

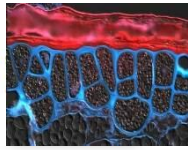


# Ons dagelijks brood: nog steeds voedzaam en gezond?

Jan Willem van der Kamp

TNO Food and Nutrition , Zeist, the Netherlands

[jan-willem.vanderkamp@tno.nl](mailto:jan-willem.vanderkamp@tno.nl)



# Inhoud

Inleiding -

Graan en Brood –wat zit er in?

Voedingsonderzoek – en voedingsaanbevelingen

Hypes en goeroes

Duurzaamheid en eco-efficiency



**HEALTHGRAIN • FORUM**

# **HEALTH EFFECTS OF CEREAL FIBRE**

**OVERVIEW PRESENTATION JANUARY 2015**



12th European  
Nutrition Conference  
**FENS 2015**  
Berlin | Germany | October 20 - 23

Nutrition and health throughout life-cycle -  
Science for the European consumer

Estrel Convention Center, Berlin, Germany

organised by German Nutrition Society  
[www.fensberlin2015.org](http://www.fensberlin2015.org)



# Health benefits of cereal foods and components in our daily diet - an overview



**Gabriele Riccardi, MD, FAHA**

Full Professor of Endocrinology and Metabolic Diseases

Director of the Master Course on Human Nutrition

Federico II University, Naples, Italy



school of  
**psychology**



**UNIVERSITY OF LEEDS**

# Cereal fibre and psychological wellbeing in young and middle-aged adults

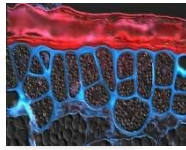
Clare Lawton

Leeds Nutrition & Behaviour Group

School of Psychology

University of Leeds, UK

[c.l.lawton@leeds.ac.uk](mailto:c.l.lawton@leeds.ac.uk)



# Inhoud

Inleiding -

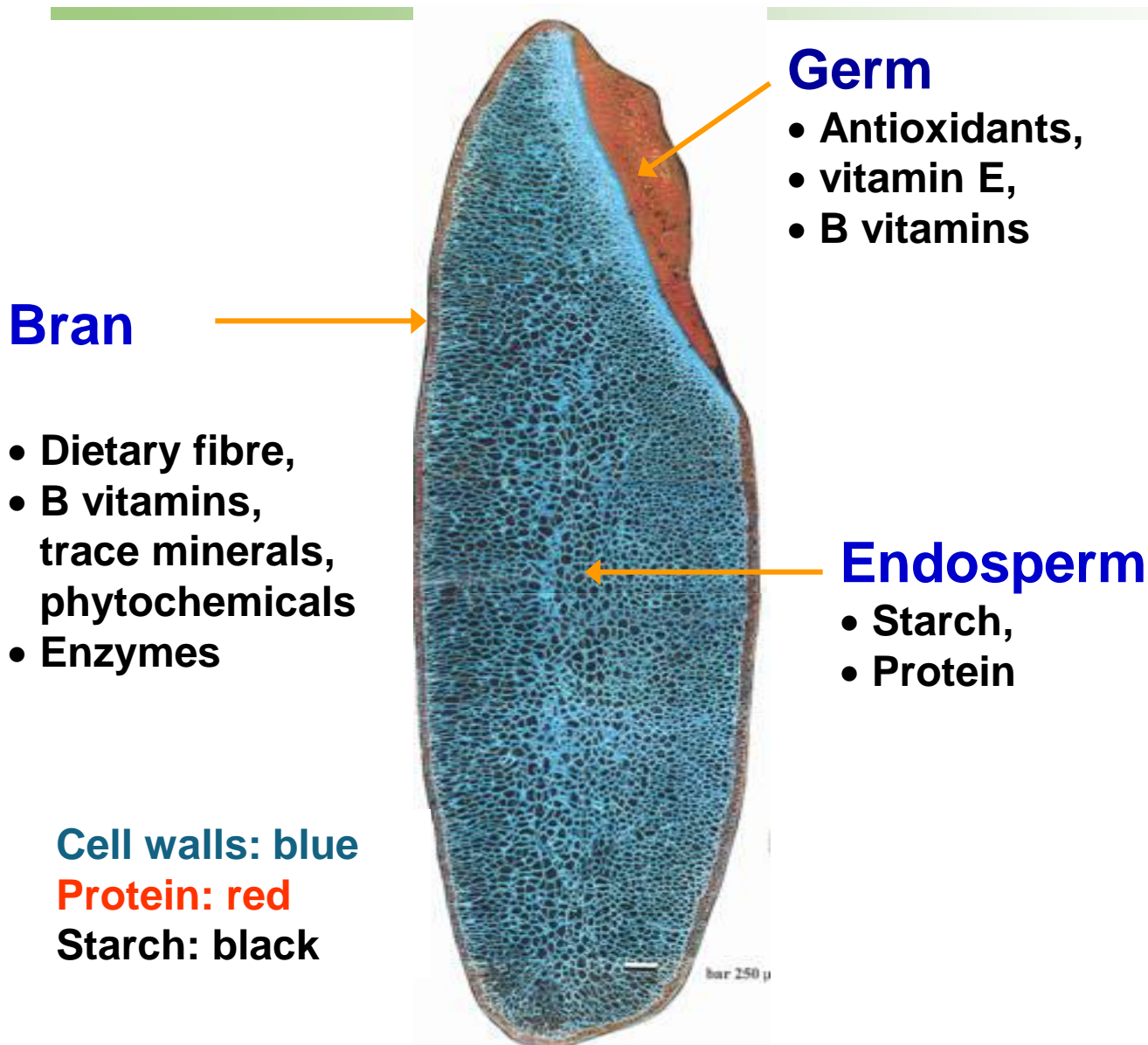
**Graan en Brood –wat zit er in?**

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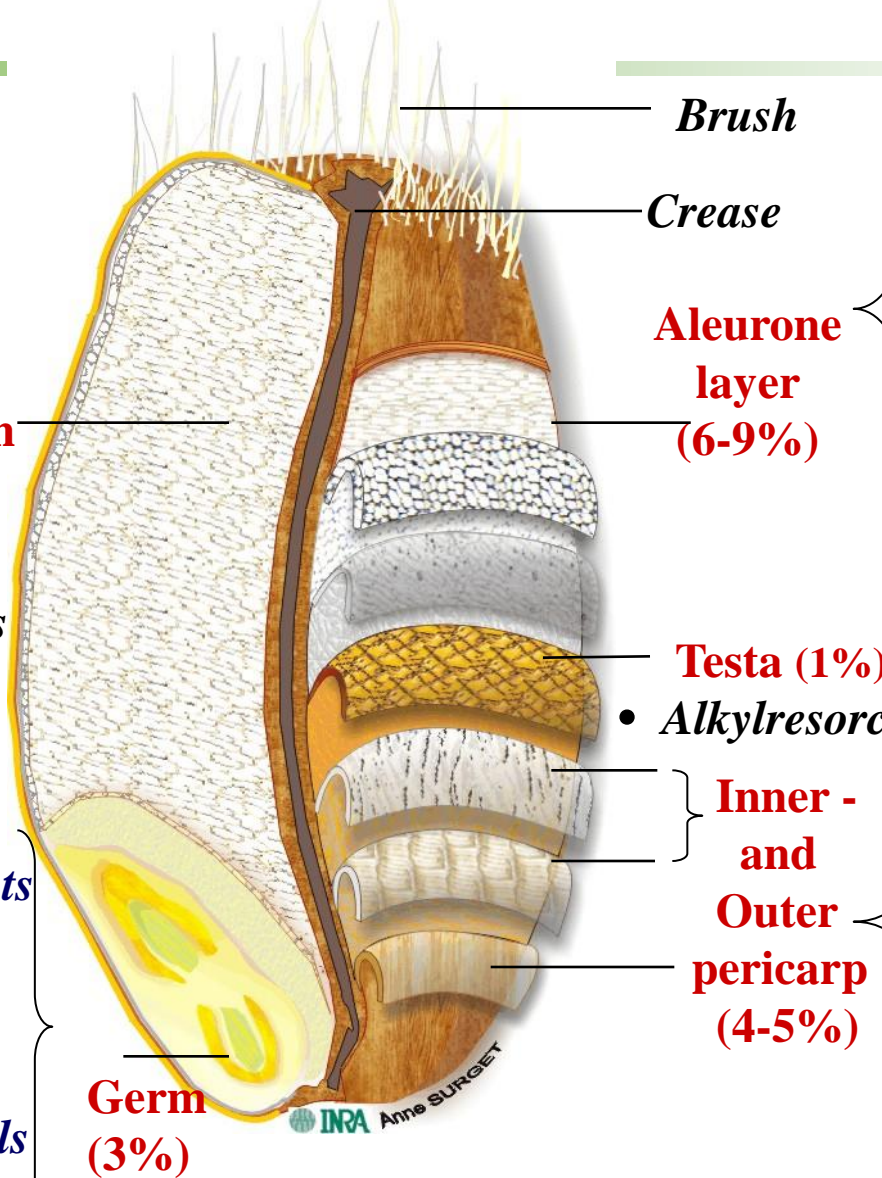
# The wheat kernel: classical picture





# THE WHEAT GRAIN KERNEL - UNEVEN DISTRIBUTION OF TARGET COMPONENTS

HEALTH GRAIN



**Starchy endosperm (80-85%)**

*Starch & Proteins*

- *Lipids*
- *Antioxidants*
- *Vitamin E*
- *B vitamins*
- *Minerals*
- *Plant sterols*
- *Enzymes*

*Brush*

*Crease*

**Aleurone layer (6-9%)**

**Testa (1%)**

- *Alkylresorcinols*

**Inner - and Outer pericarp (4-5%)**

**Germ (3%)**

- *Soluble & insoluble dietary fibre (xylans,  $\beta$ -glucans)*
- *Proteins*
- *Antioxidants (phenolic acids)*
- *Vitamin E*
- *B vitamins*
- *Minerals*
- *Phytic acid*
- *Enzymes*
- *Insoluble dietary fibre (xylans, cellulose, lignin)*
- *Antioxidants bound to cell walls (phenolic acids)*

**Bran**





# The HEALTHGRAIN definition of 'whole grain'

Jan Willem van der Kamp<sup>1\*</sup>, Kaisa Poutanen<sup>2,3</sup>, Chris J. Seal<sup>4</sup> and David P. Richardson<sup>5</sup>

Food & Nutrition Research 2014, 58: 22100 - <http://dx.doi.org/10.3402/fncv58.22100>

- 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 that is, less than 2% of the grain/10% of the bran that occur through processing methods consistent with safety and quality are allowed.
- The most comprehensive definition of whole grain (WG)
- The only WG definition published in a peer reviewed journal

Classical definitions don't address practical issues





# HEALTHGRAIN Definition of Wholegrain and follow-up

---

- Health benefits of wholegrain as indicated in large observational studies are related to current way of > 90 % of flour production:  
'modern milling' with separation of endosperm, bran, germ

Therefore the HG WG Definition accepts separation + recombination both at the flour mill and by food producers

- Production based on Good Manufacturing Principles is required
- 2% removal of outer part of bran allowed, for ensuring food safety

## FOLLOW-UP

- Definition used as internal standard by range of major companies
- Recombined WG wheat flour - widely used ratio's: 82% white flour, 15% bran, 3% germ  
( 'natural ratio's of individual cultivars show much larger variations , e.g. 9 to 18% bran)
- NBC – certification sytem for wholemeal wheat flour now applied by mainstream suppliers to bakeries in the Netherlands.



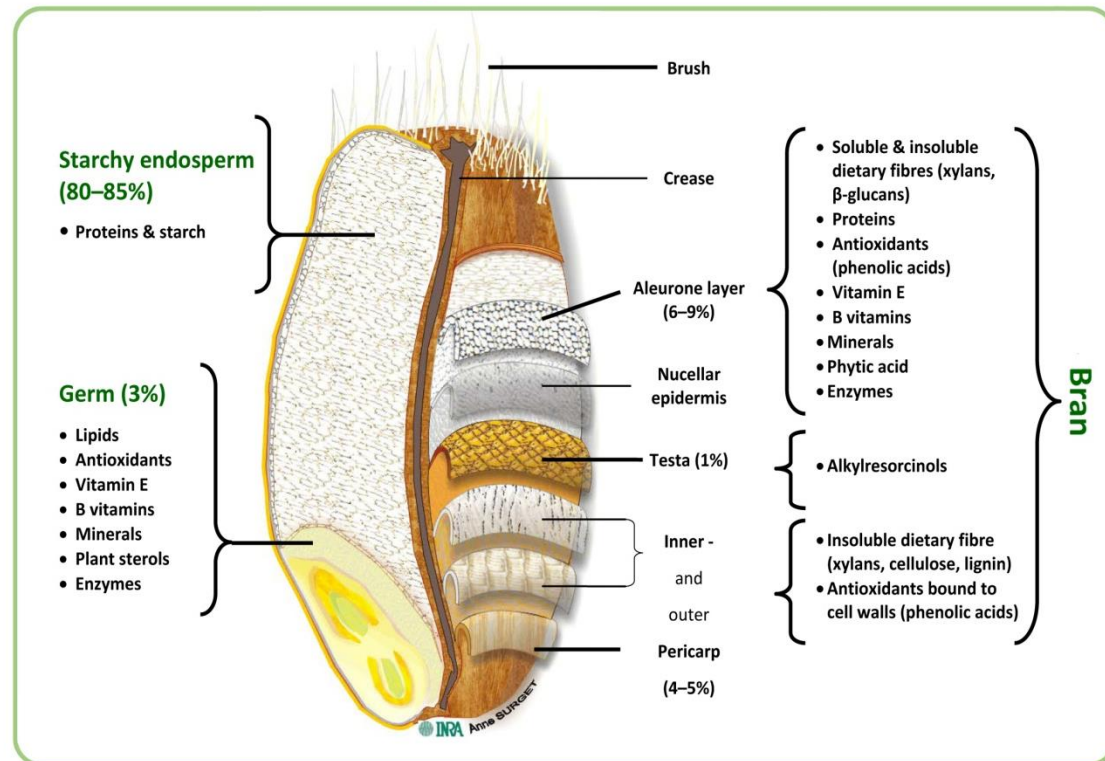
# Fibre in cereals and location of bioactive compounds

Cereal	DF (g/100g)
Tarwe	12
Spelt	11
Haver	11
Gerst	16
Maïs	7
Rogge	15
Rijst	4
Millet	9
Sorghum	6
Teff	8
<b>Pseudo Cereal</b>	
Wild rice	6
Amaranth	7
Boekweit	10
Quinoa	7

Data provided from USDA National Nutrient Database for Standard Reference. Cereal grains fiber content (available 2013-04-25).

