



Exploiting bioactivity  
of European cereal grains  
for improved nutrition  
and health benefits

## **Whole Grain Definition**

**Developed by the European HEALTHGRAIN Consortium**



Jan Willem van der Kamp  
TNO Quality of Life, Zeist, The Netherlands



## The need for a Whole Grain Definition in Europe

- Growing consumption of whole grain products **in Europe** also in countries without whole grain tradition.
- Whole grain and whole meal not defined in most countries.
- Short definitions in a number of countries e.g.  
***”Whole grain products include the entire germ, endosperm and bran. Grains that have been subjected to processing such as milling are also included.”***
- Actions at national levels for more complete definitions (e.g. UK, Denmark) including list of grains included and processes allowed.
- **HEALTHGRAIN Consortium (2008) :**  
**Need for one definition in Europe**





## WHOLE GRAIN NEW PRODUCT LAUNCHES BY CATEGORY

Category	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Baby food	3	5	7	1	8	5	29	78	55	77
Bakery	84	115	158	215	337	348	639	772	1092	1206
Breakfast Cereals	37	90	74	114	175	242	414	642	824	828
Meals & Entrees	7	4	11	10	25	29	71	90	127	95
Side Dishes	18	18	47	31	49	100	127	212	250	283
Snacks	2	23	17	35	57	103	286	401	435	359
Other	13	9	7	11	23	28	35	67	100	158
<b>Total</b>	<b>164</b>	<b>264</b>	<b>321</b>	<b>417</b>	<b>674</b>	<b>855</b>	<b>1601</b>	<b>2262</b>	<b>2883</b>	<b>3006</b>





## Towards the Whole Grain Definition

<i><b>Venue and dates</b></i>	<i><b>Activity</b></i>
<b>Autumn 2008 – 24-3-2009</b>	<b>Enquiry on websites of HEALTHGRAIN and Cereals &amp; Europe</b>
<b>Paris 4-11-2008</b> , (after (Industrial Platform Workshop)	<b>Open Discussion Meeting Organised by HEALTHGRAIN+ICC</b>
<b>Newcastle 24-3-2009</b> Part of Whole Grain Summit	<b>Discussion session →1<sup>st</sup> draft definition, followed by e-mail discussions</b>
<b>La Grande Motte, 11-6-2009</b> 4 <sup>th</sup> HEALTHGRAIN Annual Meeting	<b>Discussion session →2<sup>nd</sup> draft definition, followed by e-mail discussions</b>
<b>Frankfurt 17-11-2009</b> (after (Industrial Platform Workshop)	<b>Open Discussion Meeting</b>
<b>December '09 – February '10</b>	<b>Whole Grain Definition Finalisation</b>
<b>Lund, 7 May 2010</b> HEALTHGRAIN Final Conference	<b>Whole Grain Definition Official presentation</b>





## Whole Grain Definition - Scope

- More comprehensive than current definitions in EU countries
- When possible equal to definitions outside Europe
- Reflecting current industrial practices
- Expected to be useful in the context of **Nutrition recommendations** and guidelines (*aiming at over-all health benefits*), and of nutrition claims. For example:
  - ***'eat more fruits and vegetables'***
  - ***'when eating grain products, choose the whole grain ones'***
- Covering the **Food Category** cereal grains
- **Health claims** in Europe must be based on documentation of ***specific health effects of specific grains or grain components*** in the diet.





# Production of whole meal flours

## Current industrial practices

- > 90% of flours are produced by 'modern milling':  
Breaking of kernels → separation into milling streams: white flour, germ, bran (various fractions)
  - ✗ Option: removal of very outer layer by peeling
- Recombination: fixed ratio's of **milling streams**:  
**germ** (*after heat treatment/ inactivation of 'rancidity promoting enzymes*),  
**white flour** and **bran**;
- Recombination at the flour mill or by producers of consumer products (e.g. major biscuit manufacturers)
- Germ, bran and white flour may originate from different batches (and cultivars), but should be of one species.
- Modern milling contributes to constant quality (composition, processability)

**Notes: Health benefits shown in food epidemiology research of whole grain products = whole grain products produced by modern milling**

**< 10% of flours made by stone grinding: no separation of fractions**





## **Whole Grain Definition**

### **Developed by the 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 - the 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/10% of the bran - that occur through processing methods consistent with safety and quality are allowed.***





## USA definition

---

- AACC 1999/US-FDA 2006:  
'Whole grains shall consist of the intact, ground, cracked or flaked caryopsis, whose principal anatomical components – the starchy endosperm, germ and bran – are present in the same relative proportions as they exist in the intact caryopsis'.
- Basic principle: the ratio of bran, germ and endosperm is the same as in the original grain kernel.





