

# New environmentally friendly meat analog healthier, offers more flavors

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A team of researchers from Kaunas University of Technology (KTU), Lithuania and the University of Helsinki have proposed an extremely nutritious meat analog using fermented okara (soy press cake). The

innovation developed by the Lithuanian scientists can change the meat analog industry offering a product that has less salt and saturated fats and more flavor than real meat.

Millions of people worldwide suffer from digestive disorders. In the US alone, digestive diseases affect over 60 million people yearly according to NIDDK. Experts say that the probiotics produced during fermentation can help restore the balance of friendly bacteria and, by enhancing the number of free amino acids as well as minimizing the effect of anti-mitogenic substances, may alleviate some digestive problems.

Although fermented foods are rich in nutrients and fermentation can produce ingredients that improve smell and taste, the researchers from KTU Food Institute were among the few who relied on this process in meat analog production.

"Meat analogs are the future food. Both business and science will have to reconsider the effect of using secondary raw materials, and it will benefit all the parties by reducing costs and saving resources. We believe that science is the key to an efficient shift," says one of the authors of the study, Dr. Alviša Šalaševičienė, the Director of KTU Food Institute.

## **New component for the meat analog industry**

The group of researchers from KTU and the University of Helsinki produced meat analogs by adding fermented okara, the by-product of soy milk production, to the plant-based matrices. Okara samples were fermented by applying probiotics *L. plantarum* P1 and *L. acidophilus* 308 strains. The products containing different amounts of fermented okara modeled under different conditions were then evaluated.

The study concluded that the use of fermentation makes okara a suitable component for meat analogs. According to the sensory and nutritional

analysis, the optimum condition for producing meat analogs was the application of 6% okara in the matrices fermented by *L. plantarum* P1, when the matrices and okara are matured at 4 degrees Celsius for two hours.

"Meat industry has deep-rooted traditions and people possess a clear expectation how a pork or beef burger, chicken sausage or other meat product should look, smell, taste and feel like. That's why when modeling a meat analog, we need to clearly identify what we are developing and what qualities it should have," explains Dr. Šalaševičienė.

For example, during the project EIT FOOD RIS CEL 2021 (KAVA (no 19153-21060.)) it was determined that although Lithuanian senior consumers are willing to use such meat analogs produced from plant origin material, however the sensory properties of the products that are currently available in the market are less appealing in comparison with meat.

## **Fermented okara-based meat analog is healthier**

According to researchers, there are many health-induced reasons for reducing meat consumption: it is hard to digest, the amounts of saturated fat raises "bad" cholesterol, also meat foods are usually over salted as fat reduces the flavor.

Meat analogs with fermented okara have more free amino acids, which diminish the antinutritional factors, therefore are more easily digested than meat. Besides, the meat analogs modeled at KTU laboratories contain less fat and saturated fat but the same amount of protein—about 14–18% depending on different recipe variations.

"Non-hydrogenated oils containing only small amounts of saturated fat were used while developing our products. Thanks to the small amount of

fat we were able to create characteristic flavors by using only 1% of salt. Among the eleven ingredients used in our product are only natural spices, pigments and aromatic compounds, and no preservatives," says Dr. Gitana Alenčikienė, senior researcher at KTU Food Institute, a co-author of the study.

Currently, there are no commercialized meat analog products with okara. However, the researchers are convinced that, as organic waste recycling is becoming more and more relevant in today's world, their modeled meat analog will find its way to the market.

## **Future challenge: food from waste**

Meat analog with fermented okara is one of many products created by the researchers of KTU Food Institute. Recently, their pea-based meat analog won the local innovation fair.

"Both meat analogs are nutritionally valuable: our product with fermented okara is more easily digested and the pea-based meat analog is enriched with iron, which is very important for the normal functioning of the human organism. While creating our products we aim to solve at least one nutritional problem—be it calorie control, lack of fiber or iron, or sluggish digestion process," explains Aelita Zabulionė, a researcher at the KTU Food Institute.

The researchers emphasize—every new plant-based product widens the choice for consumers and can reduce the usage of processed [meat](#) products. Meat analogs enriched with fiber, microelements, vitamins, amino acids, processed to remove antinutrients from raw materials are, according to them, the future food. Reusing different organic waste such as okara for [food](#) production could be one of the most important challenges to solve.

**More information:** Seyedmahmood Razavizadeh et al, Impact of fermentation of okara on physicochemical, techno-functional, and sensory properties of meat analogues, *European Food Research and Technology* (2021). [DOI: 10.1007/s00217-021-03798-8](https://doi.org/10.1007/s00217-021-03798-8)

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