<http://ndb.nal.usda.gov/ndb/search/list>

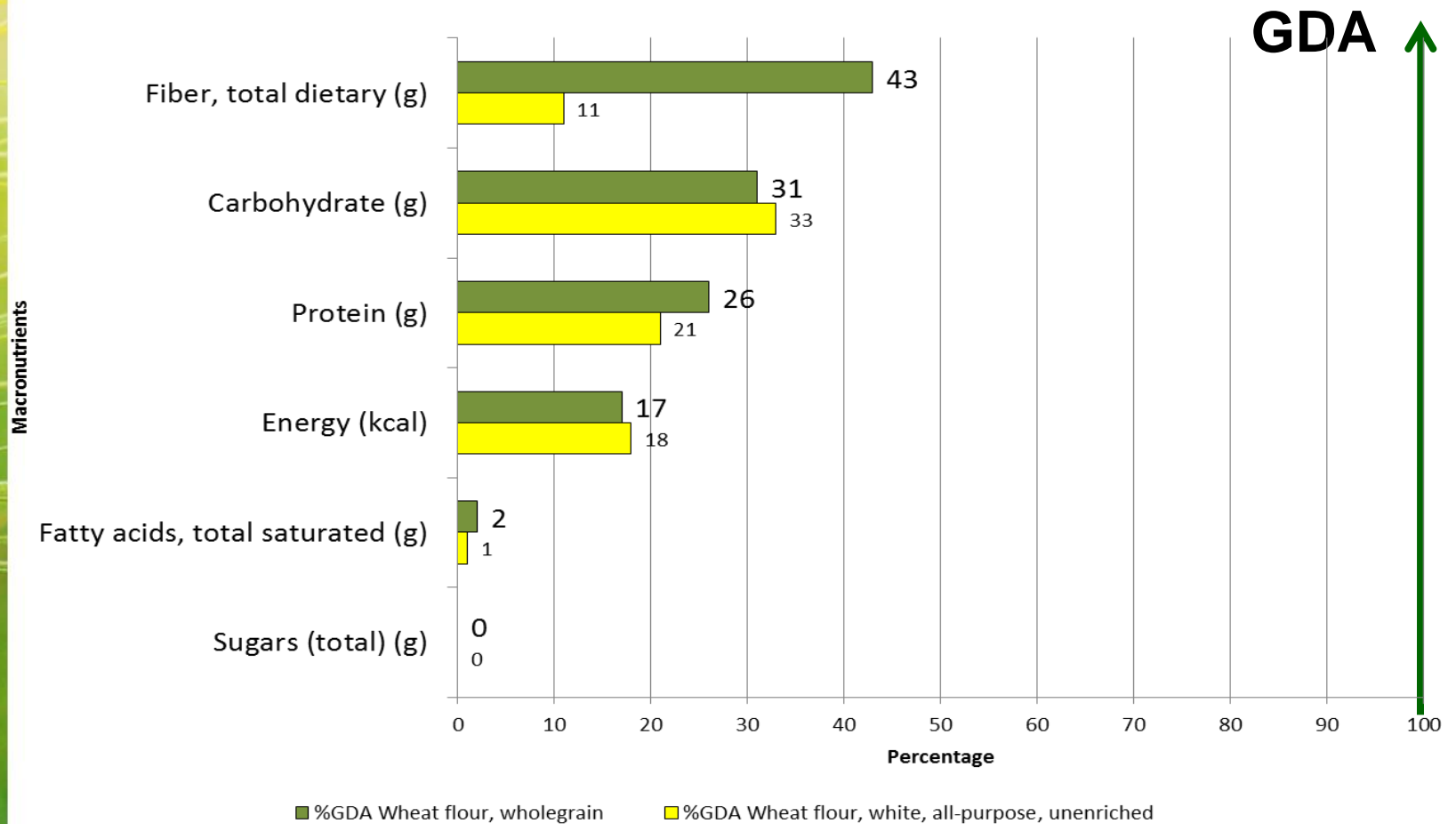
The wheat grain kernel and its components:



**Adapted from:** Surget, A.; Barron, C., Histologie du grain de blé. Industrie des Céréales 2005, 145, 3-7.

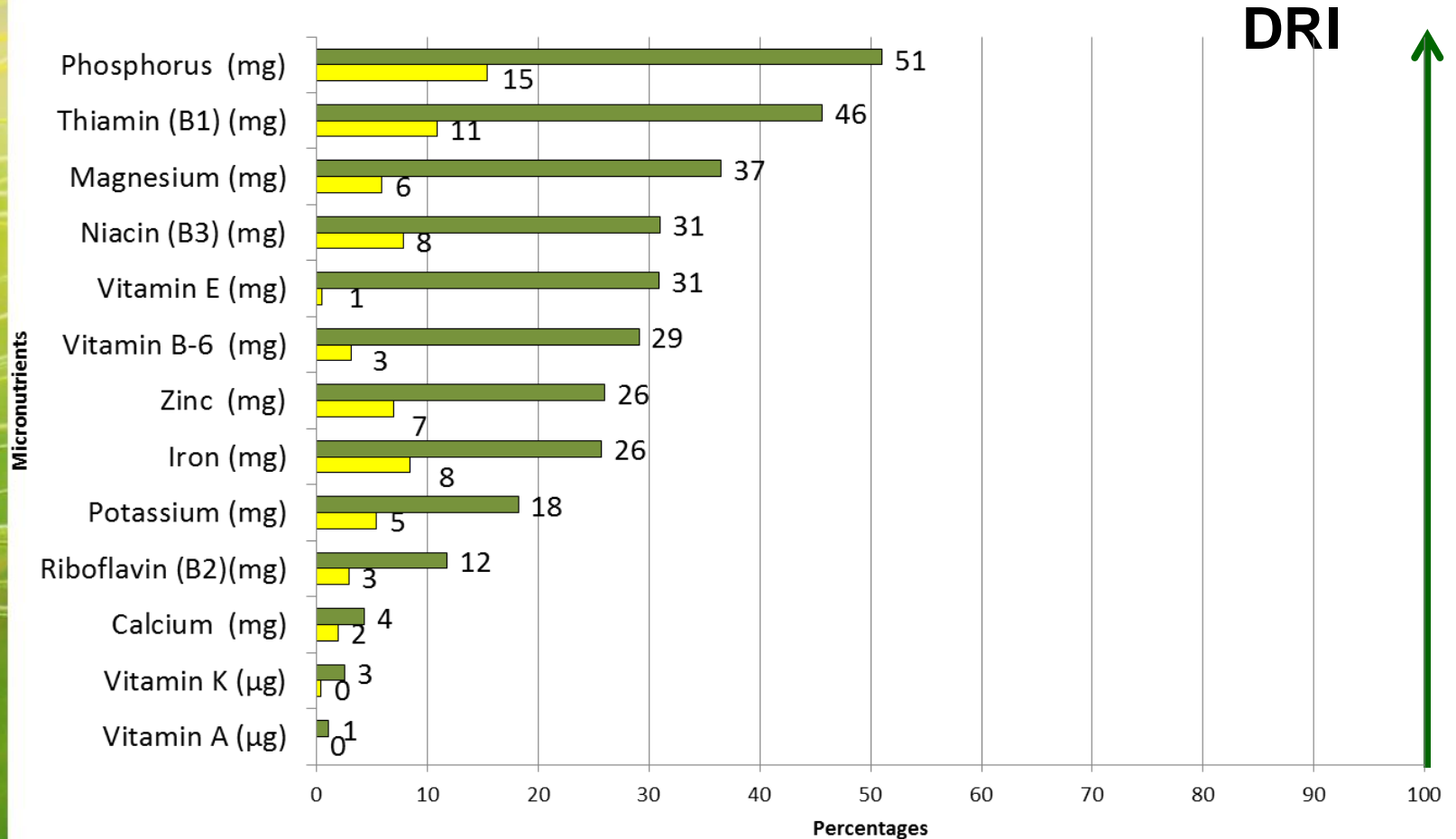
Hemery, Y.; Rouau, X.; Lullien-Pellerin, V.; Barron, C.; Abecassis, J., Dry processes to develop wheat fractions and products with enhanced nutritional quality. Journal of Cereal Science 2007, 46, (3), 327-347

# Differences in the contribution of macronutrients from wheat flour (whole grain vs. white flour) to Guidelines Daily Amounts (GDA)

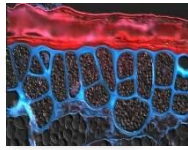


Source: National Nutrient Database for Standard Reference (Release 24), ARS, USDA

# Differences in the contribution of micronutrients from wheat flour (whole grain vs. white flour) to Daily Reference intake(DRI)



Source: National Nutrient Database for Standard Reference (Release 24), ARS, USDA



# Inhoud

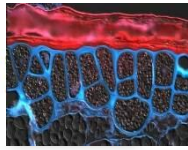
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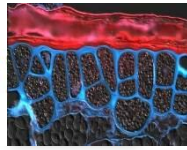


## Voedingsaanbevelingen – Vroeger en nu

- 1967 Publicatie van Klavertje Vier
- 1980 Eerste Dietary Guidelines for Americans – update elke 5 jaar
- 1986 Eerste Richtlijnen Goede Voeding in Nederland.
- 1996 Publicatie van eerste Actieve Voedingsdriehoek in België
- 2000-2010 Regelgeving over voedings- en gezondheidsclaims  
EU Claims regulation (2006) en implementatie (vanaf 2010)
- 2015 Nieuwe aanbevelingen in Engeland, V.S. en Nederland

---

Trend: meer specifieke en kwantitatieve aanbevelingen



## Geschiedenis - ondernemende artsen!



**Dr Samuel Sarphati**, Amsterdam 1813 - 1866

1852 Vereeniging van Volksvlijt

1857 Eerste NL Meel en Broodfabriek – goed en goedkoop brood!

**Dr Thomas Allinson** (1858 -1918) ‘Naturopathy ‘.

Boek: The advantages of wholemeal bread

1892: The Natural Food Company -> Allinson bread



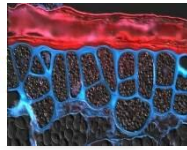
**Dr John Harvey Kellogg** (1852 – 1943)

Breakfast cereals

Corn Flakes

Wholegrain and “All-Bran” producten





## Voedingsonderzoek – diverse types

**a) Modelsystemen** (b.v. in vitro spijsverteringssysteem)

**b) Dierproeven**

**c) Onderzoek met proefpersonen** (wat is invloed van enkele variabelen?)

Interventieonderzoek – veelal twee groepen – enkele weken / maanden

Metten van vele ‘biomarkers’ zoals gehalte HDL en LDL cholesterol.

