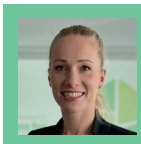
Raw material production through fermentation

Mycoprotein: The new generation of alternative proteins

According to the Food and Agriculture Organization (FAO), the global meat market will increase from 360 million tons in 2022 to 455 million tons in 2050. In light of this scenario, alternative products are growing in importance. In addition to plant-based meat alternatives, more focus is being placed on cultured meat and proteins obtained through fermentation. Here, mycoprotein in particular plays a considerable role – and for quite different reasons. Mycoprotein has numerous benefits – from the manufacturing process to health benefits, sustainability, and zero waste.



Dr. Pia Meinlschmidt
Team Leader of Product Management
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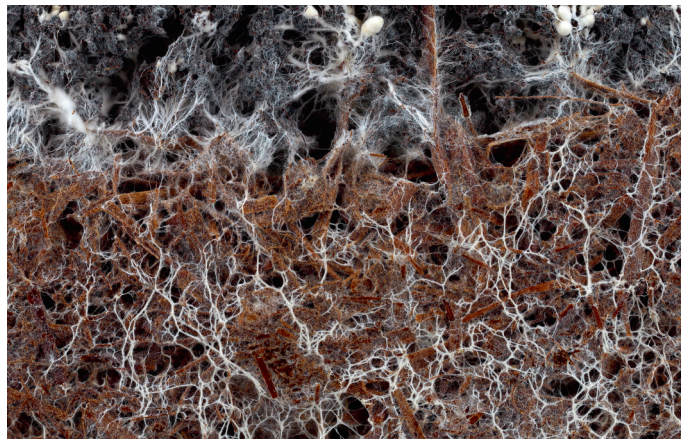
Traditional production

Mycoprotein – also known as mycelium, or fungi protein – is produced using biomass fermentation. Since the 1980s, the company Quorn (Marlow Foods, UK) has been using fermentation to produce mycoprotein on an industrial scale using the fungi fusarium venenatum. Mycoprotein is a filamentous fungal biomass with meat-like texture and a high protein content. So far, the focus has been on plant-based meat alternatives. The advantage: Fermentation then results in a natural, low-/minimal processed protein. The process just takes a few days, making it highly time-, cost- and resource efficient.

"Some of this process has already been scaled, and some of it is at the pilot scale, which shows promise for scaling. This makes transfer to industrial production feasible," explains Dr. Pia Meinlschmidt, Team Leader of Product Management at Planteneers. "The scaling challenge we have with other alternative proteins and the time it takes for a raw material to reach the market are thus eliminated." In addition, mycoprotein



has a certain structure. On the other hand, the taste and color are neutral. And not only that: "Mycelium is said to be able to mask bitterness and typical legume flavors – for example, from pea or soy. Our application tests have clearly confirmed this," says Meinlschmidt.

Nutrition and health

An exciting aspect is also the health benefit. For example, it has been scientifically confirmed that mycoprotein is a high-quality protein source with highly satiating effects that supports muscle growth. This property offers new possibilities in nutrition for the elderly. The cholesterol- and blood-sugar-regulating effect has also been proven. Added to this is the excellent nutrient profile. Mycoprotein has a high fiber content as well as a low carbohydrate and fat content. "Although the protein content of around 50-60% of the dry matter (dm) content is lower than other plant protein concentrates or isolates, the amino acid profile is much more decisive," explains Meinlschmidt. "Like its animal counterpart, mycoprotein is a complete protein. It contains all eight essential amino acids, which are also readily available. The protein digestibility corrected amino acid score (PDCASS) is 0.97–0.99; this is almost at the level of meat and fish and mycoprotein also contributes to a healthy and even improved nutriscore."

Sustainable production and consumer acceptance

The sustainable, environmentally friendly production of the mycoprotein is also interesting. For fermentation, the fungi are fed with nutrients for growth such as carbohydrates (e.g. by-products from sugar beet process). The nutrients are inoculated with a fungi culture and then fermented to grow its fungal hyphae into filamentous fungal mycelium biomass. The agriculture by-products can thus be optimally utilized.

Apart from this, the topics of microorganisms, fungi, and fermentation have a positive connotation among consumers as they are familiar with tempeh or products from milk processing like kefir. With fermented foods, acceptance and willingness to buy and consume are considerably higher than for other alternative proteins such as cell-based products.

Legal advantages

Although mycoprotein currently belongs to the new generation of alternative proteins, the raw material is not new at all. Research on this has been going on since the 1960s and Quorn commercialized mycoprotein-based products since the mid-80s. This has the great advantage that most microorganisms used to produce mycoprotein do not fall under the Novel Food Regulation. In addition, mycoprotein has been considered generally as safe (GRAS) by the Food and Drug Administration (FDA) in the US since 2002.

Flexible application

The color, texture, and taste of the mycoprotein can be individually adjusted via the fermentation process. Different colors and shades from light to dark can be achieved. In terms of texture, the whole filamentous fungal biomass (structured and frozen), powders or pellets are possible. The taste can differ from neutral to slightly umami. "Recently, we have conducted initial application trials with mycoprotein in plant-based alternatives to meat, fish, and dairy products," says Meinlschmidt. "We were quite impressed by the results: Whether burgers, nuggets, or schnitzel – the end products were satisfying in terms of both taste and texture. We have also found promising applications in the dairy sector." Based on this experience, Planteneers is currently creating prototypes of various end products in order to present them to interested customers. Complementing this, sister company Hydrosol is focusing on cellular agriculture, specifically on cultured meat and precision fermentation.

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Planteneers GmbH, headquartered in Ahrensburg, Germany, develops and produces custom system solutions for plant-based alternatives to meat, sausage, and fish products, as well as cheese, dairy products, and deli foods. As a member of the independent, owner-operated Stern-Wywiol Gruppe with a total of twelve sister companies, Planteneers can make use of many synergies. The company has access to the knowledge of some 170 R&D specialists and to the extensive applications technology of the large Stern Technology Center in Ahrensburg. Part of the Technology Center, the Plant Based Competence Center formed in 2019 is the creative pool for alternative solutions, and the heart of Planteneers. Customers also benefit from the Group's international network of 19 subsidiaries and numerous qualified foreign representatives in the world's key markets, as well as shared production facilities and the Group's own logistics resources. With revenues exceeding 760 million euros and some 1950 employees around the globe, the Stern-Wywiol Gruppe is one of the world's most successful international suppliers of food & feed ingredients.