EUROPEAN COMMISSION / European Research Area

HEALTHGRAIN

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

The Integrated Project HEALTHGRAIN joins 44 partners from 15 countries working to increase availability of high-quality, health-promoting cereal-based foods, with the goal of increasing the average European citizen's intake of protective compounds of whole grains or their fractions. Cereal foods are an essential part of the daily diet throughout Europe. Nutrition epidemiology research increasingly demonstrates that a diet rich in whole grain and grain fibre based foods protects against development of diet-related disorders such as obesity. cardiovascular disease, and the rapidly expanding epidemic of type 2 diabetes.

Background

Wheat makes up most of Europe's cereal consumption, but usually only in the form of refined white wheat flour in such foods as baked goods, pasta, and breakfast cereals. Wheat milling focuses on flour extraction and, for durum wheat, on semolina, from the endosperm, discarding about 25% of the kernel for use as animal feed. These discarded outer kernel layers (bran and aleurone) and the germ contain dietary fibre and a range of other bioactive compounds such as vitamins and phytochemicals (folate, choline, sterols, tocols, alkylresorcinols and phenolic anti-oxidants) . Rye grain in whole meal or whole-grain bread has high nutritional value but its taste mainly appeals to Northern and Eastern Europeans only.

Objectives

The 60 month HEALTHGRAIN project has addressed three main issues:
- Identification of mechanisms and cereal food product attributes important for health benefits
- Developing technologies for increasing amounts of grain fibre and bioactive compounds in cereal grains, foods and ingredients
- Enhancing consumer understanding and endorsing the development of healthier products

Results

The project provided created a toolkit of molecular markers as well as antibody based kits and calibrations for use by plant breeders enabling them to develop new cultivars with higher levels of dietary fibre and other bioactives. One of the outcomes was the development of NIR calibrations for soluble and insoluble arabinoxylan fibre and other bioactives to allow analysis of grain and flour samples in breeding and trade T. Tools were also developed for the control of the fractionation process on whole grain, and for producing functionally and nutritionally improved whole grain flours. Industrial feasibility study of 'Healthflour' production revealed that 'Healthflour' has less potential food safety issues than whole wheat flour, but the cost of production are about 4% higher. Breadmaking companies are already showing interest in using this new flour concept.
Wet processing technologies (enzymatic) were developed to extract and impact on the health profile of cereal constituents. Sensory quality of breads prepared with modified flours was studied and improvement could be ensured by peeling the whole grain before the processing stage. Further developments can be made by industry to be able to produce bread with modified flours enriched in certain constituents beneficial for health.

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In nutrition studies arabinoxylan has been shown to be bifidogenic and a good producer of butyrate, and it is thus useful for colonic health. Ferulic acid was identified as an important antioxidant of the wheat grain. Products high in aleurone increased betaine levels in blood and decreased homocysteine, a risk factor for heart diseases. These are all examples of the factors which are considered mediators of the health protective effects of grains.
Animal and human studies showed differences between rye and wheat products. Rye products improved insulin economy. Improvement of insulin economy and satiety, obtained with barley kernel or barley fibre based products was related to enhanced colonic fermentation.

Impact
HEALTHGRAIN will provide health professionals with new nutritional tools to combat such diseases as obesity, type 2 diabetes and heart disease,. This will help reduce healthcare expenditures linked to Western lifestyles and ageing populations. Europe produces about 36% of the world's wheat and 94% of its rye, but at a higher cost than many of its competitors. The project will give European grain producers new technologies to develop globally competitive, healthier grain traits, and for the processing industry, including a large number of small and medium-sized enterprises, to develop new, competitive, grain foods that are good for health. These will include foods for individuals sensitive to particular cereal constituents, for example, gluten-free products. Over 40 HEALTHGRAIN related industries, universities, institutes and organisations communicating to consumers have established the HEALTHGRAIN Forum aiming at further pursuing the HEALTHGRAIN objectives after the end of the project.

For more information, please visit the website: www.healthgrain.eu

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Participants:
VTT Technical Research Centre of Finland (Finland), AgroBioInstitute (Bulgaria), ANET - New Media Solutions (Austria), Barilla SpA (Italy), Max Rubner-Institute (Germany), BOKU University of Natural Resources and Applied Life Sciences (Austria), Branscan Limited (UK), Budapest University of Technology and Economics (Hungary), BÜHLER AG (Switzerland), Cereal Chemistry Equipment CVBA (Belgium), University of Aarhus (Denmark), Dprnutrition Ltd(UK), The Technical University of Denmark (Denmark), International Association for Cereal Science and Technology (ICC) (Austria) ,Institute of Food Research (UK), IGV Institut für Getreideverarbeitung GmbH (Germany), Institute of Plant Breeding and Acclimatization (Poland), Institut National de la Recherche Agronomique (France), Istituto Nazionale di Ricerca per gli Alimenti e la Nutrizione (Italy) ,Katholieke Universiteit Leuven (Belgium), University of Copenhagen (Denmark), Lund University (Sweden), Université de Droit, d'Economie et des Sciences d'Aix-Marseille III (France), Agricultural Research Institute of the Hungarian Academy of Sciences (Hungary), Puracor NV (Belgium), Raisio Nutrition (Finland), Rothamsted Research (UK), Swedish University of Agricultural Sciences (Sweden), SNF Swedish Nutrition Foundation (Sweden), Syral Belgium (Belgium), Tecnoalimenti S.C.p.A. (Italy), Netherlands Organisation for Applied Scientific Research (TNO) (The Netherlands), University College Cork-National University of Ireland (Ireland), University of Helsinki (Finland), University of Eastern Finland (Finland), Maastricht University (The Netherlands), Federico II, University of Naples (Italy), University of Surrey (UK), Università degli Studi della Tuscia (Italy), University of Ulster (UK), Wageningen University (The Netherlands), Öresund Diabetes Team AB (Sweden), Productschap Akkerbouw (The Netherlands), Solides Divises Technologies (France)