جامعة السلطان قابوس
Sultan Qaboos University

Workshop on

Promotion of Whole Grain Consumption

June 20 2013

College of Agricultural and Marine Sciences

Sultan Qaboos University

Sultanate of Oman

Industrial Innovation Center

أطياب لتكنولوجيا الأغذية
AtyabFoodtech

شركة المطاحن العمانية (ش.م.ع.ع)
OMAN FLOUR MILLS COMPANY (S.A.O.G.)
An Atyab Investments Group Company

Guests of Honor

HH, Dr. Fahad Al-Julanda Al-Said, Ph.D.
College of Agricultural and Marine Sciences
Sultan Qaboos University

H, Dr. Rashid Abdullah Al-Yahyai, Ph.D.
Assistant Dean, Training & Community Services
College of Agricultural and Marine Sciences
Sultan Qaboos University

Dr. Michel R. G. Claereboudt, Ph.D.
Acting Dean, College of Agricultural and Marine Sciences
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Dr. Abdullah Al Zakwani, Ph.D.
Executive Director, Industrial Innovation Center

Dr. Khamis R. Al-Balushi, Ph.D.
Industrial Innovation Consultant, Industrial Innovation Center

Mr. Al Habaj
The Chief Executive Officer, Oman Flour Mills Company

Chairman

Dr. A.Manickavasagan
Assistant Professor
Department of SWAE
College of Agricultural and Marine Sciences
Sultan Qaboos University
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Co - Chairmen

Mohib Ahmed Khan
General Manager
Atyab Food Tech LLC
Sultanate of Oman

Dr. Lorna Cork
Industrial Innovation Consultant
Industrial Innovation Centre
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Majid Mohd Al-Mugheiry

Sawsana Hilal Al Rahbi
Nawal Khamis Al – Mezeini
Halima Said Abdullah Al Dohani
Naima Hareb Al-Shukeili

AGENDA

Thursday, June 20 2013

Registration and Opening Ceremony

8:30 – 9:00 am	Registration	
9:00 – 9:10 am	Quran Recitation	
9:10 – 9:15 am	Welcome message	H, Dr. Rashid Al-Yahyai
9:15 – 9:20 am	Welcome message	Dr. Michael Rene Cleareboudt
9:20 – 9:30 am	Whole wheat product development & awareness creation in Oman: Project update	Dr. A. Manickavasagan

Oral Presentation – Session I : Chairman – Dr. Nejib Guizani

9:30 – 9:50 am	Trends in grain consumption pattern in Oman	Dr. Mariam Al-Waili, *Ministry of Health*
9:50 – 10:10 am	Bioactive compounds in whole grains and their health benefits	Dr. Amanat Ali *CAMS, SQU*
10:10 – 10:30 am	Whole grain consumption pattern in Oman	Dr. Ehsan Abbas Elshafie *CAMS, SQU*

10:30 – 11:00 am **Whole grain snack break**

Oral Presentation – Session II : Chairman – Dr. Hemanatha Jayasuriya

11:00 – 11: 20 am	Whole grain consumption in the traditional Indian food system	Dr. E. Sukumar *Higher College of Technology*
11:20 – 11: 40 am	Beneficiary health effects of oats against cardiovascular diseases and diabetes	Dr. Mathan Kumar *CAMS, SQU*
11:40 am –12:00 pm	Dietary fiber and its role in human health	Ms. Mini Padikkal *Atlas Medical Centre*

Oral Presentation – Session III – Chairman – Dr. Abdulrahim Mohd Al-Ismaili

12:00 – 12: 20 pm	Strategies for inclusion of whole grains in our regular recipes	Mr. Mathew Chacko *Oman Tourism College*
12:20 – 12: 40 pm	Indian traditional foods based on ragi (finger millet)	Dr. D.G. Rao *Caledonian College of Engineering*
12:40 – 1: 00 pm	Whole grain dietary guidelines for diabetes	Ms. Divya Nenan *Badr Al Sama Hospital*

1:00 – 2:00 pm **Lunch at Faculty Club**

Trends in grain consumption pattern in Oman

Dr. Mariam Al-Waili
Sr. Consultant in Nutritional Medicine
Ministry of Health
Sultanate of Oman

Micro nutrient survey, 2004, shows that whole grain flour consumption in Oman has decreased than what it used to be in late 60s and early 70s. Whole-wheat bread has become available in the market but it is expensive and not affordable by many families. For a variety of health reasons, whole grains have been scientifically proven to be important component of healthy life style. Yet there is no standard requirement for the wholegrain intake. In Oman, fortification of white flour is compulsory whereas it is optional for brown flour. Micronutrient survey 2004 shows that almost 60% and 70% of households reported consuming ≥ 1 kg of white and brown flour per person per month respectively. Almost 58% of households had a per capita monthly consumption of 2 Kg of flour or more**.** The study showed that in 51% of the households consume brown bread whereas 40% consume white bread. Traditional Omani bread which is normally made of whole grain was found to be the most common type of homemade bread and it was found to be available in almost 33% of surveyed houses. However, the study also showed that white and brown flours were equally used to make traditional Omani bread with 46.7% and 42.5% respectively. The most common type of white bread was white beta bread was shown to be available in 55% of the household that had white bread (19% of all households). The consumption of white bread was higher than brown bread among both men and women. The benefits of whole grain consumption are considered an inexpensive strategy to improve the health wellbeing for all people. The public and private health sectors should work collaboratively to improve the population's health by encouraging the intake of whole grain products. At the same time, consumers must be informed about the importance of consuming wholegrain products in their diets.

