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DESIGNER EGG-POWER PACKED WITH NUTRIENTS AND BENEFITS

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Introduction

Designer foods are one of the hottest topics in the food and health industries today. The design of foods to take advantage of preventive and therapeutic properties of nutrients represents a critical step in the successful food supply for the improvement of consumer health. Consumers are more health conscious and determined to take control of their own lifestyle through nutrition and exercise. Recently, scientists have been working on genetic modification to design or produce eggs from chicken that contains special proteins which are capable of preventing cancerous cells in human body.

Currently the focus is on unique components in egg and the ways to capitalize their potential for healthy applications; and for industrial uses which is presently geared in the production of designer eggs. Now extra nutrients and non-nutrients like active herbal principles are incorporated in the eggs.

Omega 3 fatty acids (PUFA)

Omega-3 fatty acids are considered essential fatty acids. They are essential to human health but cannot be manufactured by the body. For this reason, omega-3 fatty acids must be obtained from food. They are also known as polyunsaturated fatty acid (PUFA). Omega-3 fatty acids play a crucial role in brain function as well as normal growth and development. There are three major types of omega 3 fatty acids that are ingested in foods and used by the body: Alpha-Linolenic Acid (ALA), Eicosapentaenoic Acid (EPA) and Docosahexaenoic Acid (DHA). The Greenland Eskimos consuming seal based fat rich diet, which is rich in omega 3 fatty acids, has the lowest mortality for Cardio Vascular Disease, has generated much interest on health benefit of omega 3 fatty acids.

On incorporating flaxseed (linseed), rape seed (mustard), marine algae, pearl millet, soya bean, safflower oil, fishes like sardine, salmon etc. in the hen's diet, the omega-3 fatty acid content of yolk increases at the expense of the unfavorable saturated fatty acids like palmitic and stearic acid. A designer egg will supply about 50% of daily requirement of omega 3 (PUFA) without any change in sensory quality of egg. Consumption of omega 3 fatty acid enriched eggs produced changes in the serum and platelet lipid composition of human beings. It acts as an alternative to mother's milk for preterm and orphan babies and improves immunity.

Polyclonal Antibodies (IgY)

Chicken egg is abundant in antibodies like "IgY" which is cheaper and better than mammalian immunoglobulin "IgG". A hen produces about 298 mg of specific antibodies in a six week period, compared with only 17 mg from a rabbit. This "IgY" can be used to treat human rotavirus, E. coli, Streptococcus, Pseudomonas, Staphylococcus and Salmonella infections. Antibody - "IgY", other natural antimicrobials and immunostimulants in eggs, prolong life of AIDS patients, by their high nutritional value, as well as immunostimulant and anti-viral properties.

The "IgY" level in the egg can be increased by dietary manipulations. The functional feed rich in omega-3 fatty acid and anti-oxidants itself will increase "IgY" level in the egg. Herbal supplementation will further boost "IgY" level in the egg. Among the herbs, Tulsi leaves at a dietary level 0.3-0.5 % has been found to have highest ability to boost "IgY" level in the egg. Chicken egg yolk antibodies can be administered orally for passive immunization against infection in infants and young animals. The application of "IgY" technology to human medicine may be either by ingestion of pure "IgY" or by encapsulation of an egg yolk concentration so that "IgY" is not destroyed by the acidity in the stomach.

Genetic modification

Biotechnology is being used to develop genetically modified chickens that produce compounds that can be harvested from eggs like insulin for the treatment of diabetes. Scientists of United Kingdom have developed genetically modified chickens capable of laying eggs containing proteins needed to make cancer fighting drugs. According to Japanese researches, Lumiflavin and Lumichrome substances present in eggs are capable of preventing multiplication of cancer inducing viruses and also prevent normal cell turning into cancerous cell.

Hen, like all other animals, produces antibodies to neutralize the antigens (viruses, bacteria, etc.) to which they are exposed to each day. These antibodies circulate throughout the body and are transferred to eggs as a mode of protection to the developing chick. Immunologists are taking advantage of the fact that the hen can develop antibodies against a large array of antigens and concentrate them in the egg. Specific antigens are now being selected and injected into the hen that develops antibodies against them. As new knowledge is gained in the area of biotechnology, designer eggs in future may be produced that result in a range of antibodies even against snake venom.

Herbal enrichment

Incorporation of herbal plants and products in the diet of layer reduces cholesterol in egg. Tulsi, fenugreek and spirulina in functional layer mash with flax seed and fish oil is found to reduce total cholesterol by 29%. Herbs like rosemary, turmeric, garlic, neem, fenugreek, spirulina, ashwagandha etc. also possess immunomodulating properties.

Onion, garlic and neem are found to be effective as hypocholesterolaemic agents. Dietary supplementation of garlic and neem in poultry has been found to reduce cholesterol level in egg. These herbal plants contain active principles like organosulphur compounds which are responsible for hypocholesterolaemic effect.

Minerals

The dietary supplementation of selenium, iodine and chromium in layer ration has been found to increase their levels in egg. Dietary supplementation of selenium decreases cancer mortality by two fold in humans. Chromium decreases egg cholesterol and improves egg interior quality. Recent studies showed that enrichment of iron in the egg could be effectively achieved by supplementation of iron-methionine chelate at the level of 100 ppm iron for 15 days.

Pigments

Egg yolk provides an excellent, highly bioavailable source of carotenoids, lutein and zeaxanthin pigments. Recent research demonstrated the link between these dietary compounds and the macular pigment of retina of eye. Lutein and zeaxanthin are primary carotenoids found in the macular region. Sufficient quantities of these nutrients in the diet are thought to decrease the age related macular degeneration, a leading cause of blindness in the elderly. Normal egg contains 0.5mg of carotenoids and it can be increased to 4-5 mg/egg. Natural sources like yellow maize, alfalfa, corn glutein meal, marigold petal meal, blue green algae called spirulina, capsicum etc. will impart rich colour to the egg yolk by transferring the pigments.

Conclusion

Now-a-days consumer is ready to pay a premium price for designer products that are safe and which improve their health due to the presence of special health promoting components. Eggs with modified fat content have become very popular and are available in countries like U.S. Eggs with modified fat content eggs are marketed as that containing less cholesterol, less saturated fat, higher amounts of omega-3 fatty acids, higher vitamin E content and high amounts of iodine. Many omega-3 fatty acid-enhanced eggs are available in the U.S. market under various brand names such as Gold Circle Farms, Egg Plus, and the Country Hen Better Eggs.

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