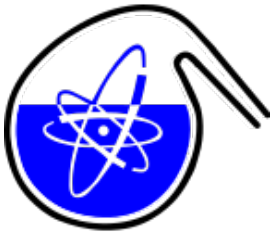

Contribution ID: **960** Type: **Verbal**

Use of radiotracers to evaluate the bioaccessibility of essential minerals from dairy products

Tuesday, 17 May 2022 14:40 (20 minutes)

Globally, it is estimated that more than two billion people suffer from micronutrient deficiencies. Nutrient-rich foods are at the center of creating healthy and sustainable diets, but supplementation approaches based only on the amount of nutrients fail to consider the bioavailability and thus the uptake potential of these nutrients. Therefore, food matrix-based approaches are essential to understand and improve nutrition. In this study we focus on the bioaccessibility of two important minerals, calcium and iron, in dairy products. Calcium stimulates healthy bone growth and prevents osteoporosis, and with anemia affecting a third of the women in reproductive age worldwide increasing dietary iron uptake is now more important than ever. Fortification of staple foods such as milk with these minerals makes for relatively easy distribution amongst the populations, as these products are commonly consumed. However, although dairy products can be an excellent source of many minerals, the body is not always able to absorb them from the product.
The aim of this research is to assess the bioaccessibility and exchangeability of calcium and iron in skim milk. The radiotracers 45Ca and 55Fe were used to follow the phase distribution and exchange behavior between casein micelles, serum proteins, and soluble calcium/iron. Fortification salts, including calcium chloride, calcium carbonate and iron chloride, were intrinsically labelled with 45Ca and 55Fe respectively. It was concluded that the addition of [45Ca]CaCl2 led to an increase of calcium in the soluble phase, indicating an increase in bioavailability, whereas fortification of milk with [45Ca]CaCO3 was shown to be unlikely to increase calcium bioavailability. Since Fe2+ is known to be more bioavailable than Fe3+, Mössbauer spectroscopy was used to assess the oxidation state of iron in milk. Furthermore, using 55Fe as tracer it was shown that the addition of an iron absorption enhancer (ascorbic acid) increases the bioaccessibility of iron, whereas the addition of the iron absorption inhibitor (tannic acid) resulted in a significant decrease in bioaccessibility. Taken together, these results show that rather than focusing just on the amount of supplemented mineral, their initial chemical state as well as conditions present in the digestive system (such as pH) play an extremely important role which cannot be neglected when using supplements. Through the use of radiotracers, a better understanding of the exchange behavior of Ca and Fe in milk was obtained, which is essential to develop effective milk products containing bioaccessible nutrients to combat micronutrient deficiencies.

Primary author: Dr DE KRUIJFF, Robin (Reactor Institute Delft, Delft University of Technology)

Co-authors: Ms DE VOS, Marije (Reactor Institute Delft, Delft University of Technology); Ms KLOOSTERBOER, Lisette (Reactor Institute Delft, Delft University of Technology); Ms SEWRATTAN, Shanin (Reactor Institute Delft, Delft University of Technology); Ms TERPSTRA, Baukje (Reactor Institute Delft, Delft University of Technology); Ms VAN DER HORST, Evie (Reactor Institute Delft, Delft University of Technology); Prof. HUPPERTZ, Thom (Food Quality & Design Group, Wageningen University & Research)

Presenter: Dr DE KRUIJFF, Robin (Reactor Institute Delft, Delft University of Technology)

Session Classification: Nuclear Analytical Methods

Track Classification: Nuclear Analytical Methods