow and are quite resistant to genetic manipulations.

That is why we thought we may try to use more friendly bacteria to mass produce the propionic acid. They grow fast, need a modest medium to grow and we know well how to work with them in the lab. We present lactic acid bacteria (LAB), known from dairy products, e.g. *Lactobacillus* or *Lactococcus*. We discovered that there is not much to be done to turn them into efficient propionic acid production factories. What is worth stressing in here, from scarce scientific literature as well as our initial research we expect that these bacteria have almost all enzymes or even the full genetic and metabolic potential needed to produce this acid. Unfortunately, the genes and regulatory mechanisms involved in the production of propionic acid in lactic acid bacteria are poorly understood. Within this project, we will be working to understand the details of this phenomenon in lactic bacteria, namely the identification and characterization of specific genes and metabolic pathways involved in the transformation from the carbon source to propionic acid.