



02.09.2020

PRESSEMITTEILUNG

Showcase Bioeconomy: Improving the ecological footprint of bakeries

New EIT Food project aims to use computer models to optimize bakery processes in order to minimize food waste, energy consumption, and CO2 emissions.

PRESSEFOTOS unter www.uni-hohenheim.de

Starting with the various types of bread to rolls, pretzels, croissants, and pastries - our bakeries offer an almost unmanageable variety of baked goods. However, this variety is often very costly: What has not been sold in the evening ends up in the garbage. This is not only a huge waste of food, but also consumes unnecessary energy. The EIT food project "PrO4Bake" aims to remedy this problem. Under the leadership of the Research Center for Bioeconomy at the University of Hohenheim in Stuttgart, an international consortium of industry and science has come together. Prof. Dr. Bernd Hitzmann from the Department of Process Analytics and Cereal Science is, among other things, responsible for the computer model: "With the help of simulations, we want to optimize the processes in bakeries, which leads to higher economic and ecological efficiency. This not only reduces production costs for bakeries, but also helps to slow the progress of climate change," he explained. Bakeries that are interested in cooperating in the project can contact him. Recently, PrO4Bake was nominated for the EIT Innovators Award 2020, which will be presented in December this year.

"In a bakery, there is a fixed workflow for each product: One step must follow the other, starting with weighing the ingredients, kneading the dough, the necessary dough rest, dividing and forming, as well as letting each piece rise and then baking," described Prof. Dr. Hitzmann. "With the large number of products in most bakeries, these work processes have to interlock, and the capacities of people and machines have to be well planned."

This is where the EIT food project PrO4Bake comes in: Computer models and artificial intelligence will be used to optimize the daily processes in small and medium-sized bakeries. This applies both to the quantity of raw materials used and to the more efficient use of existing machinery and the baking process. "Bakeries that are interested in participating in the project as practice partners are welcome to contact us."

Consumer preferences should also be taken into account. For example, a consumer survey is part of the project, developed by social scientists at the University of Aarhus, in which the customers are asked, for example, whether they would accept it if the range of products on offer

was no longer as varied in the evening, or whether they would then change bakers.

Forecasting tool to improve production planning

At the same time, a forecasting tool is to be developed to help bakers better estimate the quantities required. "Many factors play a role in the sale of individual products," stated Prof. Dr. Hitzmann. "On weekends and single-day holidays people usually buy more and different products than on weekdays. During the longer summer break, on the other hand, many people are on vacation and often not so much is sold. The weather can also play a role, as can the district in which the branch is located."

All these factors are to be recorded and analyzed and then incorporated into the development of the forecasting tool. The aim is to adapt the product range to the expected demand and to produce only as much in the bakery as is subsequently sold - and thus to keep both the amount of waste and energy consumption as low as possible.

Optimization with algorithms inspired by nature

The core of PrO4Bake is a computer simulation, which is intended to ensure a better, more efficient utilization of the machines. "Most of the time, there is a bottleneck somewhere, i.e. a machine that is constantly working to capacity and thus hinders further work," said Prof. Dr. Hitzmann. "If you know about these bottlenecks, you can do something about them. It may help if the baker invests in a better kneader or a new oven."

The team around Prof. Dr. Hitzmann uses optimization algorithms for the computer model that have previously been used in other application areas: "These optimization strategies are copied from nature, such as the particle swarm algorithm. It describes the behavior of flocks of birds, for example, when searching for food sources. Where one pigeon eats, soon there will be many."

This approach also allows external influences on the production process to be taken into account. Flour is a natural product that can vary from batch to batch and has different processing and baking properties. The yeast used is also a living product which can behave differently depending on many factors.

Objective: Optimize production processes in small and medium-sized bakeries

"Unlike in large-scale industrial production, artisan bakeries can respond to this individually, and this is exactly what we want to support. The aim should be to find the shortest production time under the given conditions, making optimum use of the machines, and to find the most energy-efficient version, i.e. to minimize energy consumption and CO2 emissions."

