

## T3O-2.

### **Effects of technological processes usable in developing countries to reduce antinutritional factor contents and improve iron and zinc bioavailability in cereal grains**

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Iron and zinc deficiencies are common nutritional disorders in the world and represent public health problems in areas where overall malnutrition is prevalent. Because animal products are often unavailable or too expensive, the main iron and zinc sources for infants and young children in developing countries are plant foods, and particularly cereals, which are very often used to prepare infant gruels.

Unfortunately, iron and zinc absorption rates in cereals are very low and ranging from 2 to 20 percent and from 20 to 40 percent, respectively. In cereal grains, iron and zinc bioavailability is reduced by antinutritional factors (ANF) such as phenolic compounds, some dietary fibres and above all phytates, which form complexes with divalent cations rendering them insoluble or non absorbable.

Certain thermal, mechanical or biological treatments allow reducing ANF contents. Apart from drastic treatment such as canning or extrusion cooking, the efficiency of thermal processes in reducing phytate content is limited because of the high stability of the molecule. Conversely, mechanical treatments such as grain decortication can allow reducing ANF contents but their effectiveness depends on the ANF localization in the grain and thus on the cereal species. Soaking is the biological treatment which is the easier to implement. It leads only to low reduction of ANF contents but addition of commercial phytases can strongly promote phytate reduction during soaking of flour. However, phytase addition involves additional cost and is not yet authorized as food additive in numerous countries. It is also possible to attain phytate degradation rates up to 80% with germination and fermentation due to enzymatic degradation by endogenous phytases or both endogenous and microbial phytases, respectively. Because of their high amylase activity, malted flours can only be incorporated to infant flours in low proportion when preparing gruels. Fermentation is not only a traditional process widely used to prepare infant gruels in different regions of the world but also one of the most effective processes to reduce ANF contents till a level permitting the improvement of iron and zinc bioavailability.

Thus, ANF content reduction has to be taken into consideration by technologists when selecting processes capable of conferring on infant gruels their required characteristics.

**Keywords:** cereal, antinutritional factors, bioavailability, iron, zinc.

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