IMPACT OF FOOD ADITIVES AND SUPPLEMENTS ON BREADMAKING PRODUCTS

INFLUENȚA ADITIVILOR ALIMENTARI ŞI A SUPLIMENTELOR ALIMENTARE ASUPRA PRODUSELOR DE PANIFICAȚIE

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Abstract: *Food additives may present chemical-nature risks in milling and breadmaking industry. The additives of food biotechnological products, which improve final products' qualities (smell, taste, aspect, stimulating properties), colour them or play the role of excipients, may generate toxic effects, especially related to the deficient dosage. These categories include: antioxidants, flavours, colorants, preservatives, emulgators, sweeteners and flavour enhancers.*

Key words*: food additives, breadmaking products, risks, influence*

INTRODUCTION

Of all the additives used in the correction of flour quality characteristics, a relative risk is represented by chlorine, used in its gaseous form since 1912 in the U.S.A., Great Britain, Canada and Australia, to bleach and maturate the flour used for biscuit production, and also the flour for pastry products containing much sugar[9].

The studies performed on rats fed on chlorinated flour-based products proved that, under conditions of normal diet doses, the lipids presented in the chlorinated flour do not exert obvious effects on biological systems. The big doses determine a series of biological effects, like lactation reduction or chlorinated lipid accumulation in the adipose tissue.

MATERIAL AND METHOD

For breadmaking industry, it is necessary to carry out an analysis of the raw matters that are included in the final products, in order to maintain freshness and to process the dough for bulk production. For this, we studied the food additives that may be included in pastry products by consulting the Romanian and foreign specialty literature and insisting on the mineral elements used as nutritional supplements in food recipes, including pastry products.

RESULTS AND DISCUSSIONS

The sanitary legislation from Romania, most European Union countries, Canada and the United States does not allow the utilization of potassium bromate as flour agent, because the potassium bromate resulted through bromate reduction is supposed to exert cancerogen effect.

Of all the additives used in food industry, only the **emulgators** (substances that facilitate the formation and maintenance of an homogenous mixture: lecithin – E 322, fatty acid salts – E 470, glycerides – E 471 – E 472, etc.) are used in pastry industry.

At the antipodes, for example, bread production includes the preservatives presented in Table 1.

Table 1. Australian codes for common food additives

Number	Preservative	The food including it
200-203	Sorbic acid and sorbates	- soft drinks - cheese - dry fruit - **bread** - fruit juices - wine
280-282	Propionic acid and propionates	- **bread** - **other flour-based products**

Source: [1]

Bread and pastry products contain emulgators for freshness maintenance and to process dough under conditions of bulk production. These are used for ice-cream, cakes, whipped cream, sauces and feta cheese as well.

The issue of **mineral elements safety as nutritional supplements in pastry products** is not new.

The television, internet and magazines are full of advertisements for nutritional supplements. A category of nutritional supplements that has recorded a significant increase during the last period and we may estimate even a bigger short-term increase is represented by the **mineral supplements**.

The reason makes the consumers and the experts in milling and breadmaking industry as well ask a series of questions, like [2]:

- What research type does stay beyond these advertisements?
- The effects exerted by various mineral elements differ from each other?
- Are these mineral supplements positive only in the case of deficiencies or may we consume them in amounts that are bigger than the ones usually recommended?
- What are the food safety problems generated by mineral supplements?

As the utilization of dietary supplements becomes more frequent, our concern regarding some of the ingredients increases, too, including their potential interactions with negative effects between supplements and medicines.

We present the main mineral elements (in alphabetical order) introduced as nutritional elements in the recipes of various food products, including pastry products (table 2) [2,3].

Table 2. The main mineral elements introduced as nutritional supplements in pastry products

