

Mycoprotein

Mycoprotein is a form of single-cell protein, also known as **fungal protein**, that is defined in the *Oxford English Dictionary* as "Protein derived from fungi, especially as produced for human consumption."

"Myco" is from the Greek word for "fungus".

History

The only mycoprotein on sale in Europe and North America is called Quorn, created from *Fusarium venenatum*.^[1] In the 1960s *F. venenatum* was identified by the English company, Rank Hovis McDougall, as a potential protein source for humans. *F. venenatum* was one of more than 3,000 species of fungi screened during a three-year period for being cheap to reproduce, nutritious, and palatable. Concerns for pathogen-potential of the species on plants led to a twelve-year testing process. After this period *F. venenatum* was allowed to be sold on the English market and at the time was the most thoroughly tested food product on the European market.^[1] *F.*

venenatum is the only source of mycoprotein that can produce a high percentage of protein biomass approved for market.

Synthesis

The fungus is grown in vats using glucose syrup as its food. A fermentation vat is filled with the growth medium and then inoculated with the fungal spores. The *F. venenatum* culture respires aerobically, so for it to grow at an optimum rate, it is supplied with oxygen, and carbon dioxide is drawn from the vat. To make protein, nitrogen (in the form of ammonia) is

added and vitamins and minerals are needed to support growth. The vat is kept at a constant temperature, also optimized for growth; the fungus can double its mass every five hours.

When the desired amount of mycoprotein has been created, the growth medium is drawn off from a tap at the bottom of the fermenter. The mycoprotein is separated and purified. It is a pale yellow solid with a faint taste of mushrooms. Different flavors and tastes can be added to the mycoprotein to add variety.^[2]

A reproducible mutation occurs after 1,000 to 1,200 hours of cultivation in *F. venenatum* that greatly reduces the hypha length in the organism, which is considered unfavorable for production. Under normal conditions, this mutant strain will rapidly displace the parent strain.^[1] Replacing ammonia with nitrate as the source of nitrogen, or supplementing ammonium cultures with peptone, prevents this mutant strain from overtaking the product, but will still develop. Alternatively, the appearance of the mutant can be delayed by varying selection pressures such as nutrient concentrations or pH levels.^[1]

Health concerns

Some strains of *F. venenatum* produce a variety of mycotoxins, such as type A tichothecenes. Mycotoxin-producing genes such as isotrichodermin, isotricodermol, sambucinol, apo-trichothecen, culmorin, culmorone, and enniatin B can be found in cultures of *F. venenatum*.^[1] Specific strands that do not produce mycotoxins under optimal conditions can be selected to reduce the danger to human consumers. Testing at six-hour intervals can be done to monitor mycotoxin presence.