In the end, a computer application will help small and medium-sized bakeries to adapt to the quantity and product range they actually need with optimized baking schedules in order to reduce energy consumption and food waste. The final implementation into a usable prototype will be carried out by Siemens. The subsequent commercialization will take place in the form of training courses for bakeries based on the software solution developed by Campden BRI Hungary in cooperation with the consortium in order to increase the reach - at first in Europe.

BACKGROUND: PrO4Bake (Optimization of bakery processes by a computational tool together with consumer feedback to minimize ecological footprint and food waste)

The aim of PrO4Bake is to use computer models to optimize the daily processes in bakeries. This optimization refers to the amount of raw materials used, to a more efficient use of the existing machines, and to the baking process. By adjusting these factors, the ecological footprint and amount of food waste can be minimized.

The EIT Food project brings together a consortium of industry and science under the leadership of the University of Hohenheim. The project is coordinated by Dr. Nadja Reinhardt from the Research Center for Bioeconomy at the University of Hohenheim. Other members are the Universities of Aarhus, Lund, and Turin, the Institute of Animal Reproduction and Food Research of the Polish Academy of Sciences, the Spanish National Research Council CSIC, and the companies Siemens and Campden BRI Hungary.

The project started at the beginning of 2020 and will run for two years.

More information

PrO4Bake on EIT Food

BACKGROUND: EIT Food

EIT Food (<https://www.eitfood.eu>) is a pan-European initiative of the European Institute of Innovation and Technology (EIT, an institution of the European Union) to promote entrepreneurship and innovation in the food sector.

It is committed to making the food system more sustainable, healthier, and more trustworthy. Consumers and the support and transfer of knowledge to small and medium-sized enterprises in Europe play a central role in this.

Members of EIT Food are important players in the international food sector: almost 100 partners from leading companies, research institutions, small and medium-sized enterprises, and universities from 13 countries.

BACKGROUND: Science Year 2020/21 – Bioeconomy

In 2020 and 2021, the Science Year will be dominated by the bioeconomy - and thus by a sustainable, biobased economy. The aim is to produce and use natural materials and resources in a sustainable and innovative way, replacing fossil and mineral raw materials, manufacturing products in a more environmentally friendly way, and conserving biological resources. This is more necessary than ever in times of climate change, a growing world population, and a drastic decline in species. The Bioeconomy Science Year, organized by the Federal Ministry of Education and Research (BMBF), shines a spotlight on the topic.

Bioeconomy is the leading topic at the University of Hohenheim in research and teaching. It links the Faculty of Agricultural Sciences, the Faculty of Natural Sciences, and the Faculty of Business, Economics and Social Sciences. During the Science Year on Bioeconomy, the University of Hohenheim is hosting many events to inform the public and experts on the topic.

BACKGROUND: Research Center Bioeconomy at the University of Hohenheim

The challenges for Bioeconomy are complex and heavily dependent on research efforts. Answers can only be found if researchers work in interdisciplinary projects with other subject areas.

The task of the Research Center for Bioeconomy is to establish this interdisciplinary topic at the university in a targeted and sustainable manner and to implement it by successfully obtaining funding. To this end, it supports researchers across faculties in the application process and/or management of national and international collaborative projects, coordinates international network projects and platforms and plays a major role in the search for possible project partners, the composition of the consortium, and in the development of the project idea, the application letter, communication, and coordination with the funding organization.

Text: Stuhlemmer / Elsner

Media Contact:

Prof. Dr. Bernd Hitzmann University of Hohenheim, Department of Process Analytics and Cereal Science
T +49 711 459 23286, E Bernd.Hitzmann@uni-hohenheim.de

Dr. Nadja Reinhardt, University of Hohenheim, Research Center for Bioeconomy
T +49 711 459 24331, E nadja.reinhardt@uni-hohenheim.de