**d) Cohortonderzoek - voedingsepidemiologie**

Volgen van grote groepen (~ 100.000 of meer) gedurende vele jaren

Doel: Vinden van verbanden: leefstijl, voedingspatroon, ziekte en gezondheid

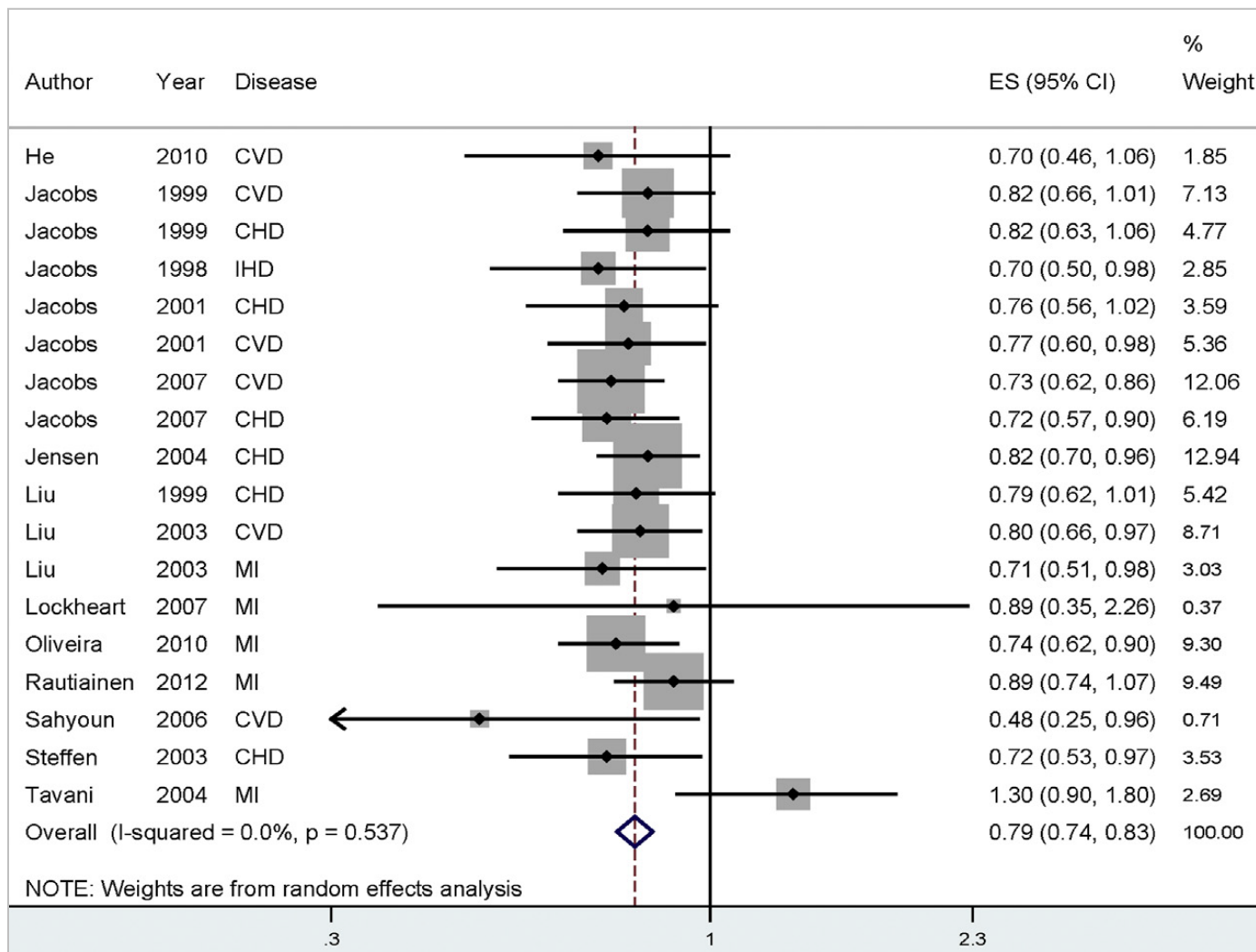
**Grote cohortonderzoeken gestart tussen 1980 en 1990**

Nu finale resultaten (“over-all mortaliteit” in relatie tot voedingsgewoonten)

**d2) Meta-analyse van aantal cohort-onderzoeken**

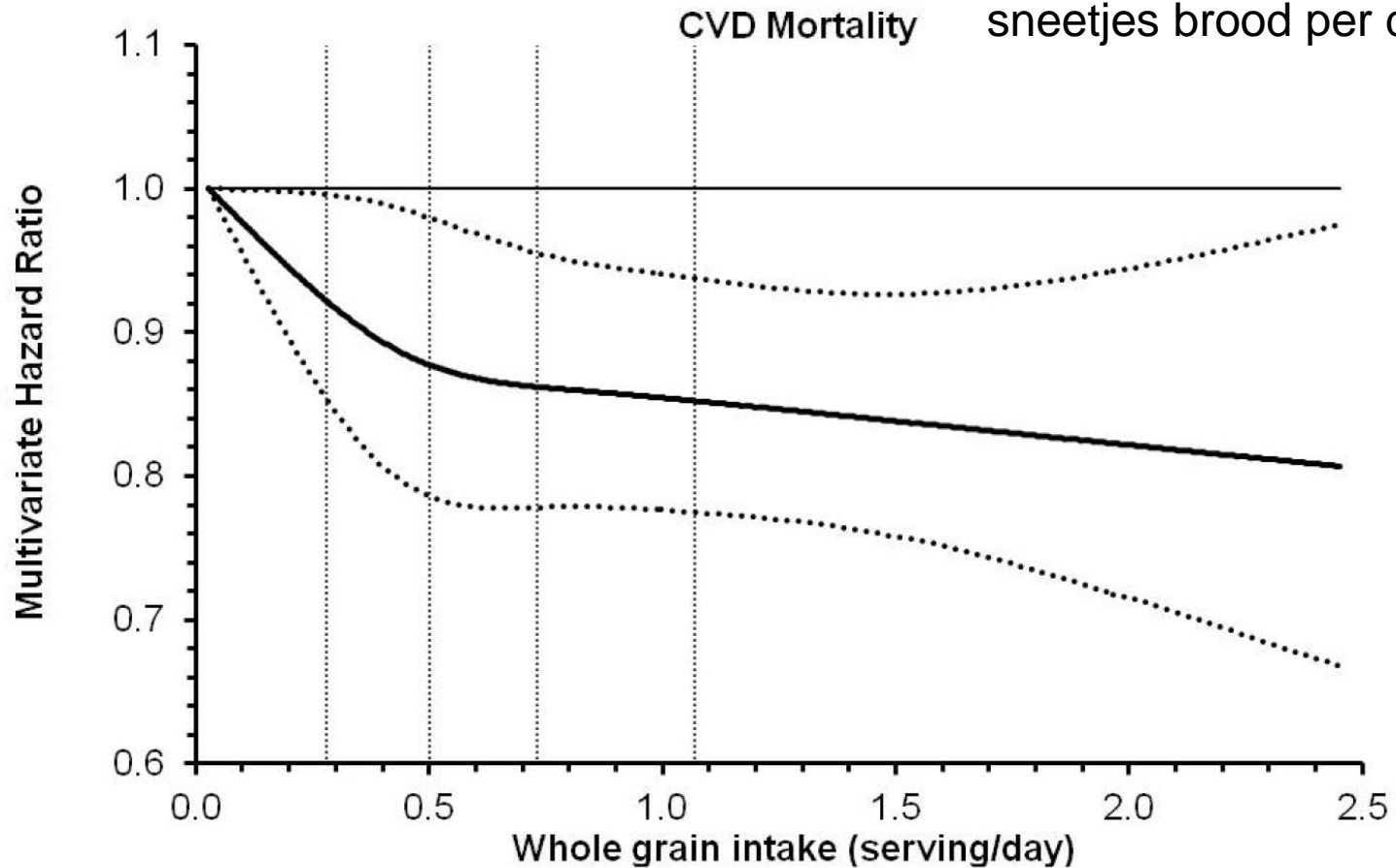
# Habitual consumption of whole grain is associated with a lower incidence of Coronary Diseases

## Meta-analysis of cohort studies



# Dose-response relationship between quintiles of whole grain consumption and Cardiovascular Disease mortality

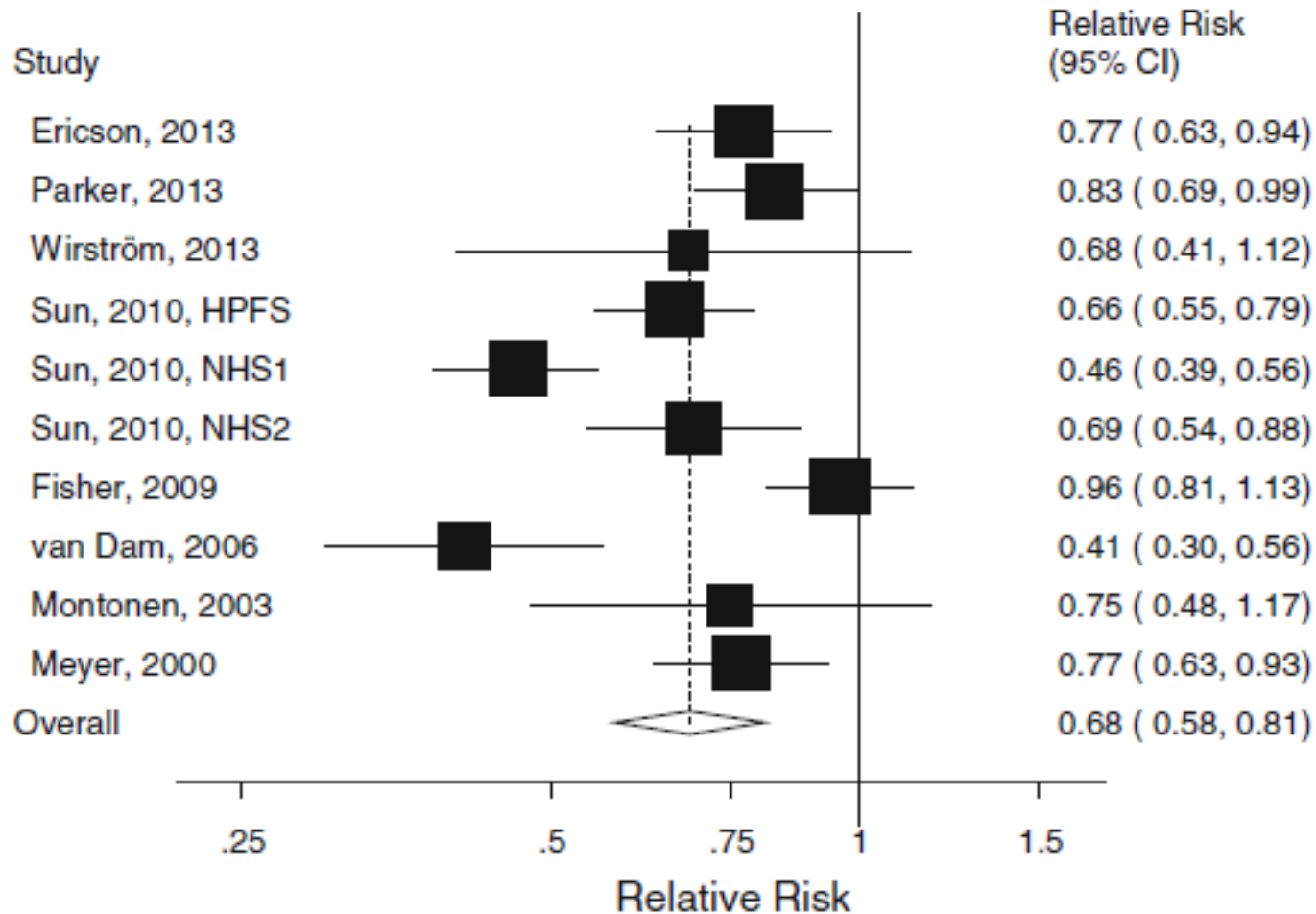
Grootste effect al bij enkele  
sneetjes brood per dag



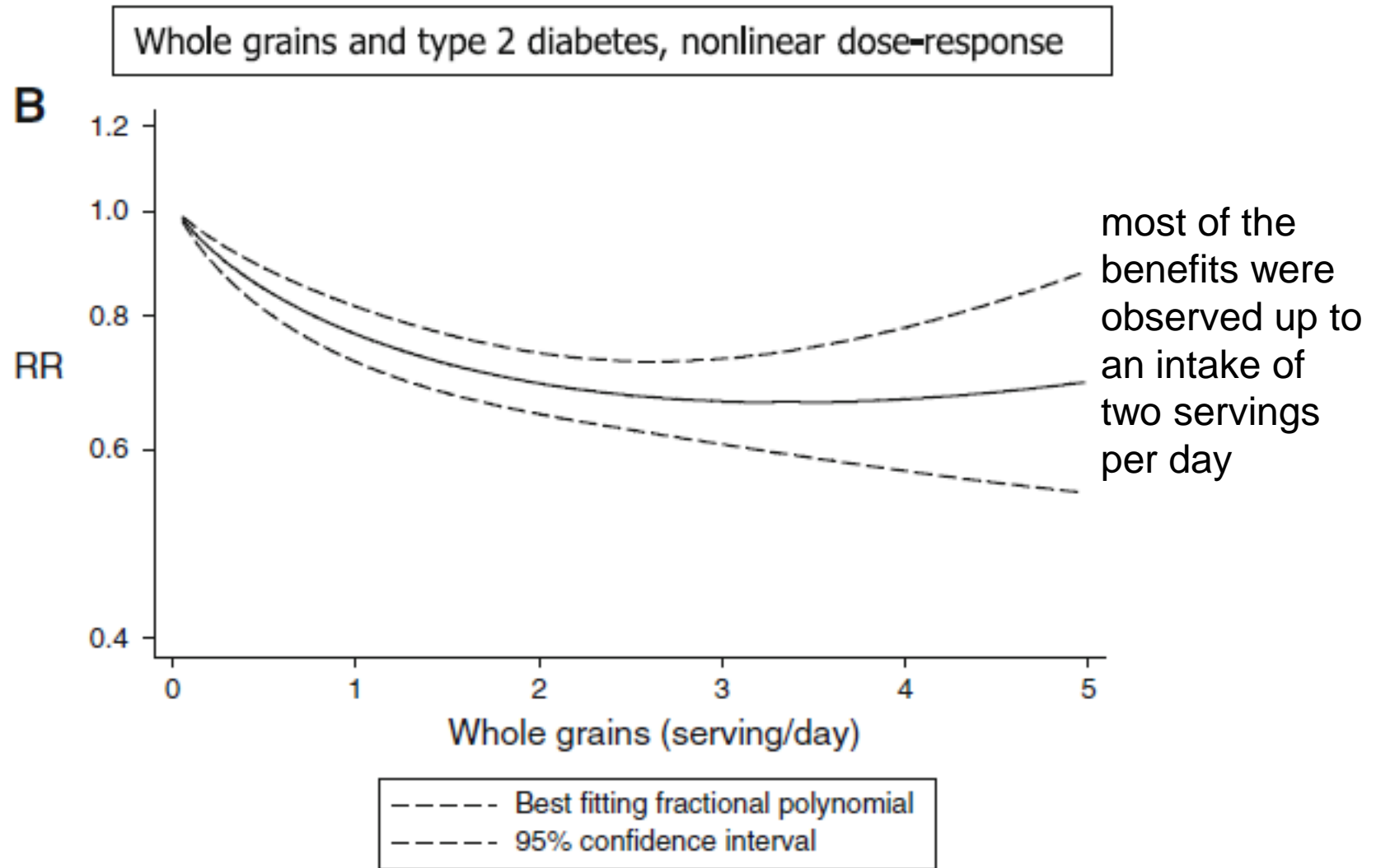
Hazard Ratio +/- 95% confidence intervals

