

# What if you could actually **PRINT** your food?



*If anyone could just print food, no one would ever go hungry, right? It's not that simple. But certain foods can nevertheless be 3D printed, if a number of conditions are met, and it opens a host of future possibilities that are being investigated at the University of Johannesburg.*

One of the very first questions I get asked once students and interested members of the public have had a look around our 3D food printing laboratory is, "Are 3D printed foods safe for consumption?", followed by, "Does a 3D food printer work like a conventional printer?"

The answer to the first question is, yes, it is completely safe to eat 3D printed food, provided it was prepared in an appropriate machine and in a clean environment that meets the required food safety standards, as you would expect for any other food preparation. As for the second question, the kind of printer that prints food is a specialised piece of equipment and must be able to process viscous materials. So it is not quite like your desktop printer at home.

These are of course not the only questions about 3D printed foods. From the initial questions on food safety, questions eventually migrate to the philosophical and ethical ones like, "Do we really need printed food?" and "Is it ethical to prepare 3D printed food in the first place?"

Considering the need to cater for an ever-growing global population, the challenges of processing food waste,

the need to meet the dynamic demands of teeming consumers, 3D food printing is one unique technology that can provide responses to all of these growing demands.



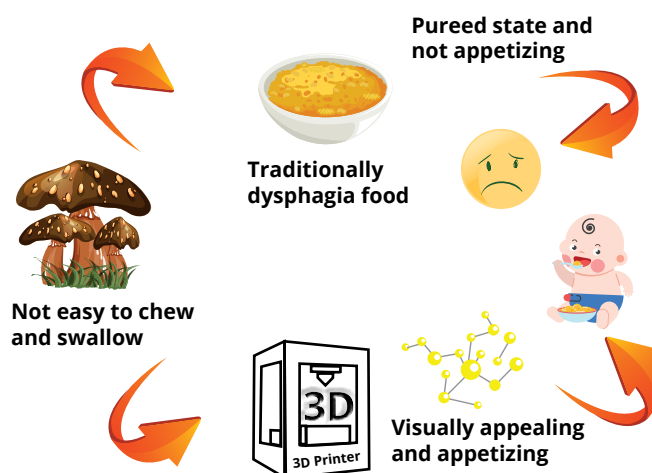
**Figure 1: A 3D food printer in the laboratory at the Department of Biotechnology and Food Technology, University of Johannesburg.**

Simply put, the 3D printing of food is an additive food manufacturing technique that leverages the ability to customise food for various purposes - and that can help with the issue of global food security.

As reflected on in studies available in literature on the topic, it also provides an opportunity for the unique personalisation of food. Personalisation with 3D printing allows for the possibility of creating foods with unique functionalities that can fulfill individual consumer requirements in terms of physical properties (texture, size, flavour, colour, etc) as well as nutritional requirements (nutrient composition, calories, etc) - all of which are largely dependent on the choice of your ingredients.

Research at UJ on 3D food printing is actively exploring different raw materials for 3D food printed products, in some instances combined with other food processing techniques. My study group at UJ explores the use of 3D printing technology to produce products from under-utilized and indigenous food products. To this end the group explores the benefits of fermentation and malting to improve the composition of raw materials, and in combination with 3D food printing and baking, creating snacks that were physically more appealing and structurally better, compared to snacks that were only baked.

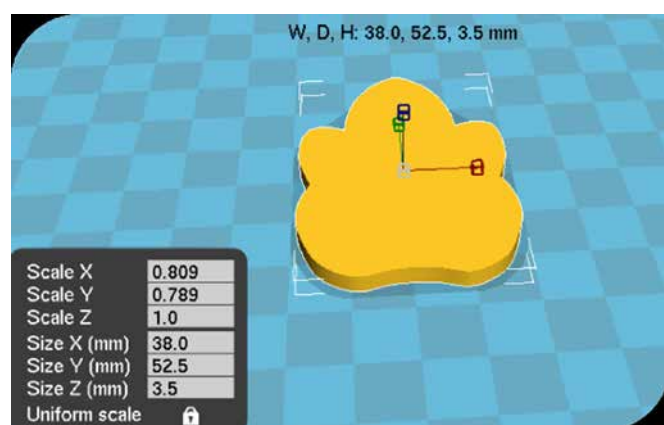
3D food printing holds great promise but there is still much more to be done regarding acceptability of these products, speed of preparation and appearance. The technology is nevertheless a step in the right direction to ensure food security on the African continent and the world at large.



**Figure 2: How 3D printing can help create more appealing dysphagia foods (Adapted from: Liu et al., 2021. 3D printing of Shiitake mushroom incorporated with gums as part of a dysphagia diet. In: *Foods* 10(2189).)**

So, one day soon, some households might choose not to buy food, but the ingredients needed by a 3D food printer - in order to print up scrumptious foods of their particular liking, whenever they have a specific craving. Imagine also, the possibilities if aid organisations can provide more easy food aid through the use of 3D food printing.

*Article written by Prof. Oluwafemi Adebo of the University of Johannesburg's Biotechnology and Food Technology Department.*



**Figure 3: Left: The virtual three-dimensional (3D) model used for 3D printing of prepared doughs. Right: 3D printed and baked biscuits with various textures, colours and densities (Adapted from: Kewuyemi et al., 2022. 3D food printing improves color profile and structural properties of the derived novel whole-grain sourdough and malt biscuits. In: *Scientific Reports* 12(12347)). This is work produced at UJ under the supervision of the author.**

*Loko munhu un'wana na un'wana a nga tsala swakudya, ku hava munhu loyi a ta tlela na ndlala. Yunivhesiti ya Joni yi karhi yi endla vulavisisi mayelana no tsala swakudya.*

*Translated into Tsonga by Dr Lean Makhubele.*