

## Importance of Designer Egg for Improving the Health Status of Human Being

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### SUMMARY

Poultry eggs are nutrient rich food regarded as an inexpensive, convenient and low calorie source of high quality protein with several other essential nutrients. However the health conscious consumers demand for the wholesome, healthy and nutritious food products free from harmful residues. The health and nutritional status of the consumers can be improved by designing nutritional profile of poultry egg through dietary approaches which is relatively simple and economic. Hence designer eggs can be designed through dietary approaches either through supplementation of specific nutrients, certain herbs or specific drugs that have functional and therapeutic properties.

### INTRODUCTION

The poultry products like egg has gained a healthy image, so in order to curb the prevalence of chronic diseases and several attempts were made to modify the eggs by adding ingredients which are beneficial for the health or by eliminating or reducing components that are harmful. This modification resulted in development of functional egg. Improving consumers health and nutritional status by designing nutritional profile of poultry egg through dietary approaches is relatively simple and economic. Eggs can be designed through dietary approaches either through supplementation of specific nutrients, or certain herbs or specific drugs that have functional and therapeutic properties. The products like designer / organic / functional eggs come under the category of food which are usually free from residues of pesticides, drugs and other harmful chemicals. Several Designer Eggs (DE) like N3 PUFA, Vitamin E, Selenium, Lutein, Folic acid and Iron rich eggs were developed earlier by many workers. In India Narahari (2005) has developed HEDE, which are not only rich in N3 PUFA, Vitamin E, Selenium and Carotenoids but also rich in herbal active principles like allicin, euginol and natural antioxidants. Eggs are also considered the highest quality protein as compared to other animal protein sources but consumer awareness on the relationship between dietary lipid and the incidence of coronary heart disease (CHD) and salmonella problem changed their attitude towards egg consumption. Hence designer eggs has being developed as an enriched and nutritionally enhanced eggs. Research priority in poultry nutrition has been diversified into the field of enriching or fortifying eggs with certain nutrients of consumers choice at preovi position itself based on the basic concept that eggs accumulate nutrients if hens are subject to dietary and nutritional manipulations (Sujatha and Narahari, 2011). Nowadays functional eggs are already present in the market mainly those enriched with omega-3 PUFA (poly unsaturated fatty acids) or with low content of cholesterol. Generally, these eggs are produced by modifications in layer diets, whereas much less attention has been paid to the development of designer eggs by means of technological methods. Designer eggs can provides more than 600 mg omega-3 PUFA and 6 mg tocopherol. There are further beneficial impacts for egg consumers due to its balanced ratio of omega-6/omega-3 PUFA (1:1) and PUFA/SAFA (1:1). Therefore, the designer egg may give an alternative choice of food product to egg consumers around the world. Designer eggs are available in global markets with different names according to geographical area like the Columbus eggs, Eggs Plus, docosahexaenoic acid (DHA) enriched eggs, omega 3 eggs, Bio-omega 3 eggs, England's best, Greek eggs, Baby eggs, Achyrona  $\Omega$  mega eggs and omega-3 herbal eggs. The egg industry has responded well in seeking new techniques to improve the negative perceptions of consumers about problems of eggs and their products, particularly the cholesterol content.

### History of designer Egg

Sim Jiang and their associates in late 80's worked together to produce nutrient enriched eggs and developed designer egg, rich in n-3 fatty acids with antioxidants and patented this egg as 'Professor Sim's Designer Egg. In 1997, Van Elswyk developed eggs enriched with conjugated linoleic acid (CLA). In Australia, Farrell (1998) enriched the eggs with folic acid and iron. Other available designer eggs in the market include eggs enriched with vitamins (Michella and Slaugh, 2000). In Canada, Leeson and Caston (2004) produced lutein and selenium enriched eggs In India, Narahari (2005) has also developed Herbal Enriched Designer Eggs (HEDE), which is not only rich in carotenoids, n-3 PUFA, selenium, trace minerals and vitamin E.

### **How to produce designer egg**

Proteins from eggs are highly digestible and contain all important essential amino acids. However, the nutrients present in eggs are not optimized compared with the recommended intake in humans for improved health status. A large number of these nutrients in eggs can be improved by modifying dietary compositions, e.g. vitamin E, omega 3 fatty acids, selenium and carotenoids. The composition and nutrient density of poultry diets can affect composition and nutritional quality of eggs and their products. Using a well-balanced ration in poultry enhances the performance, carcass and meat quality as well as food safety. The production of functional foods requires careful application of diet formulation in poultry and the nutritive values of ingredients.

### **Benefit of designer egg**

Concept of designer eggs has been introduced with the aim to improve the consumption of egg in the food market. A normal egg provides 70 kcal of energy in the form of proteins, carbohydrates, fatty acids, amino acids, fats, cholesterol and PUFAs as well as potassium, sodium and contributes to platelet inhibition, anti-ACEI and anti-ROS activities. Eggs contain anti inflammation and anti-coagulation components, and contain anti-hypertensive peptides like ovokinin along with important minerals and vitamins which can help to protect organs such as the heart from many diseases. Eggs are a cheap source of high quality protein along with balanced ratio of vitamins.

### **Decreasing cholesterol level**

The addition of PUFA in poultry diets significantly reduces the cholesterol and total lipids content. Only few studies suggest that egg cholesterol could be decreased by 25% using combinations of dietary strategies. Supplementation with the gynura procumbent plant in laying hen diets decreased cholesterol by 12% in egg yolk. Feeding of low-fiber alfalfa meal may also reduce the cholesterol level of yolk.

### **Minerals and Vitamins enriched eggs**

The dietary manipulation makes it is possible to improve the level of iodine, selenium, and chromium of eggs without affecting the important calcium and phosphorus level. Most minerals are found in the shell comprising of large concentrations of calcium and phosphorus. In fact, the production of selenium enriched eggs is very simple and can be achieved by inclusion of 0.4 mg/kg as Se yeast to produce an egg containing about 30 mg of selenium which is approximately 50% of RDI. The inclusion of designer eggs into the human diets by 12 to 16 eggs per month increased vitamin E consumption up to the level of 23 mg per day.

### **CONCLUSION**

Designer eggs provide varying nutritional benefits or properties compared to generic eggs. Dietary manipulation for designer egg production is dependent on several factors which must be considered while formulating the diets for laying hens. Hence the concept of “designer egg” has been evolved with an approach to minimize the negative compounds like cholesterol and triglycerides and enriching it with health positive compounds like  $\omega$ -3 fatty acids, antioxidants, vitamins and minerals.

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