Count Your Eggs!

**CHICKEN** egg is considered to be the most nutritious and cheapest source of high quality protein. Adulteration in egg is not possible. The rich protein, vitamin, mineral and other constituents of egg make it suitable for a wide range of food and non-food applications.

But apart from food, egg protein has several other valuable applications in the food and non-food industry.

**Nutritive supplements**
- Poly unsaturated fatty acid (n6 & n3 series) like DHA (Docosahexanoic acid), one of the major n-3 long chain PUFA, is essential for growth and functional development of brain in infants as well as maintenance of normal brain function in adults. It is used in dietary formulae of premature babies as it is important for the development of fetal nervous system. It also has a positive effect on prevention of diseases such as heart disease, thrombosis and atherosclerosis.
- Chicken egg phospholipids like arachidonic acid, docosahexanoic acid and choline play an important role in membrane integrity and function and activation of immune cells which may reduce the risk of infant infection. Choline helps in packaging of very low density lipoproteins and lipid transport, thereby essential for normal functioning of the liver.
- Eggshell contains calcium and trace amounts of other micro elements, i.e., magnesium, boron, copper, iron, manganese, molybdenum, sulphur silicon and zinc. Eggshell calcium is probably the best natural source of calcium and it is about 90% absorbable. To make eggshell powder, eggshells should be boiled in hot water for 5-10 min to kill pathogens, then drying them in air followed by grounding into a fine powder. One whole medium sized eggshell makes about one teaspoon of powder, which yields about 750-800 mg of elemental calcium.
- Egg shell supplement is viable in osteoporosis treatment and dentistry. In patients under cancer treatment, it stimulates muscle gain and hair growth.
- It works as an immunity booster to improve disease resistance in the body.
- As a fertilizer, it supplies calcium and amendments to soil. The discarded eggshells can be grounded into fine powder and applied to fields.
- As a stabilizer, used in manufacturing construction materials.

**Beauty care applications**
- In cosmetics like lip stick, face wash and shampoos, for cleansing of hair and gives a shining and soft feeling.
- Egg shells and its membranes are also used in plastic surgeries and skin burns to improve the skin quality. Collagen is a very good medium for construction of artificial skin substitutes for skin burns and fire accident disfigurements.
- Gelatin and collagen derived from eggs are used in preparation of dietary supplements to improve quality of skin and finger nails.

**Decorative purposes:** The clean egg shells have great possibilities of making pieces of art and also for colour printing to be used as showcase and gift items. Besides, egg shell are also used in art work for production of mosaics and as glue in musical instruments.

**Food industry:** Due to its many functional properties like foaming, coagulating, emulsifying, binding and interfering, eggs have a valuable use in food industry.
- Contribute to nutrients and serve as flavouring and colouring ingredients in various foods.
- In bakery products like biscuits, cookies albumen whole egg and yolk are used. For preparation of sponge cakes and pastries eggs are used as binding agent.
- In preparation of various battered chicken meat products, noodles and macaroni dishes.
- As a thickening agent in custards and curd.
- As an emulsifying and interfering agent in the preparation of ice creams, custards and puddings in which albumen and whole egg prevents large ice crystal formation. While in salad dressing, egg yolk is used as an emulsifier.
- As a clarifying agent in preparation of soups. Lysozyme is also used as clarifying agent in wine industry.
- In confectionaries mainly chocolate preparation, in which albumen is used to prevent sugar crystallisation.

**Pharmaceutical applications**
- As an emulsifying agent, it is useful in the preparation of ointments and emulsion based preparations.
- For the preparation of various pet foods for dogs and cats.
- Various egg-based products like egg pickle, egg drink, albumen rings, egg roll, devilled eggs and mayonnaise can serve the major portion of human diet mainly as ready-to-eat snacks.
- Chicken eggs are attractive systems for the production of therapeutic proteins and enzymes. Ovalbumin (portion of albumen) of chicken eggs is used to...
produce variety of medical proteins for treating human diseases, such as: Mini-antibody (miR24) to treat skin cancer and arthritis; Human interferon β1a as a high-level anti-viral therapy; Human interferon β2a to treat cancers like leukaemia, AIDS related Kaposi’s sarcoma and chronic infectious diseases like chronic hepatitis; Beta-lactamase for treatment of bacterial infections.

• For the development of vaccines, chicken eggs are the most widely preferred medium for development of vaccines for animals and poultry. Human influenza vaccines have also been developed.

• Chicken egg is gifted with a natural protein, the lysozyme, with excellent antibacterial activity and mostly found in albumen portion. Approximately 6.5 grams of lysozyme can be produced by one hen in a year. The various actions of lysozyme are as a food preservative by destroying bacteria, potentiating antibiotic effects, anti-inflammatory action, anti-tumour action, direct activation of immune cells (monocytes and lymphocytes), antiviral activity to certain viruses by forming an insoluble complex with acidic viruses.

• For neutralization of venom, IgY immunoglobulins specific to snake venom can be produced in eggs instead of horse serum. Antivenom produced in chicken has a more rapid action to snakes, scorpions, spiders, jelly fish venom.

• Systemic administration of IgY is quite effective in preventing Rota virus infection especially in young children, influenza virus, dental caries, enterotoxigenic E. coli infection, infectious diseases of fish and chicken. Also used as polyclonal antihuman insulin antibody. Can be used for treatment of Helicobacter pylori and other bacterial infections. Egg white is the most popular natural remedy for gastritis, ulcers, enteritis and colon cancer.

• The various active proteins of egg like globulins and IgY antibodies enhance the immune activation and prolong the life of AIDS patients.

• Yolk antibodies offer potential alternative to mammalian antibodies, thereby reducing or replacing the use of other laboratory animals for scientific experimentation. This avoids collection of blood from chicken for this purpose. Immunoglobulin Y is the major antibody found in birds. Chicken produces a very high amount of immunoglobulins in eggs around 50 g per hen per annum.

• Chicken immunoglobulin offers a potential alternative for antibiotics in humans and animals, addressing antimicrobial susceptibility issues. In poultry, research has been initiated in replacing the veterinary antibiotics with immunoglobulins, this may solve the concerns regarding antibiotic residues in chicken egg and meat.

• The rich iron content in egg yolk helps to reduce the incidence of breast cancer and cardiac arrest.

• The rich natural antioxidants lumichrome and sulphoraphane in eggs are thought to retard multiplication of cancer-inducing viruses.

**Diagnostic applications**

• Chicken antibodies are used in many diagnostic tests to reduce the interference caused by mammalian types, thereby improving the accuracy and reducing the cost. For the diagnosis of staphylococcus infection, and other laboratory tests.

• Avidin, a protein in egg white, is widely used as a diagnostic reagent. Avidin-biotin technology is commonly used in advanced disease diagnosis.

• Various low density lipoproteins in yolk are used in production of monoclonal antibodies which have specific application for diagnosis of viral diseases in humans and animals.

• Eggs are commonly used as enrichment media for bacterial disease diagnosis and eggs with embryos are used for diagnosis of viral diseases.

**Other non-food uses**

• As a very good adhesive agent with excellent retaining properties. Collagen is the oldest glue ever used and it is dated back to 8000 years. Collagen is applied to hold utensils and also the string of violin and guitar instruments. Left over albumen in egg can be efficiently applied to fix the corks in metal caps on beverage bottles.

• In leather industry, during tanning process to impart softness, elasticity and finishing to the leather product.

• In photography for the production of photographic aids. Albumen is used as glazing and coating agent for photographic plates and for off-set printing at aluminium/zinc foils.

• As an extender to improve the stability of semen during storage for artificial insemination in animals.

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