New uses for whey protein

For too long, whey, a by-product of cheesemaking, has been devalued and even thrown away.

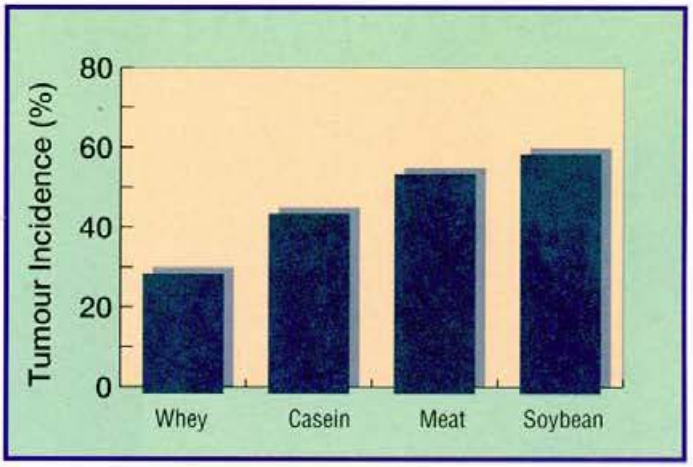
Whey proteins are the major proteins in human (breast) milk, in contrast to that of cow's milk where casein is the major protein. Dairy proteins are one of the richest sources of sulfur amino acids in the human diet, and it is not uncommon for these amino acids to be deficient.

Researchers at CSIRO's Division of Human Nutrition at Adelaide have been examining the claim that it is the quantity of protein in the diet, not the quality of protein, that is the important issue where diet influenced the risk of colon cancer.

Recent experiments at the division refute this claim. A team led by Dr Graeme McIntosh has shown that while feeding a constant level of protein to a rat, the incidence of intestinal cancer can be varied from 30% to 60% by substituting soybean protein in place of whey protein, and with all other food components being kept constant (see graph). Cysteine and methionine (sulfur amino acids) were increased by 3.3 and 1.6 times respectively. There is increasing evidence that these sulfur amino acids play a crucial role in the protection of DNA, thereby reducing the risk of cancer.

Other mechanisms influenced by quality of protein in the diet are glutathione concentrations (an important cellular antioxidant), immune status, bacterial fermentation and the level and nature of fat in the hindgut which can lead to toxic damage.

'We are doing a detailed study of the mechanisms underlying colon cancer,' McIntosh says.



'Besides helping to identify the important factors in diet which can significantly alter the incidence and number of tumours occurring in this region, we hope to provide a better understanding of why the incidence of cancer has increased in our westernised culture.

'We now recognise that whey proteins and dairy proteins generally, are a valuable component of our diet and may offer protection against colon cancer.'

McIntosh says whey proteins should not be wasted, but incorporated more extensively into our diet. Ricotta cheese (which includes whey proteins) and unprocessed milk products are examples of the most desirable foods, now that they are low in fat and readily available.

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Larvae trialled by computer

This may look like a production line at a soft-drink factory, but instead of being filled with lemonade, each bottle is a habitat for hundreds of marine larvae.

The picture depicts part of the Larvatron, built three years ago at CSIRO's Division of Fisheries by senior experimental scientist Chris Jackson and technician Bob Pendrey.

The Larvatron is a computer-controlled device which automates the previously labour-intensive job of running large-scale experiments on plankton. It was developed as part of an ecological project looking at the survival of prawn larvae in relation to environmental variation in the Gulf of Carpentaria. As that project draws to a close, Jackson and experimental scientist Michele Burford are applying the Larvatron for the benefit of the aquaculture industry.

The Larvatron consists of 100 bottles arranged in a closed loop and housed in a temperature-controlled room. The bottles advance around a track until reaching the 'sampling station'. Here a computer-controlled probe is dipped into each bottle, sucking out 10% of the water for testing to ensure that it complies with the preset experimental parameters. Another probe then replaces the sample with 'fresh' water of the correct temperature, salinity and food concentration. Jackson says one of the strengths of the Larvatron is that the animals are maintained in a consistently high-quality environment. This is because their water is refreshed daily (each bottle is processed every 2.5 hours).

The experiment is run for five to 10 days, after which time the larvae are about eight millimetres long. The scientists preserve the larvae and analyse their rates of growth, survival and health.

Jackson says many replications are needed when experimenting with marine larvae. This is because the results are often variable. The fully-automated Lavatron simplifies such broad-scale experiments, controlling such factors as the temperature, food concentration, salinity and food type of each bottle.

In addition to trialling variables such as temperature and salinity and food densities, the Larvatron can test different food types. For example, Jackson says at present little is known about which phytoplankton are the best to feed larval prawns. Information about optimum foods would increase the productivity of prawn hatcheries.

Jackson says finfish aquaculturists could also benefit from the technology of the Larvatron itself. Similar equipment could be used to monitor and maintain optimum conditions in hatcheries.

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