

The role of poultry in human nutrition

Increasing the nutrient content of chicken eggs to improve human health

David Farrell, School of Land, Crops and Food Sciences, The University of Queensland, St. Lucia 4072, Queensland, Australia

Over the past 20 years, there has been considerable interest in chicken eggs as carriers of critical nutrients (Miles, 1998). This has implications for improved nutritional status, particularly of low-income people in developing countries. The technology simply entails increasing the content of some nutrients in hens' diets. Several vitamins (folic acid, B12, vitamin E) can be increased in chicken eggs. Examples of two trace minerals are given in the following.

THE BENEFITS OF INCREASING THE IODINE CONTENT OF THE HEN'S EGG

About 1 billion people, mainly in developing countries, suffer from iodine deficiency, especially in India, Africa and China, often with serious consequences. Iodine has several functions, especially as a component of two hormones (T4 and T3) in the thyroid gland. As a result of iodine insufficiency, slow brain development in the foetus can result in stillbirth or mental retardation in the infant, and in goitre, mainly in adults. Villagers without access to marine food sources and in areas where soils are depleted of iodine are particularly at risk. Vegetables and grains grown on iodine-deficient soils lack iodine, and even when they have the minimum level, much can be lost in cooking. Iodized salt is one long-term solution to this problem. It has been introduced into many provinces in China since 1995, but has not yet reached all provinces.

A hen's egg normally contains about 53 µg iodine/100 g edible portion, which is about 33 percent of the recommended dietary intake (RDI), although this varies. Inexpensive supplementation of a hen's diet with 5 mg of potassium iodide per kilogram of feed does not affect the bird's performance, but increases the iodine content of a 60 g egg from 26 to 88 µg; this is more than 50 percent of an adult's RDI (Röttger *et al.*, 2008).

THE BENEFITS OF INCREASING THE SELENIUM CONTENT OF THE HEN'S EGG

The role of selenium, known to be a potent antioxidant, has recently received considerable attention (Surai and Dvorska, 2001). Selenium is involved in the proper functioning of the immune system and in reducing or inhibiting the progression of HIV to AIDS. This disease is less prevalent in countries where soil has a high selenium content than in countries with a low soil level (Jaques, 2006). Selenium is also required for sperm motility, and may reduce the risk of miscarriage.

The United States Department of Agriculture has allowed the statement, "selenium may reduce the risk of some forms of cancer". It is particularly important in reducing the incidence of prostate cancer. A deficiency of selenium can have an adverse effect on mood states, especially depression, and may be associated with several other health-related problems, including heart

disease (Keshan's disease). The conversion of thyroxine (T4) to the biologically active triiodothyronine (T3) also involves selenium.

One problem with selenium is that, unlike iodine, there are few specific symptoms of deficiency; consequently an obvious deficiency (with few exceptions) has not been recognized, although it may affect general well-being.

Selenium in plants depends very much on soil concentrations. Seafoods are a rich source, as are some livestock products, including eggs and chicken meat. Again, the amount reflects the selenium content of the poultry feed. Because humans' daily intake of selenium is relatively low, eggs are an ideal carrier of the trace mineral; there is a maximum amount that can be transferred from feed, but transfer is efficient at low levels of inclusion. Selenium in the inorganic form is less efficient than in the organic form. Supplementation of a layer's diet with organic selenium at 0.4 mg/kg of feed will increase the content of 100 g of edible egg from 20 µg to about 60 µg – the minimum RDI of an adult.

CONCLUSIONS

Eggs are an ideal carrier for enriching human diets with some important dietary minerals. The advantages of this approach is that it is unlikely to exceed the minerals' safe upper limits in humans because the amounts sequestered into the eggs are limited, irrespective of the levels in the hens' diet, and quickly reach a plateau.

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