# Habitual whole grain consumption is associated with a lower risk of type 2 diabetes: meta-analysis of cohort studies

## A Whole grains and type 2 diabetes, dose-response, per 3 servings/d

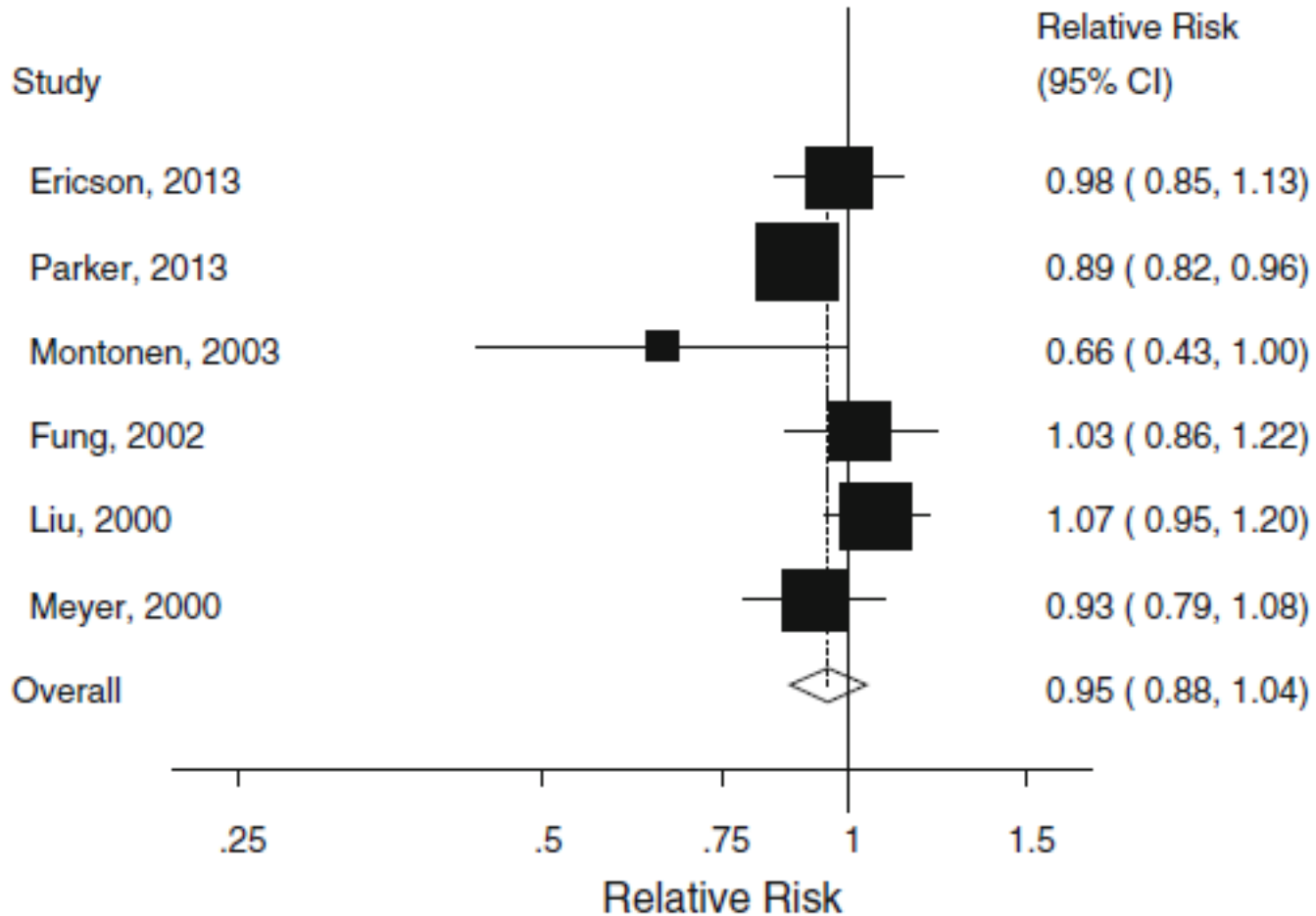


# An inverse dose-response relationship exists between whole grain consumption and the risk of type 2 diabetes: dose-response meta-analysis of cohort studies

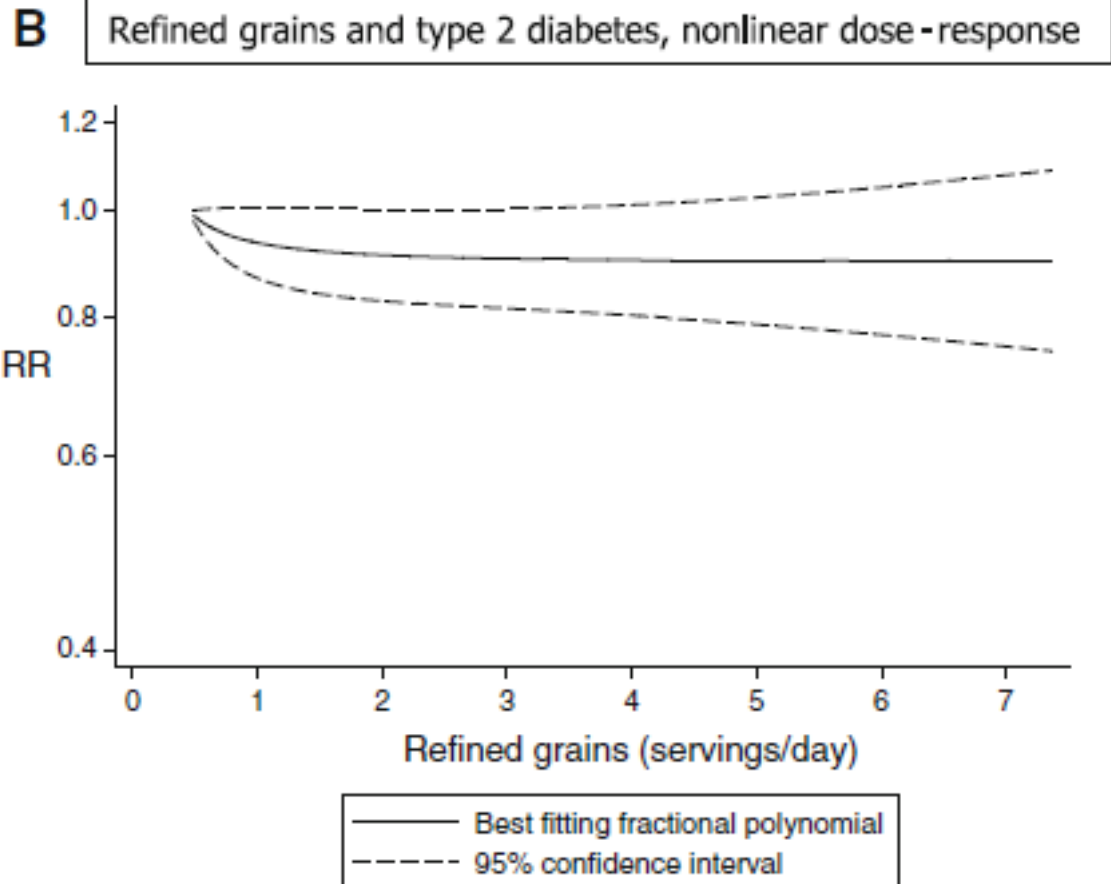


# Habitual refined grain consumption is not associated with the risk of type 2 diabetes: meta-analysis of cohort studies

## A Refined grains and type 2 diabetes, dose - response, per 3 servings/d



# There is no relationship between habitual refined grain consumption and the risk of type 2 diabetes: dose-response meta-analysis of cohort studies



# Habitual whole grain consumption is associated with a lower mortality for cancer with a dose-response relationship the NIH-AARP Health Study


**Table 2 Association of whole grain intake with total and cause-specific mortality**

	All participants	Whole grains (oz eq/d)					P trend
		Q1 (n = 41,248)	Q2 (n = 41,248)	Q3 (n = 41,249)	Q4 (n = 41,248)	Q5 (n = 41,249)	
		0.13	0.30	0.47	0.69	1.20	
<b>Causes of death</b>							
<b>Cancer</b>							
No. of deaths	19,043	4,772	3,974	3,616	3,391	3,290	
Model 1		1.00	0.81 (0.78–0.85)	0.72 (0.69–0.76)	0.66 (0.63–0.69)	0.61 (0.59–0.64)	<0.0001



# DF and colorectal cancer- cereal fibre appears more effective than other fibres

## Dietary fibre, whole grains, and risk of colorectal cancer: systematic review and dose-response meta-analysis of prospective studies

 OPEN ACCESS

Dagfinn Aune *research associate*<sup>1</sup>, Doris S M Chan *research associate*<sup>1</sup>, Rosa Lau *research associate*<sup>1</sup>, Rui Vieira *data manager*<sup>1</sup>, Darren C Greenwood *senior lecturer in biostatistics*<sup>2</sup>, Ellen Kampman *professor of diet and cancer*<sup>3</sup>, Teresa Norat *principal investigator*<sup>1</sup>

<sup>1</sup>Department of Epidemiology and Biostatistics, School of Public Health, Imperial College London, St Mary's Campus, London W2 1PG, UK;

<sup>2</sup>Biostatistics Unit, Centre for Epidemiology and Biostatistics, University of Leeds, Leeds, UK; <sup>3</sup>Division of Human Nutrition, Wageningen University and Research Centre, Wageningen, Netherlands

*BMJ* 2011;343:d6617 doi: 10.1136/bmj.d6617 (Published 10 November 2011)

Page 1 of 20

- **A high intake of dietary fibre, in particular from cereals, is associated with a reduced risk of colorectal cancer**

OPEN ACCESS Freely available online

 PLOS ONE

### Dietary Fibre Intake and Risks of Cancers of the Colon and Rectum in the European Prospective Investigation into Cancer and Nutrition (EPIC)

Neil Murphy<sup>1</sup>, Teresa Norat<sup>1\*</sup>, Pietro Ferrari<sup>2</sup>, Mazda Jenab<sup>2</sup>, Bas Bueno-de-Mesquita<sup>3,4</sup>, Guri Skeie<sup>5</sup>, Christina C. Dahm<sup>6</sup>, Kim Overvad<sup>7</sup>, Anja Olsen<sup>8</sup>, Anne Tjønneland<sup>8</sup>, Françoise Clavel-Chapelon<sup>9,10</sup>, Marie Christine Boutron-Ruault<sup>9,10</sup>, Antoine Racine<sup>9,10</sup>, Rudolf Kaaks<sup>11</sup>, Birgit Teucher<sup>11</sup>, Heiner Boeing<sup>12</sup>, Manuela M. Bergmann<sup>12</sup>, Antonia Trichopoulou<sup>13,14</sup>, Dimitrios Trichopoulos<sup>15,16</sup>, Pagona Lagiou<sup>13,15,16</sup>, Domenico Palli<sup>17</sup>, Valeria Pala<sup>18</sup>, Salvatore Panico<sup>19</sup>, Rosario Tumino<sup>20</sup>, Paolo Vineis<sup>1,21</sup>, Peter Siersema<sup>4</sup>, Franzel van Duijnhoven<sup>3,22</sup>, Petra H. M. Peeters<sup>23</sup>, Anette Hjartaker<sup>24</sup>, Dagrun Engeset<sup>5</sup>, Carlos A. González<sup>25</sup>, María-José Sánchez<sup>26,27</sup>, Miren Dorransoro<sup>28</sup>, Carmen Navarro<sup>27,29</sup>, Eva Ardanaz<sup>27,30</sup>, José R. Quirós<sup>31</sup>, Emily Sonestedt<sup>32</sup>, Ulrika Ericson<sup>32</sup>, Lena Nilsson<sup>33</sup>, Richard Palmqvist<sup>34</sup>, Kay-Tea Khaw<sup>35</sup>, Nick Wareham<sup>36</sup>, Timothy J. Key<sup>37</sup>, Francesca L. Crowe<sup>37</sup>, Veronika Fedirko<sup>2</sup>, Petra A. Wark<sup>1</sup>, Shu-Chun Chuang<sup>1</sup>, Elio Riboli<sup>1</sup>

