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Press release

Leibniz-Institut für Lebensmittel-Systembiologie
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Research results, Scientific Publications
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Combating malnutrition–Egg powder suitable as a food supplement?

Malnutrition is a key challenge not only in African countries. As an international study led by Veronika Somoza now shows, egg powder is a food with great potential to improve the nutritional situation of children in deprived areas. Compared to pasteurized whole egg, the powder contains lower amounts of essential fatty acids, but still provides many vitamins, indispensable amino acids and important trace elements. In addition, it has a long shelf life without additional preservatives, is easy to transport over long distances and is simple to prepare.

According to the German Federal Ministry of Food and Agriculture, more than 250 million people in Africa alone are undernourished. Infants and children are particularly hard hit. "Studies show that adding one egg a day to complementary food can help reduce the incidence of underweight in older infants by 74 percent, as well as counteract the so-called 'stunting' effect," says Veronika Somoza, director of the Leibniz Institute for Food Systems Biology at the Technical University of Munich (LSB).

Egg powder a low-cost alternative?

In areas where malnutrition is part of everyday life, however, eggs are hardly available. Inexpensive egg powder could therefore be an alternative. Due to its minimal water content, it has a significantly longer shelf life as well as a relatively high nutrient density. In addition, it is easier to store and transport than eggs, and it can be easily added to food. This makes it interesting as a potential dietary supplement.

However, despite its widespread industrial use, little has been known about its nutritional quality. To fill this knowledge gap, the team led by Veronika Somoza conducted an extensive comparative study. Using state-of-the-art food chemistry analysis methods, the scientists determined the nutrient profiles of three batches each of industrially produced, pasteurized whole egg and egg powder processed from it and compared them on a dry matter basis.

Egg powder not contaminated by heavy metals

"As our analyses showed, the drying process did not lead to an accumulation of the heavy metals cadmium, lead, arsenic and mercury," reports Philip Pirkwieser, PhD chemist at LSB and lead author of the study. In addition, the research team observed little or no loss in total fat content, essential amino acid content, important trace elements or carotenoids. Likewise, vitamin E (alpha- and gamma-tocopherol) and vitamin B12 concentrations remained nearly constant. However, vitamin A (retinol) levels decreased by 14 percent. The amount of vital omega-6 and omega-3 fatty acids even decreased significantly by an average of 39 and 61 percent, respectively.

"Despite the small loss of retinol, egg powder is a valuable source of vitamin A. Sub-Saharan African regions in particular could benefit from this. This is because vitamin A deficiency is widespread there and leads to a high prevalence of vision problems," explains Veronika Somoza. A daily intake of egg powder equivalent to one

medium-sized egg is sufficient to cover 24 percent of a child's daily requirement for vitamin A, 100 percent for vitamin E, 61 percent for selenium and 22 percent for zinc, depending on age. This is very positive. If it were possible to increase the content of essential fatty acids and vitamin A, the great potential of egg powder as a food supplement could be fully exploited, the LSB director continues. One way to achieve this could be through chicken feed enriched with these fatty acids and vitamins.

Publication:

Pirkwieser, P., Grosshagauer, S., Dunkel, A., Pignitter, M., Schneppe, B., Kraemer, K., and Somoza, V. (2022). Evaluation of spray-dried eggs as a micronutrient-rich nutritional supplement. Frontiers in Nutrition 9. 10.3389/fnut.2022.984715. https://www.frontiersin.org/articles/10.3389/fnut.2022.984715/full

Background information:

On the nutritional value of fresh chicken eggs:

Chicken eggs are a valuable source of protein with a biological value of 100 percent. They contain all vitamins except vitamin C and are an important source of nutrients. All fat-soluble vitamins A, D, E and K are contained in egg yolks. In 100 g of whole egg, an average of 276 µg vitamin A (retinol), 2.3 mg vitamin E (total tocopherols), 2.9 µg vitamin D and 8.9 µg vitamin K can be detected. With these contents, eggs can make an important contribution to meeting daily vitamin requirements. For more information on nutritional information and recommended intakes, visit https://info.sfk.online/ and the D-A-CH reference values for nutrient intakes for adolescents and adults https://www.dge.de/wissenschaft/referenzwerte/?L

Brochure:

Ernährung sichern – Wachstum fördern 2020; Publisher: German Federal Ministry of Food and Agriculture (BMEL); Status: Nov. 2020
https://www.bmel.de/SharedDocs/Downloads/DE/Broschueren/afrika-konzept.pdf?__blob=publicationFile&v;=5

Spray drying process to produce the egg powder:

While the commercially available spray drying process with an inlet temperature of 160 °C and an outlet between 80-90 °C proves to be suitable for most nutrients such as vitamin E and vitamins of the B group or the essential amino acids, the significant decrease in concentration of unsaturated fatty acids shows that the process should be optimized in this respect.

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Information about the Institute:

The Leibniz Institute for Food Systems Biology at the Technical University of Munich (LSB) comprises a new, unique research profile at the interface of Food Chemistry & Biology, Chemosensors & Technology, and Bioinformatics & Machine Learning. As this profile has grown far beyond the previous core discipline of classical food chemistry, the institute spearheads the development of a food systems biology. Its aim is to develop new approaches for the sustainable production of sufficient quantities of food whose biologically active effector molecule profiles are geared to health and nutritional needs, but also to the sensory preferences of consumers. To do so, the institute explores the complex networks of sensorically relevant effector molecules along the entire food production chain with a focus on making their effects systemically understandable and predictable in the long term.

The LSB is a member of the Leibniz Association, which connects 97 independent research institutions. Their orientation ranges from the natural sciences, engineering and environmental sciences through economics, spatial and social sciences to the humanities. Leibniz Institutes devote themselves to social, economic and ecological issues. They conduct knowledge-oriented and application-oriented research, also in the overlapping Leibniz research networks, are or maintain scientific infrastructures and offer research-based services. The Leibniz Association focuses on knowledge transfer, especially with the Leibniz Research Museums. It advises and informs politics, science, business and the public. Leibniz institutions maintain close cooperation with universities - among others, in the form of the Leibniz Science Campuses, industry and other partners in Germany and abroad. They are subject to a transparent and independent review process. Due to their national significance, the federal government and the federal states jointly fund the institutes of the Leibniz Association. The Leibniz Institutes employ around 21,000 people, including almost 12,000 scientists. The entire budget of all the institutes is more than two billion euros.

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https://www.bmel.de/SharedDocs/Downloads/DE/Broschueren/afrika-konzept.pdf?__blob=publicationFile&v;=5
Brochure: Ernährung sichern – Wachstum fördern 2020

URL for press release: < https://info.sfk.online/> Food composition and nutrition table

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