Mineral elements	Adult requirement	Typical dose in studies on supplementation	The best supplementation complex	Applications	Maximal level admitted
BORON	not known	not known	not known	stimulation of other mineral functions, especially for bone health	not known
CALCIUM	1000 mg	400-1000 mg (the optimal doses for each application are not known)	there are some, acceptable for most people; in some cases, one complex may be better than another	good for rachitis treatment; seems to be good in bone system treatments (although the calcium available in dairy products represents a good alternative); promising in weight lose and cholesterolemia; good for blood pressure (not known how good)	not known
CHROME	35 mg (males), 25 mg (females)	200-1000 mg (the efficient dose is questionable)	picolinate or nicotinate (controversial)	not known; the best targets are glycaemia and lipemia	not known
COPPER	0.9 mg (controversial)	2-5 mg	glycinate or sulphate; gluconate may be good, but insufficiently tested; the oxide is currently used, but it has been not sufficiently tested on animals	enhances the enzymatic activity in some persons; possible positive effects on health	10 mg
IRON	18 mg (males), 8 mg (females)	variable, but in anaemia correction may reach 300 mg/day	Iron sulphate is the cheapest and get well absorbed, but some doses may irritate the gastro-intestinal tract	positive in anaemia treatment, possibly good for anaemia prevention, in pregnancy	45 mg
PHOSPHORUS	700 mg	variable	not known	in sports (controversial, but possible)	4 g
IODINE	150 g	Variable	not known	treatment of severe and marginal deficiencies;	1100 g

				possibly in breast cyst fibrosis	
MAGNESIUM	420 mg (males), 320 mg (females)	300-600 mg	on the whole, the organic complexes are considered to be more attractive than the inorganic ones, excepting the liquid chlorine; actual data are controversial; amino acids chelates and lactate are among the best for gastro-intestinal tolerance; some of the magnesium-based complexes may act better in some specialized applications	hypomagnesia treatment	350 mg of supplement (according to the gastro-intestinal tract symptoms); doses may be overtaken if the daily doses get rare
MANGANESE	not known	5-15 mg (the minimal efficient dose is not known)	not known	possibly in the bone-articular system; probably as antioxidant	10 mg (controversial)
POTASSIUM	not known	900-2000 mg (the minimal efficient dose is not known)	numerous complexes seem to present good absorption	hypertension treatment, in association with another medicine; potassium-rich food	not known
SELENIUM	55 g (may cover the basic function without maximizing the action of protection against health problems that are not strictly related to the selenium deficiency)	55 g for prevention or 200 g for treatment	selenite, selenate, L-selenomethionine (single or in yeast) with good absorption; L-selenomethionine is more bioactive than the others	prevention of some cancer forms, treatment of chronic pancreatitis, nutritional support for children affected by epilepsy on ketogenic diet; immune and antioxidant effects, nutritional support for HIV-affected persons; treatment/prevention of arthritis, therapy for reproduction problems	400 g (below the amount that cause toxicity)
SILICON	not known	not known	not known	maintains the connective tissue involved in bone and cardio-	not known

				vascular systems	
VANADIUM	not known	not known	not known	diabetes treatment	1.8 mg
ZINC	11 mg (males), 8 mg (females)	variable (there are not any response curves to doses)	the oxide is the least desired; other complexes are well absorbed	Correction of zinc deficiencies; insufficiently confirmed in Down's syndrome and renal dialysis; possible utilization in diabetes or in underdeveloped children not confirmed in osteoporosis prevention; used in cold treatment; controversial in acne treatment	40 mg (insufficiently tested)

The specialty literature in the fields of milling and breadmaking make evident the role played by some of these mineral elements, used as food supplements in pastry products, in human food safety. So, there are sufficient data regarding the utilization of the following mineral elements:

- **calcium**: females in menopause (when the incidence of osteoporosis is very high because the release of specific hormones stops) may obtain the necessary calcium from the bread fortified with three salts and $CaSO_4$ [7];
- **selenium**: people may take the selenium necessary for normal development and health from the selenium bread [6];
- **zinc**: the zinc deficiency (frequent in the regions where the bread is made without yeast and is rich in phytate, which impedes zinc absorption) may be corrected through consumption of bread and other wheat-based products with addition of zinc as zinc oxide or zinc sulphate [2];
- **mineral elements on the whole**: some experiences performed on rats proved that the bread made with yeast improves the availability of mineral elements, by reconstituting the whole wheat flour [6].

CONCLUSIONS

The toxicity studies performed by various researchers proved that moderate chlorine doses do not affect the flour's content in fatty acids.

In the food industry from our country, of all the additives used, only **emulgators** (lecithin – E 322, fatty acid salts – E 470, glycerides – E 471 – E 472, etc.) are used in breadmaking industry.

We observed that the bread prepared with yeast improves the availability of mineral elements, by reconstituting the whole wheat flour.

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