PLoS One. 2012;7(6):e39361. doi: 10.1371/journal.pone.0039361

- **Similar results from EPIC as shown by Aune et al.**

# Whole Grain, Bran, and Germ Intake and Risk of Type 2 Diabetes: A Prospective Cohort Study and Systematic Review

Jeroen S. L. de Munter<sup>1,2</sup>, Frank B. Hu<sup>1,3,4</sup>, Donna Spiegelman<sup>3,5</sup>, Mary Franz<sup>1</sup>, Rob M. van Dam<sup>1,2,4\*</sup>

1 Department of Nutrition, Harvard School of Public Health, Boston, Massachusetts, United States of America, 2 Institute of Health Sciences, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands, 3 Department of Epidemiology, Harvard School of Public Health, Boston, Massachusetts, United States of America, 4 Channing Laboratory, Department of Medicine, Brigham and Women's Hospital and Harvard Medical School, 5 Department of Biostatistics, Harvard School of Public Health, Boston, Massachusetts, United States of America

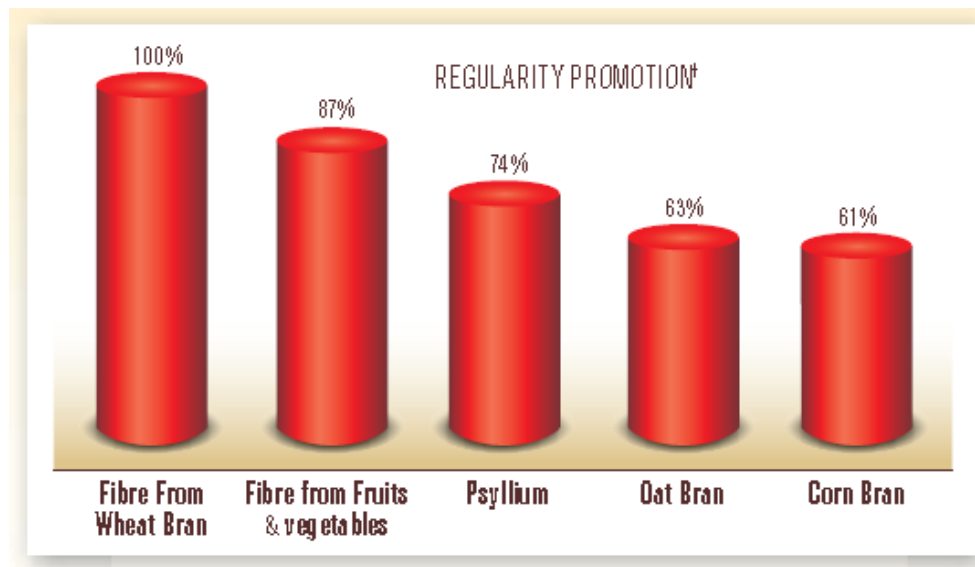
- ❑ Data of 6 pooled studies, incl. 286.125 persons and 10.944 cases of type 2 diabetes
- ❑ Associations for bran intake were similar to those for total whole grain intake
- ❑ No significant association was observed for germ intake
- ❑ Two servings of whole grain/day is associated with 21% decrease in risk of developing type 2 diabetes!
  - One serving of whole grains corresponds to a ~30g slice of 100% whole wheat bread (US Department of Agriculture)

Source: PloS Medicine 2007;4(8):e261

## Effect of dietary fiber on constipation: A meta analysis

Jing Yang, Hai-Peng Wang, Li Zhou, Chun-Fang Xu(2012), World J Gastroenterol

- **Dietary fibre showed significant advantage over placebo in stool frequency (19%,  $P < 0.05$ )**
- **No difference in stool consistency, treatment success, laxative use and painful defecation compared to control**



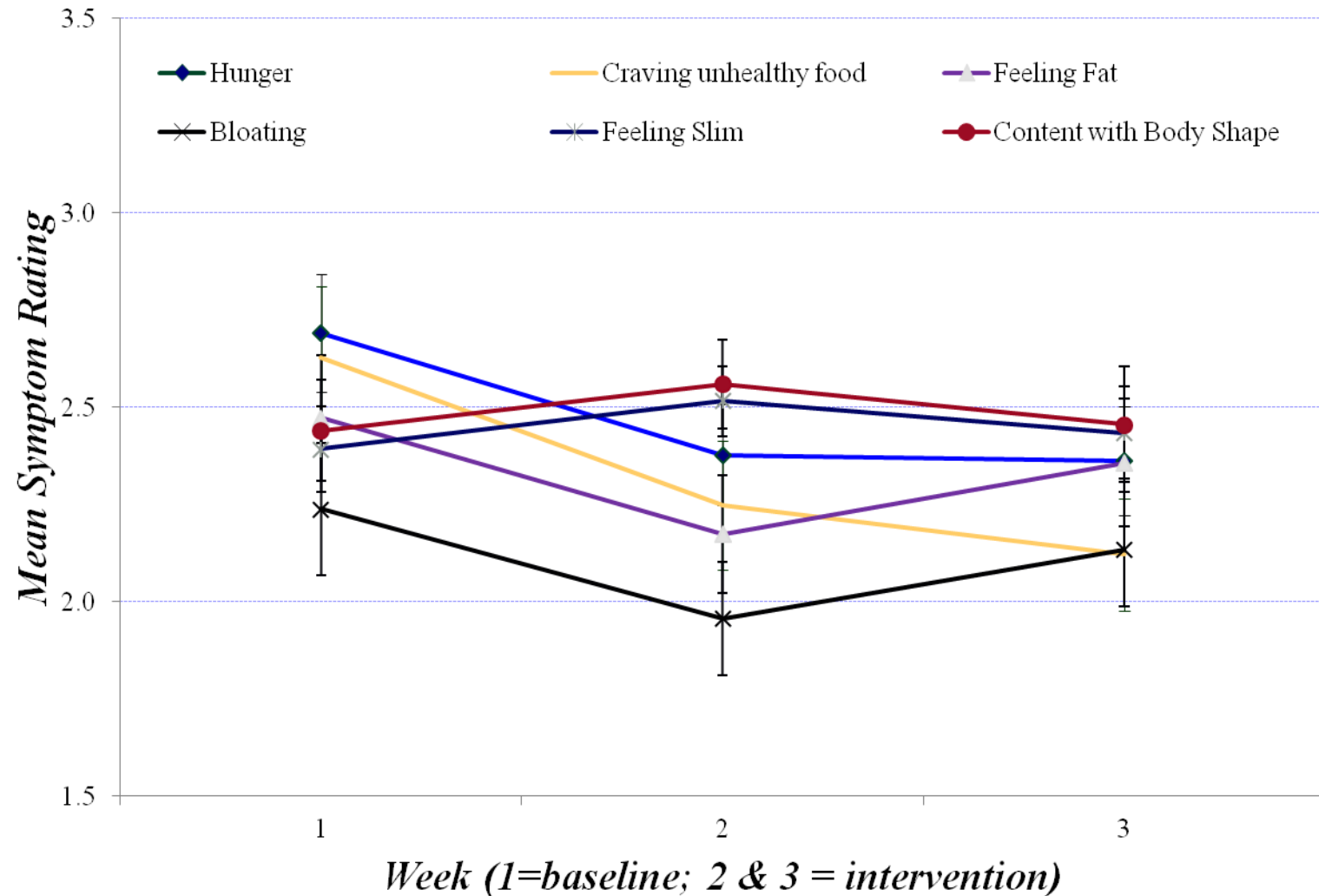
1. Guideline for Planning and Statistical Review of Clinical Laxation Studies for Dietary Fibre, Health Canada, 1994

†This chart shows the ability of different types of fibre to promote regularity compared to wheat bran fibre

# Increasing Cereal Fibre Intake Improved Psychological Wellbeing



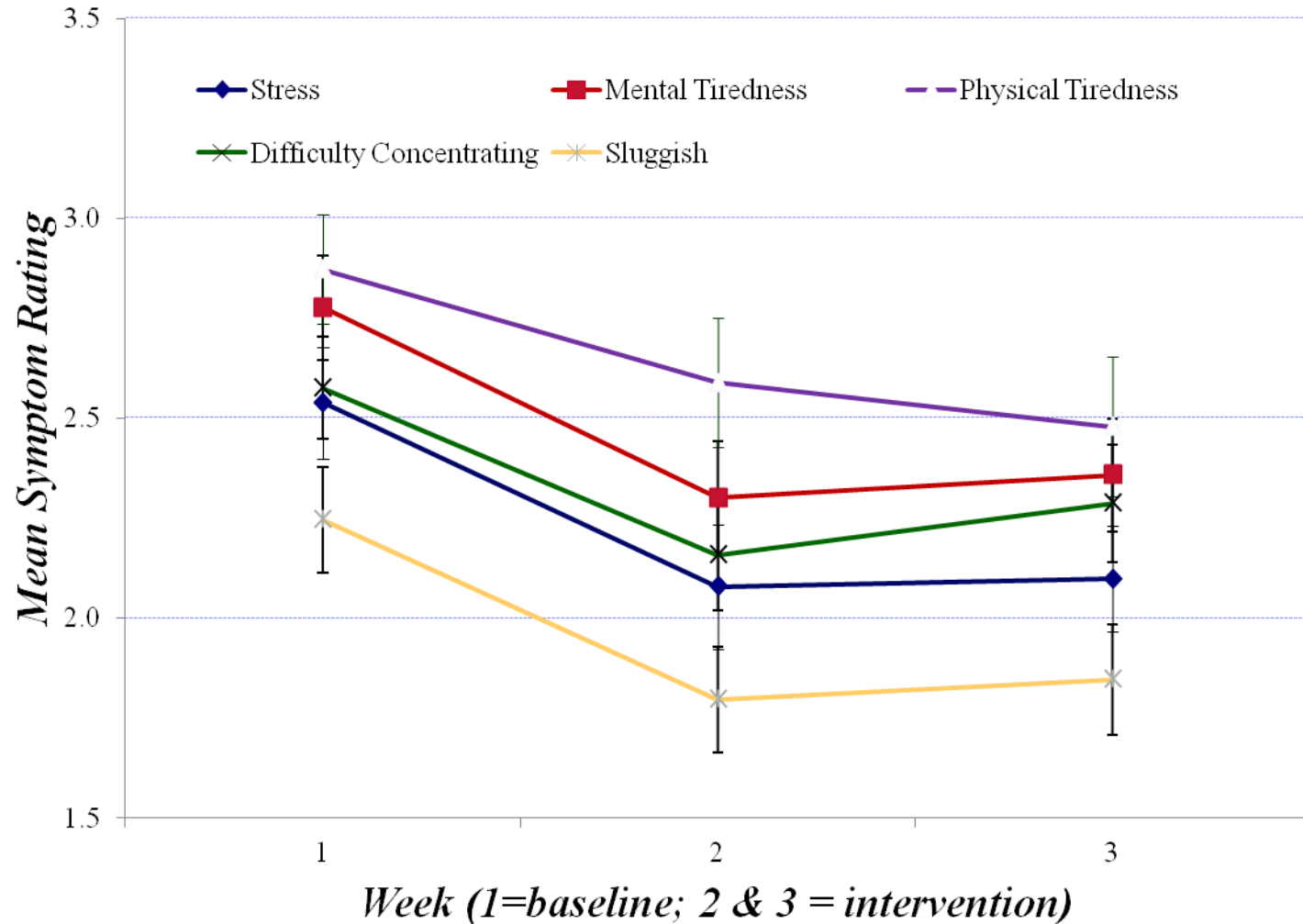
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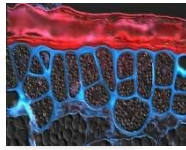


# Increasing Cereal Fibre Intake Improved Psychological Wellbeing



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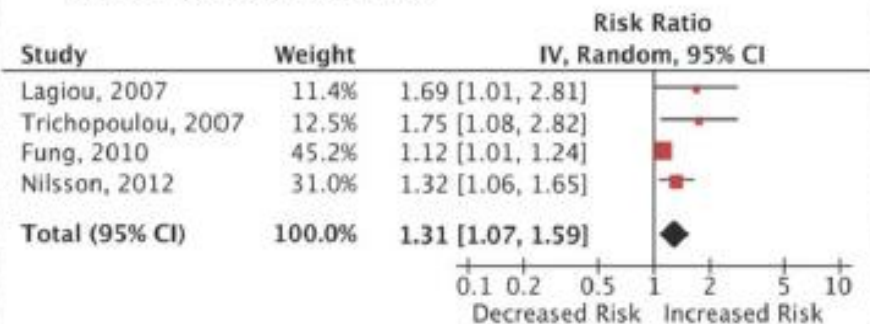
# Low-carb diets; Higher all-cause mortality

Meta-analysis - 17 studies - 272,216 people in 4 cohort studies

- All-cause mortality - high low-carb score RR = 1.31
- Similar for low carb/high protein
- Low-carb diets were associated with a **significantly higher risk of all-cause mortality.**
  - limited observational studies
  - long-term outcomes are needed.

