Single Cell Protein - Is It The Future Food ?

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Single cell protein (SCP) can be described as yeasts, bacteria, fungi or algae which can be used as sources of protein for livestock and human feeding. In the past few years there has been a great deal of interest in the use of these unicellular organisms as a high protein feed stuff and as a feed supplement to provide essential vitamins and other nutrients in both animal and human feeding sector. Some products are now commercially available in India especially the algae protein, spirulina, which is used as a supplement in human diet.

Disproportionate growth of human population with respect to food supplies in a developing country like ours has made it necessary to think about developing low-cost protein materials especially from waste industrial products and biological wastes. The importance of microbial protein lie in its speed of production which is exponential in nature. Substrates used to produce microbial protein include hydrocarbons, molasses, wood hydrolysate, sulfite liquor, ethanol, methanol, sewage and other similar effluents.

SCP's can be broadly classified into yeast protein, bacterial protein, fungal protein and algae protein.

Yeast Protein

Yeast has been in our diet for eons together. But excessive intake is dangerous because of its high content of nucleic acids. In humans, increased ingestion of nucleic acids from yeast and other microbial proteins increases risk of developing pathologic conditions like gout, gouty arthritis and urolithiasis. These occur due to poor solubility of uric acid, the major human metabolic end product of the purine bases in nucleic acids. But most animals form a more soluble end product so that increased purine ingestion is not likely to be hazardous to them.

A daily dosage of 20 grams of protein from algae or 10 grams from yeast is allowable, provided the diet does not contain other rich sources of nucleic acids.

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Bacterial proteins

Bacteria grow faster, have high protein levels and can use a wide variety of substrates when compared to other microbial protein. They are prepared for feeding by boiling or by sonically rupturing the cell walls. Arginine is the limiting amino acid in bacterial protein.

Feeding tests on human beings with bacterial protein were a failure since most of the persons tested exhibited nausea, vomiting and diarrhoeas (NVD) with cutaneous rashes Moreover purified bacterial protein is unpalatable.

Fungal protein

It can be used in animal feeding. An example is the 'pekilo protein' which can be used in grower rations of pigs upto a level of 10 per cent of dietary protein.

Algae protein

It is used extensively by humans. Various algae including *Spirulina maxima* and *Chlorella pyrenoidosa* are widely used as food in many countries The spirulina species is a blue green algae characterized by its spirally coiled shape which entraps air bubbles, allowing it to float to the surface from where it may be skimmed off. The dried algae contain around 60 per cent protein, contain all of the essential amino acids and the rare essential fatty acid, gamma linolenic acid. It also contains several vitamins including betacarotene and compounds like phycocyanin, polysaccharides and sulfolipids that enhance the immune system. Algae protein upto 100 gram per day will be tolerated by an adult. Higher levels can result in NVD. The algae are utilized better when combined with protein of higher digestibility.

Spirulina is considered to be the first photosynthetic life form. They are usually grown on artificially illuminated synthetic ponds for commercial purposes. It grows well on sewage and waste water, but will contain high levels of heavy metals. Various processing methods like homogenizing, spray drying, ball milling and enzyme treatment can improve its nutritive value.

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