Analytical approaches to selenium speciation in eggs

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Eggs are an important source of protein, essential vitamins and minerals and can make a significant contribution to a healthy diet. They are the most popular foodstuff of animal origin and one of the most versatile ingredients used in domestic cooking and in many branches of the modern food industry. Eggs are consumed regularly by the majority of the population and as such can be considered a good candidate to become functional food. Due to physiological processes protecting the embryo, it is practically impossible to increase significantly the level of minerals in eggs.

However, selenium, known to protect cell membranes against oxidation, can be incorporated into egg proteins and its content in eggs can be easily manipulated. Presently, Se-enriched eggs are introduced to the market in many countries. Nevertheless, it rises many concerns regarding safety and quality issues related not only to the total selenium content but also to the identity of selenium species present and their bioavailability.

Analytical methods providing information on the selenium species present in eggs have been scarce. Most of selenium is believed to be incorporated into proteins. However, the difficulties in identifying the individual Se-containing proteins spur interest in methods allowing at least the distinction between the fraction of selenium present in the form of selenomethionine (*selenized proteins*, unspecific replacement of S by Se during supplementation), selenocysteine (corresponding to true *selenoproteins*) and non-covalently bound inorganic selenium. Recently, it was demonsrated that the optimization of the sample preparation procedure and, in particular, a selenocysteine derivatization step, allowed the quantitative recovery of selenoaminoacids prior to their specific determination in milk and meat and samples.

This work presents the development of an analytical approach based on a similar principle allowing an insight into the incorporation of selenium into egg proteins. The results obtained indicate the preferential incorporation of selenium into selenized proteins in the egg white and into selenoproteins in the yolk.

In addition, bioavailability of selenium present supplemented eggs (white and yolk) was investigated by fractionation of selenium in simulated gastric and gastrointestinal conditions. It was demonstrated that more than 50 % of selenium present could be bioavailable.