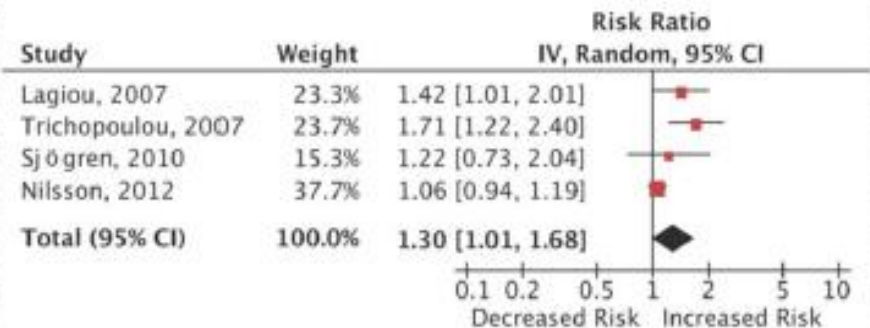
Noto H et al PLoS One. 2013;8(1):e55030.

(A) Low-carbohydrate score

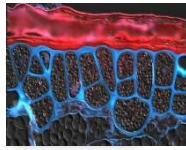


Heterogeneity:  $\tau^2 = 0.02$ ;  $\chi^2 = 6.44$ ,  $df = 3$  ( $P = 0.09$ );  $I^2 = 53\%$   
Test for overall effect:  $Z = 2.68$  ( $P = 0.007$ )

(B) Low-carbohydrate / high-protein score



Heterogeneity:  $\tau^2 = 0.04$ ;  $\chi^2 = 8.55$ ,  $df = 3$  ( $P = 0.04$ );  $I^2 = 65\%$   
Test for overall effect:  $Z = 2.01$  ( $P = 0.04$ )



# Overzicht van graan – gezondheid publicaties

<http://wholegrainscouncil.org/whole-grains-101/health-studies-on-whole-grains>

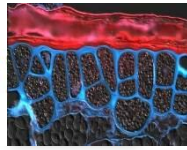
[Voorbeelden voor “Any grains” en “Mortality”](#)

*British Journal of Nutrition* (2015), **114**, 608–623  
© The Authors 2015

doi:10.1017/S0007114515001701

**Whole-grain products and whole-grain types are associated with lower all-cause and cause-specific mortality in the Scandinavian HELGA cohort**

Nina F. Johnsen<sup>1\*</sup>, Kirsten Frederiksen<sup>1</sup>, Jane Christensen<sup>1</sup>, Guri Skeie<sup>2</sup>, Eiliv Lund<sup>2</sup>, Rikard Landberg<sup>3,4</sup>, Ingegerd Johansson<sup>5</sup>, Lena M. Nilsson<sup>6,7</sup>, Jytte Halkjær<sup>1</sup>, Anja Olsen<sup>1</sup>, Kim Overvad<sup>8,9</sup> and Anne Tjønneland<sup>1</sup>



## Graan – gezondheid publicaties

<http://wholegrainscouncil.org/whole-grains-101/health-studies-on-whole-grains>

Voorbeelden voor “Any grains” en “Mortality”

### **Whole Grains and Cereal Fiber Linked with Longevity**

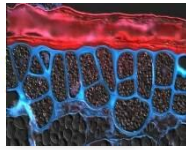
A growing body of research suggests that whole grains may help you live longer. Boston scientists analyzed data from over 367,000 adults,

**those with the highest intake of whole grains had a 17% lower risk of death from all causes compared to those who ate the least whole grains.** Those eating the most whole grains had a lower risk of several disease-specific deaths, ranging from 11% for respiratory disease, up to 48% for diabetes.

**A high intake of cereal fiber** (the fiber from grain foods) was associated with a **19% lower risk of death from all causes, and a 25-34% lower risk of disease specific deaths.**

*BMC Medicine. 2015 Mar 4;13:59 (Huang T et al.)*





## Graan – gezondheid publicaties

<http://wholegrainscouncil.org/whole-grains-101/health-studies-on-whole-grains>

Voorbeelden voor “Any grains” en “Mortality”

### **Fiber in Grains Lowers Mortality Risk**

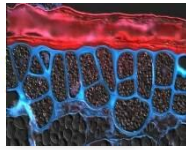
Korean scientists analyzed studies following over 900,000 people to determine the relationship between fiber intake and mortality.

**Those with the highest fiber intake (about 27g/day) had a 23% lower risk of death than those with the lowest fiber intake (about 15g/day).**

However, upon closer inspection, the researchers found that these results were largely dependent on the foods eaten.

- **As fiber from grains increased, mortality significantly decreased.**
- **A similar, although much weaker, relationship was observed for fiber from beans and vegetables,**
- **While no association was observed for fruit fiber.**

*American Journal of Epidemiology. 2014 Sep 15;180(6):565-73. (Kim Y et al).*



# Dietary Guidelines

**Issued and updated per country by authoritative body**  
**Process description**

## **Experts appointed by authoritative body**

(Nutritionists, medical doctors, sometimes food spoilage microbiologist)

USA – Dept.'s of Health and Agriculture;

Germany – Nutrition Society; Netherlands – Health Council

## **Scientific basis:** literature searches (e.g. PubMed)

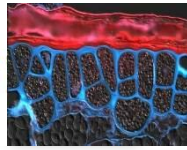
**Human studies only** – rigorous criteria for inclusion in search

**Studies relating diets to key diseases, disorders and mortality**

(Heart, blood pressure, type-2 diabetes, cancer, obesity,  
(sometimes included: severe mental diseases/ disorders))

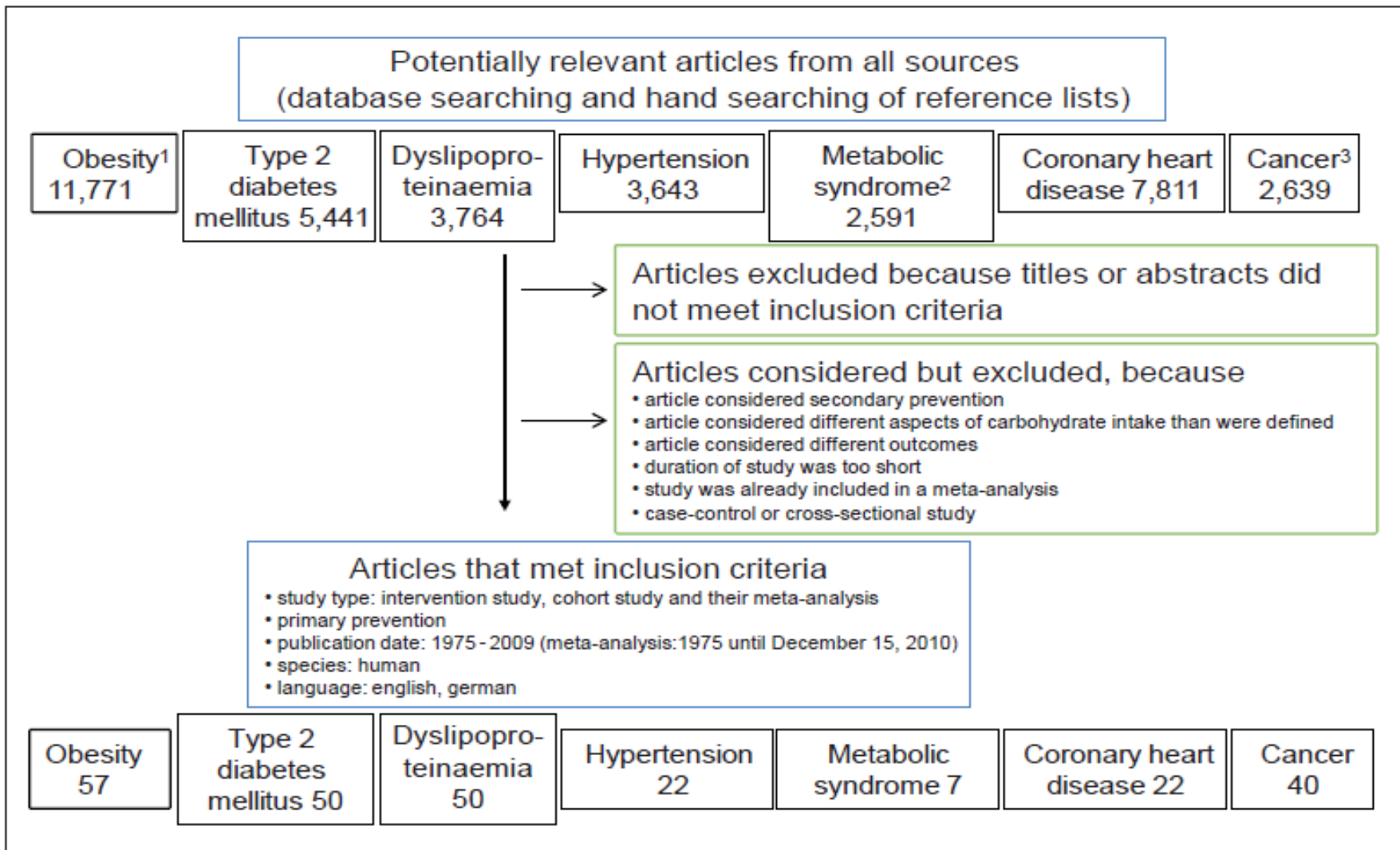
## **Conclusions per type of food and for key components**

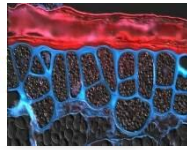
(fats/oils, proteins, carbohydrates, fibre)



# Rigorous selection of publications taken into account

(Example Hauner, 2012)





## Key Documents and sources

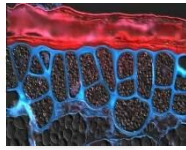
**EFSA Panel on Dietetic Products, Nutrition, and Allergies (NDA)**; Scientific Opinion on Dietary Reference Values for carbohydrates and dietary fibre. EFSA Journal 2010; 8(3):1462

**German Nutrition Society**: Hans Hauner et al. Evidence-Based Guidelines Carbohydrate Intake and Prevention of Nutrition-Related Diseases Ann Nutr Metab 2012;60

**England: Scientific Advisory Committee for Nutrition (SACN)**  
Carbohydrates and Health report July 2015 (> 30 MB)

**2010 Dietary Guidelines for Americans** (Departments of Agriculture and Health)  
**USDA Background document for 2015 Dietary Guidelines for Americans** (> 600 pages)

**Nederland – Gezondheidsraad - Richtlijnen goede voeding 2015** (november 2015)



## Conclusies – Aanbevelingen

### Nederland – Gezondheidsraad 2015

- *Eet dagelijks ten minste 90 g bruin brood, volkorenbrood of andere volkorenproducten*
- *Vervang geraffineerde graanproducten door volkorenproducten*

### Engeland SACN Carbohydrate and health report

- *Koolhydraten - ~50% van totale energie*
- *Vrije suikers(ook vruchtensappen) max. 5% van tot. Energie*
- *Voedingsvezel – 30g/ dag voor volwassenen, vezels uit groente, fruit en volkorenproducten*

# German Nutrition Society – Summary of Evidence

## Wholegrain products and cereal fibre best associated with health benefits

	T2D	CHD	Stomach cancer	Colon cancer	Obesity
Total dietary fibre (DF)	O	↓↓	~	↓	↓↓
DF from cereal products	↓↓	↓	↓	↓↓	—
Wholegrain products	↓↓	↓↓	—	—	↓
Fruit fibre	OO	↓	—	—	—
Vegetable fibre	OO	O	—	—	—

### Legend

- not assessed
- O possible evidence, no association
- ↓ possible evidence, risk reducing
- ↓↓ probable evidence, risk reducing
- ~ insufficient evidence

Hauner et al. Ann Nutr Metab. 2012;60 Suppl 1:1-58

# Scientific Statements of Cereal Fibre and Disease



American Society for Nutrition  
Excellence in Nutrition Research and Practice

FROM THE AMERICAN SOCIETY FOR NUTRITION

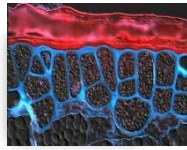
Consumption of cereal fiber, mixtures of whole grains and bran, and whole grains and risk reduction in type 2 diabetes, obesity, and cardiovascular disease<sup>1-4</sup>

*Susan S Cho,<sup>5</sup> Lu Qi,<sup>6</sup> George C Fahey Jr,<sup>7</sup> and David M Klurfeld<sup>8\*</sup>*

**Evidence level: A (strong evidence)- D (inadequate evidence)**

	T2D	Obesity	CVD	Hypertension
Cereal Fibre	B	B/C	B	D
Mixtures of whole grains and bran	B	B/C	B	D
Whole grains	C	C/D	C	D

- **The ASN position:** Consumption of foods rich in cereal fibre or mixtures of whole grains and bran is modestly associated with a reduced risk of **obesity (B/C)**, **T2D (B)**, and **CVD (B)**.
- Statement based on current available literature from 1965-2010.
- No long-term RCTs (>1y) using cereal fibre was available for **disease endpoint**.



