Supplementary Material

This file contains a more extensive discussion on the mineral's composition of the breakfast cereals products developed in the study: "High-Fiber Breakfast Cereals Using Only Carrot and Cereal By-products".

3.5.Minerals composition

All formulations provided a similar amount of K (19-20 mg/g) except for formulations with 60% of wheat bran, as this ingredient provides half of the amount of carrot flour and rice bran (Table 6). Considering the recommended intake of K of 3500 mg/day, a 30 g meal of these BCP formulations can provide 14-17% of the recommended daily allowance. Comparing to other foods of plant origin, these products can be considered good sources of this mineral. Seeds and nuts are rich in K, providing 22 mg/g, other food plants such as potatoes, banana and avocado can provide 0.2-7.3 mg/g [67].

The minimum Na content was 0.34 g/100 g for formulation B, so these BCP may not have any nutritional claim regarding Na. It would be necessary to have a maximum of 0.12 g of sodium/100 g of products to claim 'low sodium/salt' [65].

The formulations with 70% of rice bran are the richer in P. A 30 g meal of the BCP with 70% of rice bran delivers almost 50% of the minimum daily dosage of P. So, these formulations provide a good source of this mineral. Regarding excessive amounts, it would be required more than 3-4 g/day to be harmful by interfering with Ca absorption [67].

As it is well known, calcium is essential for human health and several biological functions in musculoskeletal, nervous and cardiac systems, bones and teeth, and parathyroid gland [67]. These formulations provided a good amount of this mineral, ranging from 1.7 to 3.3 mg/g (Table 6). Carrot flour was the ingredient providing the highest amount of Ca in BCP formulations, while rice bran provided the lowest.

On the other hand, Mg was mostly given by rice bran, thus the formulations with 60% of rice bran had the higher Mg content, approximately 6 mg/g. So, a 30 g meal of these formulations (D and DR) provide approximately 90% of the minimum daily dosage of Mg. The formulations with no rice bran and 70% of carrot flour, provided the least amount of this mineral, corresponding to 30% of the minimum daily dosage in a 30 g meal of this BCP.

Regarding Zn, the wheat bran formulations provided approximately the double amount comparing to the rice bran formulations. These BCP formulations provide 15-34% of the minimum daily recommended amount for each meal of 30 g.

Despite the fact that Fe is considered a trace element, the Fe amount that is needed is higher comparing to other trace elements as it plays a vital role in the transport of the oxygen and iron deficiency results in hypochromic anaemia [67] and is a risk factor for Plummer-Vinson syndrome which is associated with risk for cancers of the upper alimentary tract [69]. Brans contributed more to Fe content than carrot flour. Thus, formulations with 70% of bran, especially wheat bran, presented higher Fe content, delivering up to 38% of the minimum daily recommended amount for each meal of 30 g.

These formulations provided from 0.05 (70% carrot/30% rice bran) to 0.12 mg/g (40% carrot/60% wheat bran) of magnesium. Mn recommended amount is 2 mg/day for toddlers and 11 mg/day for adults [68]. For children, it would be enough 0.07 mg/g to achieve the goal of 2 mg/day in one meal.

The BCP formulations can provide 30-60% of the minimum recommended daily allowance for cupper, in one meal of 30 g. Aluminium (Al) was also found in these formulations, coming from carrot flour and rice bran. Formulations end up with 0.01 mg/g, which corresponds to 0.3 mg per meal of 30 g. In average the ingestion of Al in foods range from 3-5 mg/day and few amounts of the ingested Al is absorbed [69]. Therefore, the detected Al amounts are not considered to have any relevant positive or negative nutritional effect.