

NIZO FOOD RESEARCH

BY ASTRID VAN DE GRAAF



# Innovation starts with bioinformatics

**T**he era of endless trial and error in fermentation is about to become history. With bioinformatics it is possible to do faster and more efficient purposive research. NIZO food research operates at the forefront of this exciting new field and assists its clients in profiting from this development.

“The client is always our starting point for research,” says Koos Oosterhaven, Business Manager at NIZO food research in Ede. Since the management buyout in 2009, he has been one of the inspiring owners of the private contract research company. “Our task is to translate the possibilities of science and bioinformatics into practical solutions that help our customer improve their product or fermentation processes.” Among their regular customers are large multinationals in food and food ingredients. “They all have their own R&D, but when it comes to complex issues such as bioinformatics they tend to outsource the research,” Oosterhaven explains. “And you need a whole team of bioinformaticians to tackle every aspect of data analysis and data integration, otherwise you end up with a partial solution,” adds his colleague Sacha van Hijum, who leads a team of nine bioinformaticians at NIZO and heads the Bacterial Genomics group in Nijmegen.

**FRAGMENTS UNITED** Knowledge of the production strain and fermentation process is often fragmented among several experts in a company. “They all know a piece

of the puzzle. With bioinformatics we can organise and integrate all available data and knowledge into a structured map,” explains Van Hijum. “The next step is to interpret and analyse the data.” NIZO offers bioinformatics workshops for this whole process, in which a company works along with NIZO experts to structure and explore their data. The assistance can range from data processing and management, constructing metabolic maps to visualisation of data. “We help them use bioinformatics tools and speed up their R&D efforts. Our experts always work closely with clients in joint teams because together we gain new insight more quickly and more focused on their needs,” Oosterhaven explains. “With bioinformatics we can solve issues which were unsolvable before. For instance, a client had a mysterious growth delay in his fermentation process that took ten percent of the production time. With trial-and-error parameters, like vitamins or nitrogen sources, that might limit microbial growth would be changed one by one. Now we are able to do a comparative analysis of the gene activity on samples taken

before, during and after the growth delay period. Combined with knowledge of the metabolic pathways of that microorganism and bioinformatics tools, we discovered that carbon dioxide availability was the bottleneck. That is a rather unusual factor, which would not have been found without bioinformatics technology.”

**GENERAL TOOLS** Most companies involved in fermentation processes have sequenced their production strain. They end up with a hard disk full of data. “It is often at that moment that they wake up to the question: how do we get valuable information out of this?” Similar questions reach Van Hijum via Top Institute of Food and Nutrition (TIFN) or the Kluiver Centre, the public private partnerships in which NIZO participates. “Development of generic tools that can handle e.g. next-generation sequencing data is a joint effort of the teams at NIZO, Nijmegen, and the NBIC,” Van Hijum says. “For that matter, I think the result of any bioinformatics effort should be a generic tool that can be used for every microorganism. It does not matter who poses the question: industry, academia or consortia.”

NIZO food research BV, an independent contract research company, assists the international dairy, food & beverage, ingredients and biotech industries to make better foods and become more profitable by developing and applying competitive technologies. This can range from innovation in flavour, texture and health benefits to process efficiency, ingredient optimisation and food safety.

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