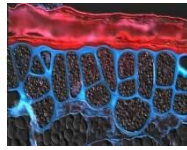
## Recommended dietary fibre consumption at least 25 g/ day. *Preference for fibre naturally occurring in foods*

	Intake	Remarks
EFSA (2010)	25 g / day	25 g is adequate for normal laxation in adults. Diets rich in fibre containing foods at DF intakes $\geq$ 25g are associated with additional health benefits
WHO (2003)	$\geq$ 25g / day	Total dietary fibre from whole grain cereals, fruit and vegetables
Germany, Austria, Switzerland (D-A-CH,2008). UK SACN	$\geq$ 30g / day	At least 30 grams of dietary fibre daily, especially from whole-grain products
Netherlands (GR, 2001, 2006)	30-40g / d.	30-40 g dietary fibre via products not enriched with isolated and purified dietary fibre
Nordic Countries (NNR 2012)	25-35g / d.	
USA (IoM, 2005)	25-38g / d.	Total fibre from whole grain cereals, fruit and vegetables for women and men, respectively
USA (USDA, 2010)		Choosing whole grains that are higher in dietary fibre has additional health benefits Unclear if added fiber provides the same health benefits as naturally occurring sources

Van der Kamp and Lupton 2013

Fibre-rich and wholegrain foods. Cambridge, UK: Woodhead; 2013, pp. 3-24





## Remarks on added fibre

examples showing the general opinion

### **SACN Carbohydrates and Health report 2015**

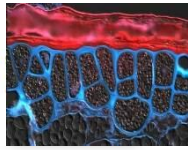
There is evidence to show that particular extracted and isolated fibres have positive effects on blood lipids and colorectal function but due to the smaller evidence base,

it is not known whether these components confer the full range of health benefits associated with the consumption of a mix of dietary fibre rich foods.

**Therefore, it is recommended that fibre intakes should be achieved through a variety of food sources.**

### **USDA 2010:**

Unclear if added fiber provides the same health benefits as naturally occurring sources



# Inhoud

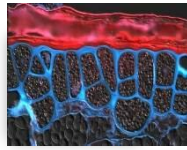
Inleiding -

Graan en Brood –wat zit er in?

Voedingsonderzoek – en voedingsaanbevelingen

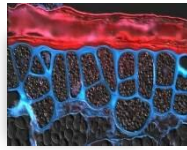
**Hypes en goeroes**

Duurzaamheid en eco-efficiency



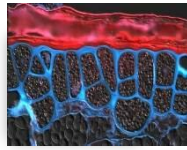
## Statements van 'goeroes' en feiten - 1

<b>Statements o.a. in sociale media</b>	<b>De feiten</b>
<p>Granen worden pas sinds 10.000 jaar gegeten.</p> <p>De oermens is genetisch niet aangepast aan consumptie van granen en andere zetmeel-houdende gewassen</p>	<p>Recent archeologisch onderzoek laat zien dat zetmeel-houdende gewassen, waaronder granen al meer dan 100.000 jaar gegeten worden.</p> <p>Oermensen - Genoomanalyse Zij hebben veel meer (6) zetmeel-afbrekende enzymen dan andere primaten (2)</p>



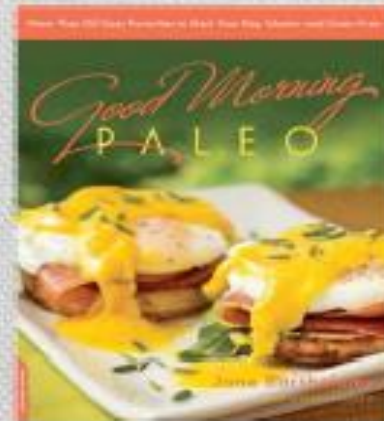
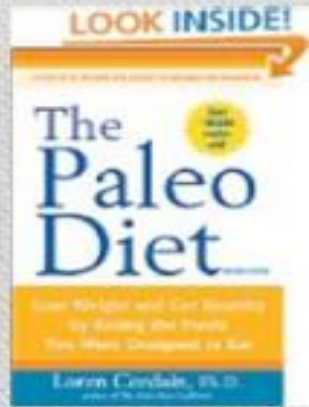
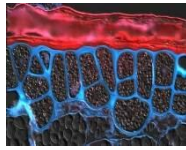
## Fabels en feiten - 2

<p>Moderne tarwe is genetisch gemodificeerd en bevat gliadine, een verslavende component van gluten</p>	<p>Moderne tarwe is niet genetisch gemodificeerd. Tarwe van vroeger en nu bevat evenveel gliadine en glutenine.</p>
<p>Een dieet hoog in koolhydraten is ongezond.  Hogere eiwitconsumptie is beter.</p>	<p>Dit is in tegenspraak met de officiële voedingsaanbevelingen . Voeding hoog in eiwit heeft ook gezondheidsnadelen. Van belang is – om ook bij lagere koolhydraatconsumptie - veel voedingsvezel (= koolhydraat) te consumeren</p>
<p>Oude tarwesoorten zoals spelt en speciale granen zoals quinoa zijn gezonder dan moderne tarwe</p>	<p>De samenstelling van spelt wijkt nauwelijks af van die van gewone tarwe. Quinoa bevat vrij veel sporenelementen, maar veel minder vezel dan tarwe</p>

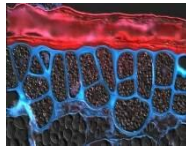


## Placebo en Nocebo effect

- › Mensen die een speciaal dieet volgen – b.v. een laag koolhydraat dieet - of die geen tarwe meer eten (Djokovic!) zeggen vaak dat ze zich beter voelen. (Maar Murray stelde: “gluten-free was heel slecht voor me”)
- › Mogelijke verklaring:
  - › het Nocebo effect -, vergelijkbaar met het Placebo effect.
- › Placebo-effect voorbeeld: ik consumeer neutrale stof verpakt als medicijn – en ik voel me beter.
- › Nocebo voorbeeld – ik eet geen gluten / weinig koolhydraten, dus ik voel me beter.



CLAIM: HUMANS DID NOT EVOLVE TO EAT GRAINS; PALEO DIETS ARE BETTER



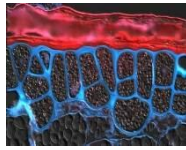
## Claim: Humans Did Not Evolve to Eat Grains

- Arguments for this perspective fail
- Humans -eating grains >100,000 yrs
- **Dental record evidence**
  - Hominids were and are omnivores
  - Cooked grain DNA in **dental calculus** of Paleolithic humans
- **Cave and cooking evidence\***
  - Grains (sorghum, wild maize, others) found in caves
  - Grain DNA on stone tools and in cooking pots indicate processing and cooking of grains.



\*Caves in Iraq and the Low Countries; the Americas

Henry, A. et al. *Ethology and Sociobiology* 15 (4): 219-35; Unger, P. The known, the unknown and the unknowable  
DOI:10.1016/0162-3095(94)90015-9.



## Claim: Humans Did Not Evolve to Eat Grains

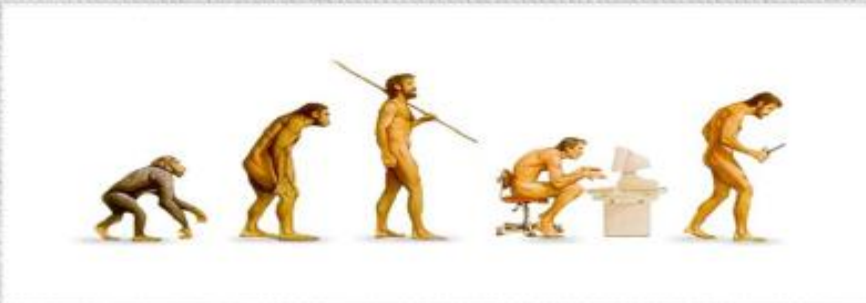
- With the advent of Agriculture
- Humans **evolved** to have **6 copies of amylase**
  - other primates - 2 copies
- Amylase & cooking -
  - Enabled ready supply of glucose to the brain
  - the brain's preference for fuel
- Cooked CHO / food may have enabled evolution



Haslam & Rigby. A long look at obesity. *Lancet*. 2010;376:85–86

<http://news.sciencemag.org/evolution/2012/10/raw-food-not-enough-feed-big-brains>

[news.nationalgeographic.com/.../121026-human-cooking-e...](http://news.nationalgeographic.com/.../121026-human-cooking-e...) - A surge in human brain size about 1.8 million years ago is linked to the innovation of cooking

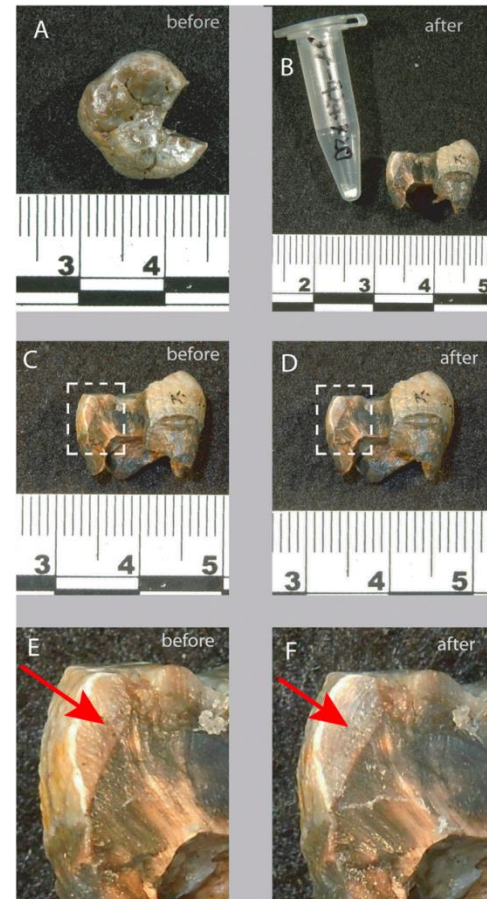




Fossil grain- 300 milion yrs  
found: Geo park Araripe- Brasil

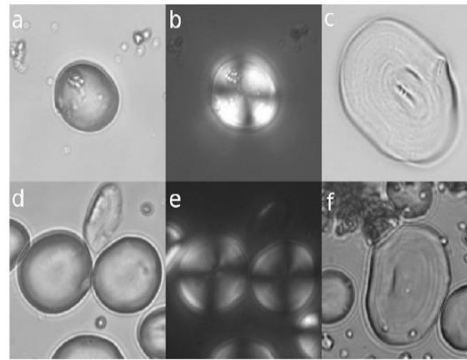


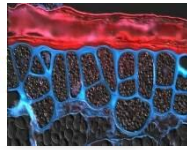
- 1-4 million years: our ancestors in Kenia consumed a diet composed of **plants, grasses and seeds**



**45.000 jaar geleden!**

Microdeeltjes van graszaden (tarwe, gerst, rogge) in tandglazuur bewijzen consumptie in het Neanderthaler dieet:





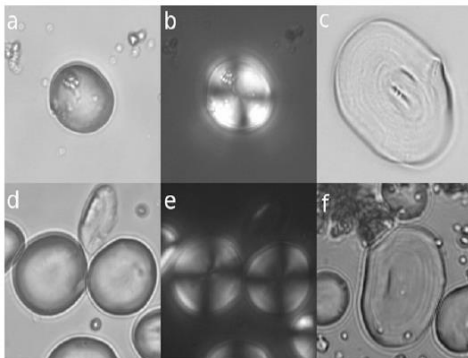
## Evidence for the processing of wild cereal grains at Ohalo II, a 23 000-year old campsite, Israel

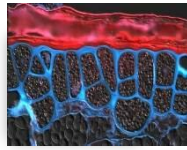
Nadel et al. *Antiquity*. Vol. 86, 334, Dec. 2012, Pages 990-1003



45.000 years ago! Micro-particles in dental enamel prove consumption of plants and cooked meals in the Neanderthal diet: dates, vegetables, roots, wheat, rye and barley

