

Gaining nutrition through whole grains

The importance and necessity of incorporating whole grains in the daily diet is strongly being advocated by healthcare experts and professionals around the globe. Whole grains are packed with beneficial nutrients which positively contribute to the well-being of the human body.

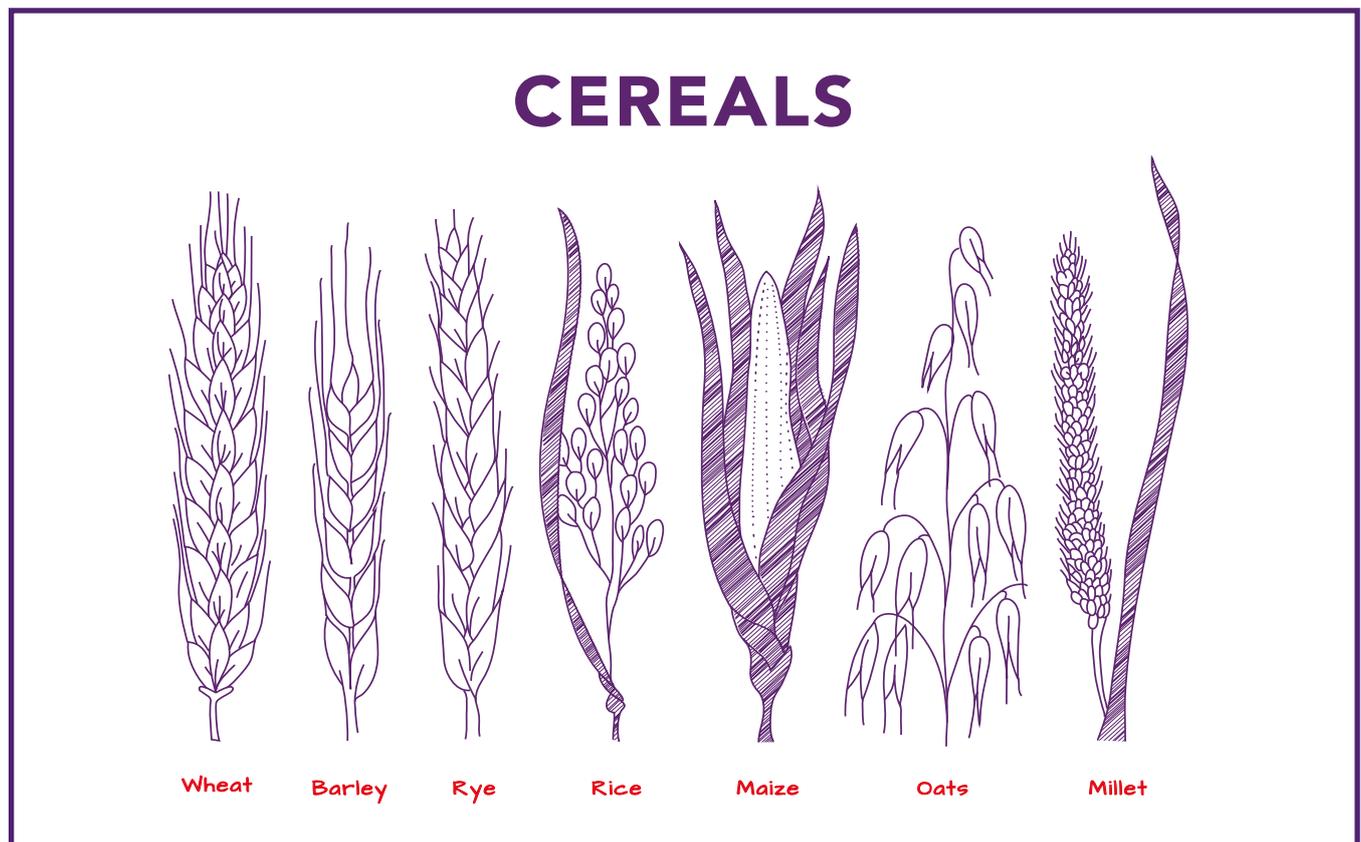
Increasing goodness of whole grains in mondelēz international's food offerings

Mondelēz International has made a concerted effort to increase whole grain-based food offerings. We have used our nutrition research and technological expertise to develop a strong portfolio of whole grains-based adaptive and innovative food products.

♥ We have created more than 300 whole grains-based snacks worldwide, including *Wheat Thins* crackers with 70% whole grains, *beVita* breakfast biscuits with 40% whole grain, *VitaLU* crackers with 80% whole grain and *Triscuit* crackers with 93% whole grain.

