Vegetarian cutlet

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The ingredients in this cutlet are 100 percent vegetable. Credit: Fraunhofer IVV

It looks like a cutlet, it's juicy and fibrous like a cutlet, and it even chews with the consistency of a real cutlet -- but the ingredients are 100 percent vegetable. Researchers are using a new method to prepare a meat substitute that not only tastes good, but is also environmentally sustainable.

Meat production is complicated, costly and not eco-friendly: fatted animals have to consume five to eight kilos of grain just to generate one kilogram of meat. It would be simpler and more sustainable if one were to make cutlets out of seed – without the detour through the animal's body. Impossible? Not entirely: there are plants that are suitable for the production of meat substitute products. Researchers in the EU-project "LikeMeat" have studied what they are, and how they can be

incorporated into a product that tastes and looks like meat. "Studies have shown that many Europeans are ready to give up meat, but there have only been a handful of alternatives until now," explains Florian Wild. The researcher at the Fraunhofer Institute for Process Engineering and Packaging IVV in Freising is spearheading the project. "Our goal is to develop a vegetable surrogate for meat that is both juicy and fibrous, but that also has a pleasant flavor. The product should have a long shelf life, it should not be more expensive than meat, and be suitable for vegetarians and allergy sufferers."

In addition to the scientists at IVV, experts from the University of Natural Resources and Life Sciences, Vienna (BOKU) are also participating in the development, as are consumer researchers from the University of Wageningen, in the Netherlands, and eleven small to medium-sized corporations that manufacture or do business in food or food ingredients. The team roster also includes two Austrian and one Dutch company that have hitherto only processed meat, as well as an organic food producer from Spain. "As a group, we are seeking to engineer a simple production chain in which pure vegetable raw materials are used to produce a meat substitute that corresponds to consumer preferences," as Wild summarizes it. The ingredients originate from the land: Wheat and peas, lupins and soya are all suited for production, explains Wild: "We are intentionally not tying ourselves down to one type of plant because many people get an allergic reaction to the one or other substance. In the process, we have developed a variety of recipes. They are the basis for a product spectrum that offers a broad selection to people who suffer food intolerance or allergies."

But how do you turn a field crop into meat? "The processing technology was the biggest challenge," recalls the project manager. The previously conventional methods of mixing plant proteins with a little water, and heating them under high pressure, proved to be useless: With this hot extrusion process, the mass is heated up under high pressure. At the

moment when it pushes through the die, the temperature drops dramatically, steam is released and the mass foams up. That is certainly the desired effect when making peanut flips. But not in the production of meat substitutes. Wild and his colleagues use a new process specially developed for meat substitutes: The main ingredients – water and plant proteins – are brought to a boil and slowly cooled down. Since no sudden release of pressure takes place, no steam blows out of the paste. As the temperature sinks, the protein molecules start to form chains. This gives rise to a fibrous structure that is quite similar to that of meat.

The prototype of the new vegetarian cutlet factory is currently located in the IVV laboratory. The system is no larger than two table tennis tables. On request, it can produce one endless piece of meat approximately 1-cm thick that can be shaped as desired, for example into little morsels for diced or thinly-sliced meats, or entire cutlets. The research team is currently able to produce 60 to 70 kilos of the meat substitute per hour – or 300 to 500 kilos per day. "Consistency and texture are already superb," Wild assures. There is still a little work to do on the flavor. By the end of the project term, in one year, the meat substitute from the land should be every bit as good as a genuine cutlet, and it should come directly from the machine, ready-to-eat. The experts will present their new product at the Anuga FoodTec trade fair from March 27 through March 30 in Cologne.

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