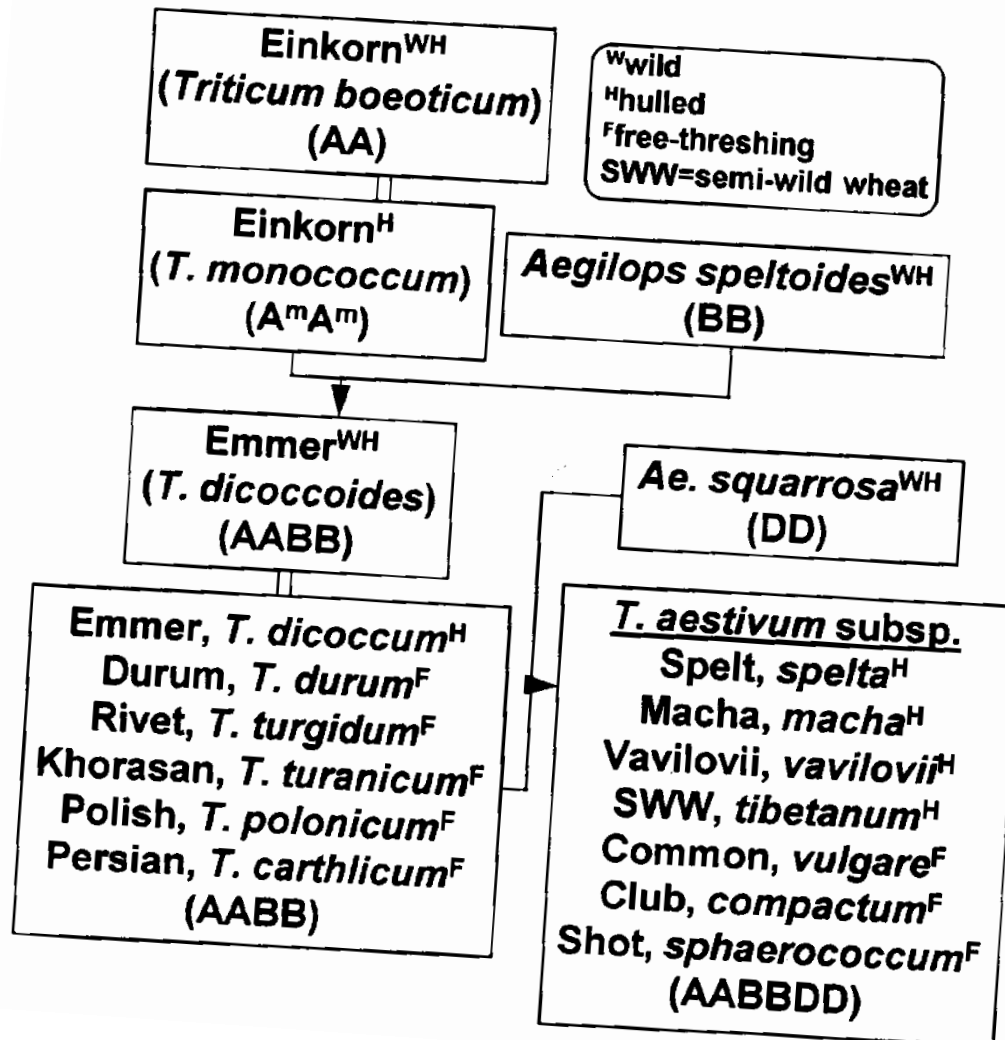
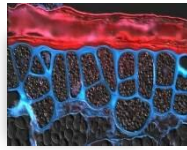
PNAS | January 11, 2011 | vol. 108 | no. 2 | 487





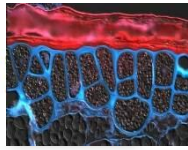
# Brood-type en gezondheid

Brood	Opmerkingen / relatie tot gezondheid
Boeren-, Oer-, Andes-brood enz.	Geen relatie tot gezondheid
Donkere kleur	Met gebrande mout, - suiker (kleur puur volkoren: licht bruin/ grijs)
Meergranen	% andere granen dan tarwe niet gedefinieerd Geen relatie tot gezondheid
Spelt- quinoa- maïs-brood enz.	Niet gezonder dan gewoon brood % Spelt e.d. ligt niet wettelijk vast
Biologisch	Relatie tot graanteelt en kwaliteit van gebruikte stoffen. Geen bewezen relatie tot gezondheid
Vezelrijk (dwz > 6% vezel)	<b>Bewezen relatie tot gezondheid met vezels uit graankorrel</b> (n.b. niet uit tarwestro/ kaf van haver)
Volkoren	<b>Bewezen relatie tot gezondheid</b> De term volkoren is wettelijk gedefinieerd



Evolutie  
tarwegroep

Spelt is een  
tarwesoort



# Inhoud

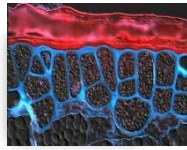
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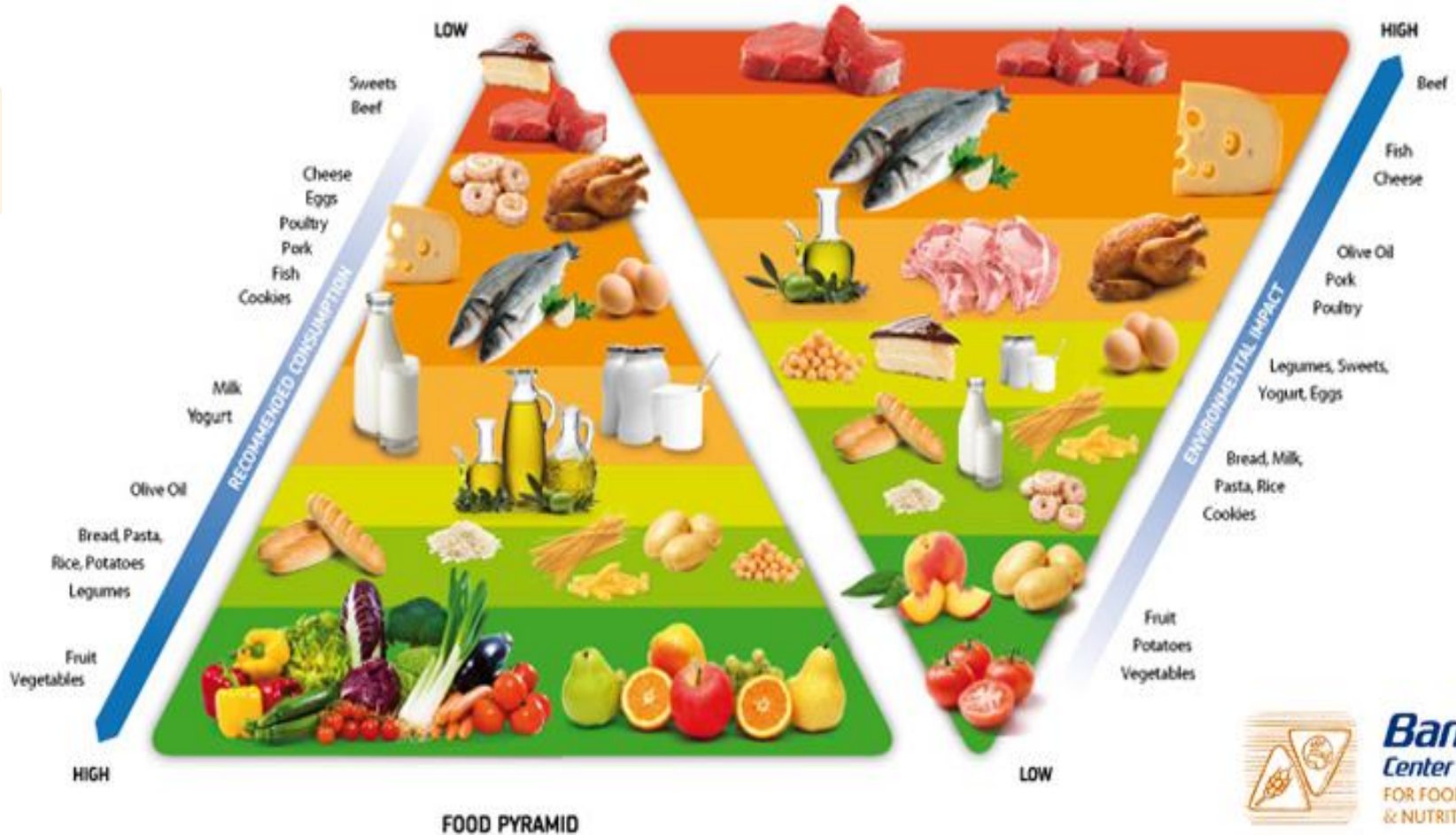
Hypes en goeroes

**Duurzaamheid en eco-efficiency**



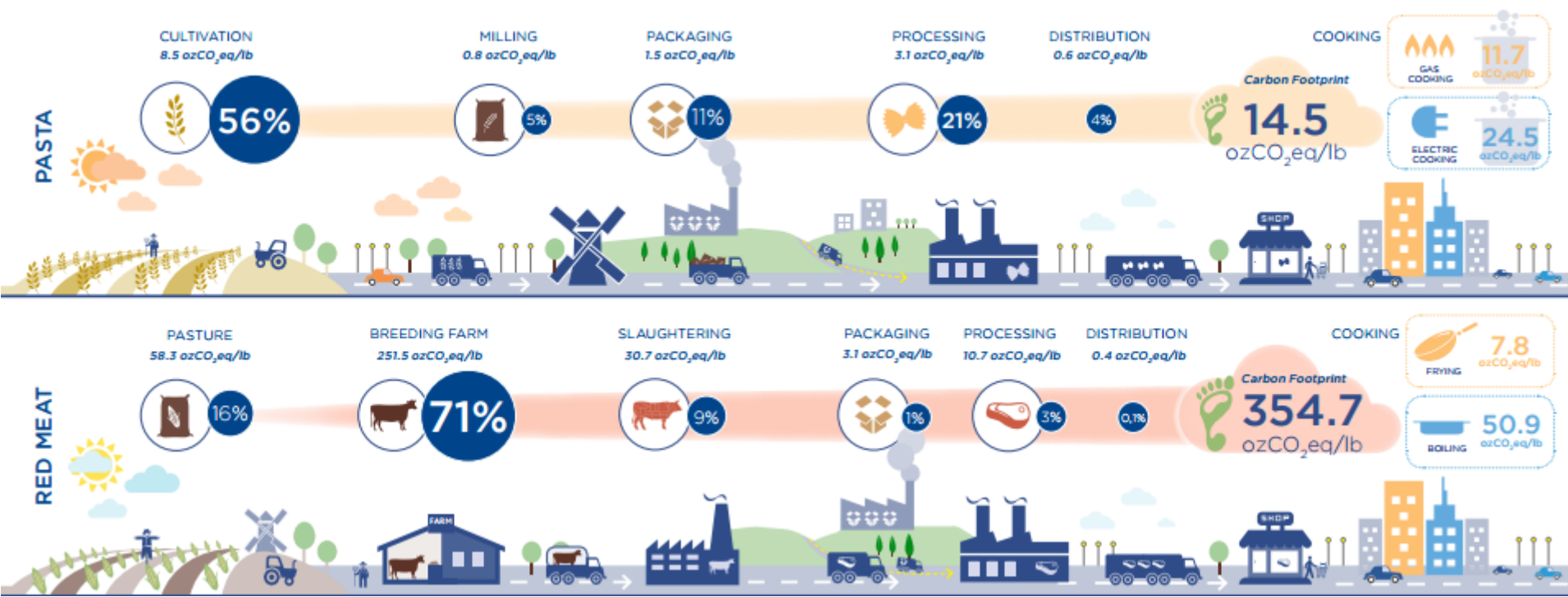
# The food pyramid and the sustainability pyramid

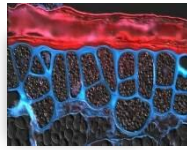
ENVIRONMENTAL PYRAMID










# The life cycle assessment of pasta and red meat





# Impact of food production on CO2 emissions

Blonk Consultants,  
2015

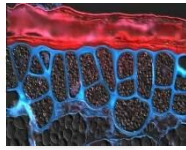
Product	Carbon footprint
	kg CO2-eq./kg
Beef	46.7
Cheese, Gouda	9.2
Pork	7.7
Chicken	5.1
Salmon	3.9
Egg	3.3
Herring	2.0
Tomato	1.7
Cashew nuts	1.6
Milk, semi-skimmed	1.2
 <b>Crispbread</b>	<b>1.0</b>
 <b>Bread, white</b>	<b>1.0</b>
 <b>Bread, rye</b>	<b>0.9</b>
 <b>Bread, wholemeal</b>	<b>0.9</b>
Carrots	0.7
Potatoes	0.7
 <b>Cereal, wholegrain</b>	<b>0.7</b>
Apple	0.5

Product (ready-to eat)_	Carbon Footprint	Dry matter (DM) %	CO2 footprint Per kg DM
	kg CO2- eq./kg		kg CO2- eq./kg
Beef	46.7	74,0 (raw)	180
Cheese, Gouda	9.2	39,3	15
Pork	7.7	52,0	16
Chicken	5.1	52,0	11
Salmon	3.9	64,2	11
Egg	3.3	76,2	14
Herring	2.0	65,0	5,7
Tomato	1.7	95,4	37
Cashew nuts	1.6	2,9	1,7
Milk, semi- skimmed	1.2	89,4	11
<b>Crispbread</b>	<b>1.0</b>	<b>6%</b>	<b>1,1</b>
<b>Bread, white</b>	<b>1.0</b>	<b>37.3</b>	<b>1,6</b>
<b>Bread, rye</b>	<b>0.9</b>	<b>46.2</b>	<b>1,7</b>
<b>Bread, wholemeal</b>	<b>0.9</b>	<b>38.8</b>	<b>1,5</b>
Carrots	0.7	90,4	7,3
<b>Potatoes</b>	<b>0.7</b>	<b>78,0</b>	<b>3,2</b>
<b>Cereal, wholegrain</b>	<b>0.7</b>	<b>11,0</b>	<b>0.79</b>
Apple	0.5	85,8	3.52

# Food Sustainability

Access to sufficient, nutritious, and safe food is an essential element of food security for the U.S. population. A sustainable diet ensures this access for both the current population and future generations. The major findings regarding sustainable diets were that a diet higher in plant-based foods, such as vegetables, fruits, whole grains, legumes, nuts, and seeds, and lower in calories and animal based foods is more health promoting and is associated with less environmental impact than is the current U.S. diet. This pattern of eating can be achieved through a variety of dietary patterns, including the Healthy U.S.-style Pattern, the Healthy Mediterranean-style Pattern, and the Healthy Vegetarian Pattern.

2015 USDA Scientific report for the Dietary Guidelines for Americans



# Conclusie– geniet van lekker volkoren- en ander brood

