ABSTRACT:

In many European countries, including Poland, the dose of selenium (Se) supplied in the diet is too low and amounts to about 50% of the recommended daily dose. In the event of a Se deficiency, it is recommended to additionally supplement the diet with this element. Dairy products can be a valuable source of Se in the human diet, especially since the Se present in them is characterized by high bioavailability. In the context of increasing the intake of this element, a group of products worth considering are fermented milk drinks. The LAB bacteria contained in them demonstrate the ability to sequester heavy metals, which limits their absorption in the digestive tract and distribution to target sites, thus preventing their harmful effects.

The aim of the study was to assess the effect of probiotic cultures and biofortification of milk with selenium: a) on the bioavailability and concentration of the total form of Se in milk and in fermented milk drinks made from it - kefirs and yogurts b) on the bioavailability and concentration of its selected antagonists in milk and in kefirs and yogurts.

The obtained results indicate that milk biofortification with selenium (Se) and a certain kind of starter and probiotic cultures have a significant effect on the concentration and bioavailability on most of the analyzed elements in kefirs and yogurts. When using Se-biofortified milk for the production of kefirs and yogurts, higher total concentrations of Se, Zn (only in yogurts) and Hg and lower concentrations of Cd and Pb can be expected in dairy products. In yogurts, milk biofortification with Se usually increased the bioavailability of the analyzed elements, except for Zn. In the case of kefirs, milk biofortification with Se improved the bioavailability of Se and Zn, but at the same time contributed to a decrease in the bioavailability of Cu and Fe. In both dairy products, a favorable phenomenon seems to be the lower bioavailability of toxic elements (Hg, Cd and Pb). In practice, this means that milk biofortification with Se can be adapted to specific production needs and goals to optimize the beneficial effects in various dairy products. In kefirs, probiotic vaccines containing L. rhamnosus and L. plantarum improve the bioavailability of beneficial elements (Se, Fe and Zn) without affecting toxic elements. In yogurts, however, it has been shown that probiotics can limit the bioavailability of Cu and Zn, and L. plantarum can increase the bioavailability of Hg, while reducing the bioavailability of Cd. Therefore, the selection of appropriate probiotic vaccines should be adapted to the type of product. The addition of inulin to yogurts can limit the bioavailability of beneficial elements such as Se, Fe and Zn and increase the bioavailability of Hg, which should be considered in the production of dairy products. In kefirs, the effect of inulin is less significant, which suggests that its use may be more beneficial in the context of kefir production than yogurt.

The conducted studies allowed to confirm only the first hypothesis, which states that biofortification of milk with Se increases the content of the bioavailable form of Se in kefirs and yogurts. However,

the two remaining hypotheses, stating that biofortification of milk with Se and the use of probiotic cultures, have an impact on the reduction of the bioavailability of Cu, Fe and Zn and toxic metals, could not be fully confirmed. Nevertheless, based on the obtained results, it can be concluded that the use of milk with the right concentration of Se, inulin, as well as appropriate starter and probiotic cultures for the production of fermented milk drinks allows for the formation of a profile of trace elements in a given product that is desirable from the consumer's point of view.

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