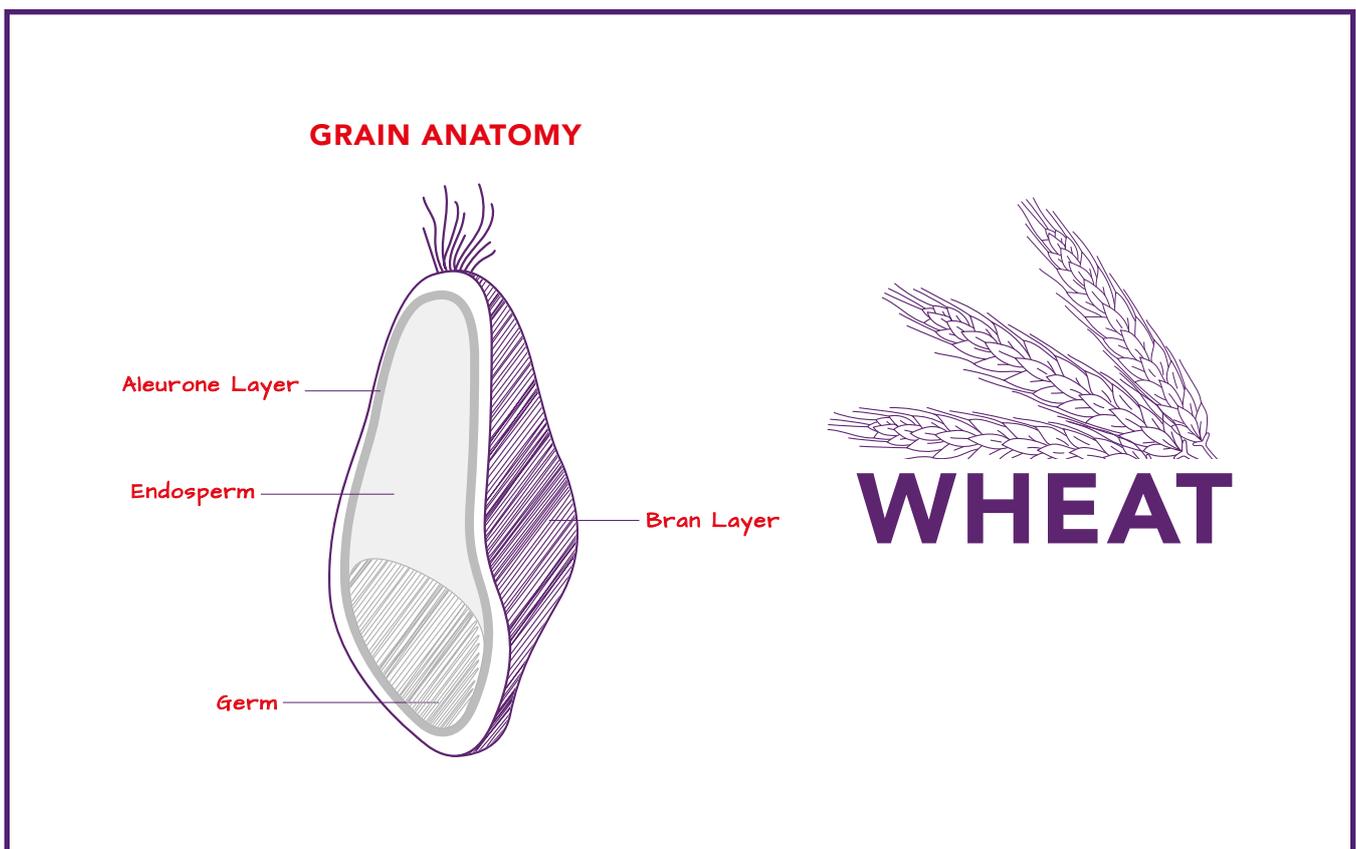
♥ We have a public commitment to increase the level of whole grains delivered through our food offerings by 25% by the year 2020.

Understanding whole grains



Whole grains are edible nutrient-dense grains produced by cereal plants belonging to the *Gramineous* family. Examples of commonly consumed whole grains are barley, maize, oat, rice, rye, and wheat. A few exceptions included in the list of whole grains are buckwheat and quinoa. These “pseudocereals” are grains which do not belong to the *Gramineous* family but still provide similar nutritional value. Grains are consumed cooked or when their flour is used as an ingredient for making other foods. The source of whole grain for both is the grain kernel.

Grain kernel: anatomy and nutritional composition



The three main parts of a grain kernel are as follows:

Germ: The innermost layer which upon germination is the future progeny of the grain is composed of nutrients such as B vitamins, vitamin E (antioxidant), vital minerals, beneficial unsaturated fatty acids, phytosterols, fibers and proteins.

Endosperm: The middle layer which is the main provider of energy during the kernel germination. It is packed with starch and proteins and is the largest part of the kernel.

Bran: The outermost layer which mainly serves to protect the kernel, is quite coarse, rich in soluble and insoluble fibers and also contains proteins, B vitamins, minerals and antioxidants in the form of phenolic acids.

The nutrient dense whole grain is thus packed with bioactive components such as vitamins, fiber, minerals, antioxidants including phytochemicals like betaine, choline, sulfur containing amino acids and melatonin. Majority of these bioactives are present mainly in the bran and the germ of the whole grain kernel (Fardet A, 2013).

