

Review Article

DESIGNER EGG PRODUCTION-AN OVERVIEW

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Introduction

The growing role of human nutrition in both the treatment and prevention of chronic diseases has led to the convergence of the consumer and governmental attention on the nutritional quality of foods. The food industry has responded to the demand for foods of superior health benefits by modifying the nutritional profile of popular foods like eggs and meat.

Consumer awareness on the relationship between dietary lipid and the incidence of Coronary Heart Disease (CHD) changed their attitude towards egg and meat consumption. The per capita consumption of egg and meat has not increased in required number and quantity, respectively, through the years because of the fear that egg yolk and meat contain high cholesterol. Due to unsuccessful attempts to significantly reduce cholesterol content of eggs through genetic, nutritional, pharmacological tools, researchers have turned towards using the egg and meat as vehicle for delivering essential nutrients that were traditionally absent or in low concentration in those products.

With the focus on concepts such as the glycemic index, macronutrient ratios and food groups, essential fatty acids (EFA) are one of the most neglected aspects of nutrition in modern society. Even though a diet that is nutritious by most standards can be deficient in polyunsaturated fatty acids (PUFA), omega-3 fatty acids are of particular importance to the present day enlightened consumers.

Designer food

The health promoting effects of dietary PUFA have provoked considerable effort to enrich animal products using various sources of PUFA. The poultry industry in particular has been seeking newer technologies to exploit products beyond their traditional food value. One such technology is **DESIGNER FOOD (MEAT/EGGS)**, which can be defined as a nutritionally

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modified functional or designer food, which retains its functional, nutritional and sensory qualities but has a significantly altered lipid profile.

Cholesterol scare

Egg is a cholesterol rich food. A large egg contains about 210 mg of cholesterol. Assumptions like egg consumption will increase the serum cholesterol levels directly, many have reduced the egg consumption. This "cholesterol phobia" has scared the people in developed countries until 1990 and still continued to do so in developing countries including India due to ignorance; leading to low egg consumption.

Even though the nutritional superiority of the egg has been proved beyond doubt, the egg consumption in India is very low due to vegetarianism as well as cholesterol scare. Although the nutritionists and cardiologists have established that there is only an insignificant correlation between dietary and serum cholesterol levels; the consumers are still scared of consuming cholesterol rich foods, hence there is an urgent need to reduce the egg yolk cholesterol levels as well as to incorporate several other health promoting components in the egg.

The industry is presently geared in production of speciality eggs that have higher or enriched levels of certain nutrients already present in the eggs or lower the levels of other nutrients, which are considered undesirable for some reasons. Such eggs are called "**designer eggs**", "**functional eggs**", "**diet eggs**", "**omega-3 fatty acid enriched eggs**", which are capable of safeguarding the health of the consumers.

The designer egg will be produced with rich health promoting components like omega-3 fatty acids and vitamin E along with incorporation of some more additional health promoting components, like anti-oxidants, carotenoid pigments, certain vitamins and minerals; besides reducing the yolk cholesterol levels. In general, omega-3 fatty acids reduced the LDL-Cholesterol (Bad cholesterol) levels in serum, thereby reducing the risk of cardiovascular diseases. Further they scavenge the free radicals and act as immunomodulators in the persons, consuming such eggs regularly.

Designer eggs-Significance

In general, eggs are regarded as highly nutritious food. The egg is considered as nature's most complete food containing high quality proteins, a 2 to 1 ratio of unsaturated fats to saturated fats an excellent source of iron, phosphorus and other minerals and all vitamins with the exception of vitamin C. Multifunctional attributes of eggs have contributed to their

continuing use as ingredient in many food items. The antibacterial components in the egg and their contribution to food safety is an acknowledged fact.

Omega-3 PUFA

Omega-3 fatty acids are a group of polyunsaturated fatty acids (PUFA) also known as n-3 fatty acids. n-3 denotes the position of the first double bond in the carbon chain starting from the methyl end of the molecule being on the third carbon atom. Majority of birds and animals including human beings cannot synthesize these n-3 fatty acids, hence they are dietary essential.

Designer egg is rich in Omega-3 (or) n-3 fatty acids such as

- ❖ Alpha- Linolenic acid (ALA) : C18:3n-3
- ❖ Eicosapentaenoic acid (EPA) : C20: 5n-3
- ❖ Docosahexaenoic acid (DHA) : C22:6n-3

Unfortunately, the foodstuffs rich in these n-3 fatty acids namely linseed and fish oils are having undesirable flavour and consistency, hence not relished commonly by human beings. They can be made acceptable by incorporating these beneficial n-3 fatty acids into eggs.

Sources of Omega-3 fatty acids

- Sardine fish
- Anchovy Fish
- Fish oil
- Linseed/Flaxseed & oils
- Rapeseed/Canola & oils
- Pearl Millet
- Algae

Clinical Significance – Omega-3 Fatty acids

With the pioneering discovery of the fact that omega-3 fatty acids was responsible for the lesser incidence of Coronary Heart Disease (CHD) in Greenland Eskimos, whose staple diet is the fish. Research over the past decades on the various health benefits of dietary omega-3 fatty acids from fish oils, has shown that omega-3 fatty acids are essential nutrients for adults and children alike. The dietary omega-3 fatty acids reduce plasma triglycerides, blood pressure, platelet aggregation, thrombosis and atherosclerosis particularly in diabetics, tumour growth, skin disease and enhance immunity. The potential health benefits of n-3 fatty

acids in human diet have also drawn attention and altering the fatty acid composition of the egg and tissue through dietary ingredients.

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