## Whole Grain definition - Whole grain sources - 1

Cereals	Scientific name
Wheats, including spelt, emmer, faro, einkorn, kamut, durums	<i>Triticum</i> spp.
Rice	<i>Oryza</i> spp.
Barley incl.hull-less or naked barley but not pearled	<i>Hordeum</i> spp.
Maize (corn)	<i>Zea mays</i>
Rye	<i>Secale</i> spp.
Oats, including hull-less or naked oats	<i>Avena</i> spp.
Millets	<i>Brachiaria</i> spp.; <i>Pennisetum</i> spp.; <i>Panicum</i> spp.; <i>Setaria</i> spp.; <i>Paspalum</i> spp.; <i>Eleusine</i> spp.; <i>Echinochloa</i> spp.
Sorghum	<i>Sorghum</i> spp.
Teff (tef)	<i>Eragrostis</i> spp.
Triticale	<i>Triticale</i>
Canary seed	<i>Phalaris arundinacea</i> and <i>P.canariensis</i>
Job's tears	<i>Coix lacryma-jobi</i>
Fonio, black fonio, Asian millet	<i>Digitaria</i> spp.
Wild rice	<i>Zizania aquatica</i>





## Whole Grain Definition - Whole grain sources - 2

<b>Pseudocereals</b>	<b>Scientific name</b>
Amaranth Buckwheat, Tartar buckwheat Quinoa	<i>Amaranthus caudatus</i> <i>Fagopyrum</i> spp. <i>Chenopodium quinoa</i> Willd. is generally considered to be a single species within the Chenopodioideae

Note: Whole grain sources: same as in USA definition

Covering the Food category Cereal Grains





## Definition – grains included - remarks

- Rice, wild rice and the specified pseudocereals are included in the whole grain sources.
- Nutritional guidelines with regard to a food category do not exclude a particular food within the group because of a particular compositional profile.
- Pseudocereals have a similar macronutrient composition to cereals, and in dietary guidelines they are included in the bread and cereal group.
- Pseudocereals provide alternative sources of grains for those who cannot consume mainstream cereals because of allergies and they allow for product innovation and a wider consumer choice.
- US FDA draft guidance in 2006 also included the specified pseudocereals amaranth, buckwheat and quinoa.





## **Whole Grain Definition - remarks Milling and processing - 1**

---

The adding together, after temporary separation, of the three whole grain constituents as separate ingredients, in the correct proportion at both the milling and baking stages, is consistent with longstanding food industry technological and safety practices in Europe and the USA.





## Whole Grain Definition Milling and processing - 2

- Recombination of bran, germ and endosperm from the same type and variant of grain in which a component (bran, germ or endosperm) has been stabilised is allowed, provided that the three components are in the correct proportions.
- Removal of the very outer bran layer - up to 10% of the bran or 2% of the grain - is acceptable for minimising levels of undesirable substances such bacteria, moulds, agrochemicals and heavy metals.





## Whole Grain Definition

### Milling and processing 3 – fluctuation in composition

---

- Recombination of the endosperm, bran and germ takes into account that there are variations in the ratio of endosperm, bran and germ between kernels in one ear and between varieties of one type of grain.
- Recombination per grain and per variety will result in some fluctuations in the ratios of endosperm, bran and germ between batches of flour and products. There should, however, be no significant nutritional losses, and differences should be no greater than normally found from season to season or between varieties.





## Whole Grain Definition

### Milling and processing 4 – GMP requirement

- Virtually all the cereals are made into flours that can be used to bake breads and other cereal-based products, including breakfast cereals.
- *Production of those flours and products must follow appropriate quality systems (e.g. Good Manufacturing Processes, GMP etc.) in compliance with food safety regulations in the European Union.*
- Storage conditions and shelf-life of whole grain flours, breads and cereal-based products vary according to the nature and composition of the product. Shelf-life stability information should be provided on product labels in compliance with European legislation.





## ***Whole Grain Definition – further actions To be initiated by the HEALTHGRAIN Forum***

- 1) Communication of the definition in and outside Europe**
- 2) Submission to European Commission – DG SANCO**
  - ✘ Proposed: submission to Standing Committee by several member states*
- 3) Further development of the definition**
  - ✘ Guidelines for allowed processes and for labelling*
  - ✘ Inclusion of tritordeum*
    - hybrid of durum wheat and a wild barley species
    - (see poster, abstract book p.83)





## *Acknowledgement*

- Members of HEALTHGRAIN's Whole Grain Definition Committee:
  - Kaisa Poutanen            VTT and University of Eastern Finland
  - David Richardson        DPRNutrition
  - Nils-Georg Asp and      Swedish Nutrition Foundation  
  Susanne Bryngelsson
- Participants in all discussions





# The HEALTHGRAIN Forum - FROM SCIENCE TO ACTION