This leads us to the question: what is the difference between whole grain and non-whole grain containing foods?

According to the definition developed in 2010 by the European HEALTHGRAIN Consortium, “Whole grains shall consist of the intact, ground, cracked or flaked kernel after the removal of inedible parts such as the hull and husk. The principal anatomical components (starchy endosperm, germ and bran) are present in the same relative proportions as they exist in the intact kernel. Small losses of components (i.e. less than 2% of the grain and 10% of the bran) that occur through processing methods consistent with safety and quality are allowed.” – (Asp N-G et al., 2010 cited by van der Kamp et al., 2014).

The answer therefore lies in the type of flour that is used to make these foods. Cereal grain derived flour products incorporate either whole grain flour or refined grain flour.

What is the difference between whole grain flour and refined grain flour?



Grain flour is obtained through an elaborate milling process in which the grain kernels are first broken down and exposed to various processes such as grinding, reduction and sifting. These processes separate germ, endosperm and bran into three individual streams.

Whole grain flour is made by recombining each of these fractions back together in the original ratio that existed in the intact grain kernel. This allows for delivery of the whole nutrition that originally existed in the original grain kernel (Jonnalagadda et al., 2010).

Refined grain flour contains only the endosperm fraction and lacks the germ and the bran fractions. This makes it nutritionally weaker since it lacks the majority of the nutrients present in the germ and the bran (Jonnalagadda et al., 2010). This subtle difference in the flour composition therefore leads to big difference in the nutritive value and health benefits delivered.

Health benefits of consuming foods containing whole grains



Current scientific evidence based mainly on epidemiological and cross-sectional studies indicates that consumption of products containing whole grains, along with a balanced diet that is low in saturated fat, is associated with protective health benefits against chronic diseases such as type 2 diabetes, cardiovascular disease, (Fardet A, 2013) and a reduced risk of weight gain (Harland and Garton, 2008 cited by Jonnalagadda et al., 2011). A reduced risk of hypertension has been seen in men who reported consumption of at least 4 daily servings of whole grain foods (Wang et al., 2007). Evidence from 14 cross sectional studies most of which were done in the US, showed that a daily intake of ~3 servings of whole grains is associated with lower Body Mass Index (BMI) in adults (Jonnalagadda et al., 2011).

Limited interventional studies in humans have shown that increased consumption of whole grain containing products may contribute to lower Body Mass Index (BMI), better glycemic and insulinemic control, reduced level of inflammatory markers, increased satiety and lower levels of amino acid homocysteine which is a cardiovascular risk factor (Fardet A, 2013).

Fibers which are a major component of whole grains have been observed to play a role in maintaining gastrointestinal health. The soluble fibers promote the growth of intestinal flora while the insoluble fibers due to their ability to retain water increase fecal weight and increase intestinal transit time (Slavin 2004; Sengupta et al., 2001). Limited observational studies indicate a strong inverse association between gastrointestinal and pancreatic cancers and consumption of whole grains (Jonnalagadda et al., 2011).

Even though available observational and interventional data assert the beneficial health effects of whole grains, more interventional studies are needed to establish a solid understanding of the mechanisms through which whole grains positively impact health.

Click the link to access a comprehensive review outlining the evidence of beneficial effects of whole grains on health <http://www.mdlznutritionscience.com/FLIPBOOK-NUTRINSIGHT-2/nutrinsight2.html>

References

- Jonnalagadda SS, Harnack L, Liu RH, Mckeown N, Seal C, Liu S, Fahey GC. Putting the whole grain puzzle together: health benefits associated with whole grains- Summary of American Society for Nutrition 2010 Satellite Symposium. *J Nutr.* 2011, 141:1011S-1022S
- Fardet, A. Whole grains from a mechanistic view. In *Whole Grains Summit 2012 Proceedings* (Chapter 1). 2013. doi:<http://dx.doi.org/10.1094/CPLEX-2013-1001-01B>
- Sengupta S, Tijandra JJ, Gibson PR. Dietary fiber and colorectal neoplasia. *DI Colon Rectum.* 2001, 44:1016-33
- Slavin J. Whole grains and human health. *Nut Res Rev.* 2004, 17(1):99-110
- van der Kamp JW. Whole grain definition: new perspectives for inclusion of grains and processing but not for analysis. In *Whole Grains Summit 2012 Proceedings* (Chapter 7). 2013.
- van der Kamp JW, Poutanen K, Seal C, Richardson DP. The HEALTHGRAIN definition of 'whole grain'. *Food Nutr Res.* 2014, 58:22100. doi:<http://dx.doi.org/10.3402/fnr.v58.22100>
- Wang L, Gaziano JM, Liu S, Manson JE, Buring JE, Sesso HD. Whole and refined-grain intakes and the risk of hypertension in women. *Am J Clin Nutr.* 2007, 86:472-9