Bioactive components in whole grains and their health benefits

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Cereal grains are the dietary staple globally and are the main source of daily energy intake. Whole grains or their products are defined as those which consist of all the 3 principle components of intact caryopsis (the starchy endosperm, germ and bran) in original relative proportion ~ 83, 14, and 3%. In addition to their usual nutrient contents, they also contain many bioactive components (dietary fiber, phenolics, phytoestrogens, lignans, β-glucan, terpenoids, flavonoids, carotenoids, inositols, phytates, saponins, lectins, etc.), which have not yet been clearly identified and fully explored for their bioavailability and disease prevention potentials. It is hypothesized that these bioactive components may act synergistically to contribute their protective effects. The protective mechanism of action of wholegrain is poorly understood, however their main action appears to be due to their potential to improve the integrity of the gastro-intestinal tract, act as antioxidants and provide protection against a number of chronic diseases. Published data suggests a strong inverse association between the increased consumption of wholegrain foods and reduced risk of obesity, insulin resistance, diabetes, metabolic syndrome, cardiovascular disease and cancer. To obtain the beneficial effects of whole grains, it is suggested that at least 3 servings of whole grains should be consumed daily. The germinated (sprouted) whole grains or their products are emerging as potential functional foods. This review discusses the positive and beneficial role of consuming whole grains as part of healthy diets and biological mechanisms related to their bioactive components involved in disease prevention.

Whole grain consumption pattern in Oman

Ihsan Abbas[1], Annamalai Manickavasagan[1], Lorna Cork[2], Mohib Ahmed Khan[3] and Sawsana Al-Rahbi[1]

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In this study, a survey was conducted to assess the consumption pattern of whole grain products and availability of these products in Oman. A detailed questionnaire (27 questions in 3 sections: a. rice and rice products b. wheat and wheat products c. other grain products) was distributed to 2773 people (0.1% of the total population) in nine regions of Oman and 1891 were received with completion (65% recovery). In Oman, almost 100% of the people consume rice 4 to 7 days a week. Overall 83% of the people consume only white rice. But almost 100% of the people living in Al-Batinah and Dhofar regions eat only white rice. Similarly, 99% of the people consume bread 4 to 7 days per week. About 40% of the people reported that white bread is healthier or don't know which bread is healthier. Apart from rice and wheat, 86 % of the people in Oman also consume other grains mainly corn. In terms of willingness to consume whole grains, 82% and 90% of people were willing to consume brown rice and whole wheat products, respectively. However, only 20 to 30% of people mentioned that that brown rice or whole wheat bread is available in the market all the time in their regions. Therefore it is important to improve the availability of whole grain products to promote whole grain consumption in Oman.

Whole grain consumption in the traditional Indian food system

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India is an agricultural country with vast land mass, varied climates, soil and precipitation pattern. It is known as the producer of different varieties of agricultural products that are utilized for both internal consumption as well as exports. Though rice and wheat are the major produces, many whole-grain products such as ragi, Indian corn, common millet, Italian millet etc. are also cultivated and consumed widely in many parts of the country especially the tribal pockets. The whole grains occupied prominent place in the traditional food systems over many years and were consumed as the main source of nutrition and way of disease prevention. Ancient scientific literature such as *Charaka Samhita* and *Patharthaguna Chinthamani* have dealt in detail on various types of foods, their characteristics and nutritional cum medicinal values. But due to the invasion of modern foods in cities and towns, these traditional foods have gone into oblivion. With increasing incidents of under-nutrition and incurable diseases, of late, a renaissance in whole grain food consumption is dawn in the Indian food scenario. People started realizing that diseases which show phenomenal increase year after year could be prevented / checked only with the use of traditional foods. Many nation-wide programs to impart awareness among the public are on full swing in the media and educational institutions.

Beneficiary health effects of oats against cardiovascular diseases and diabetes

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Globally each year 36 million people succumb to non-communicable diseases (NCDs). Among the NCDs, cardiovascular diseases (CVDs) are the leading cause of death and the number of people affected with diabetes worldwide is increasing at an alarming rate. Rise in blood cholesterol is a major risk factor for CVDs that arises out of calorie-enriched diet intake and lack of exercise which in turn causing obesity and insulin resistance typifies the risk factor's association with lifestyle and diet. Even though aetiologies of these are complex, they are yet preventable. Dietary inclusion of whole grains such as oats can promisingly combat CVDs and diabetes. Oats provide diverse health benefits to humans through favorable physiological responses to act against the risk factors and it contains rich macro and micro nutrients, soluble fiber (β-glucans) and oat poly phenolic (Avns). Soluble fiber fraction (1→3, 1→4) β-D-glucan decreases total cholesterol (TC) and low-density lipoprotein cholesterol (LDL-C) concentrations and is a sum of several physiological effects such as soluble fibers bind cholesterol thus augmenting the increased clearance of LDL-C and the byproducts of fermentation of fiber at large intestine such as acetate, butyrate, and propionate play a major role in altering cholesterol metabolism. Other mechanisms that include by increased gut viscosity that may prevent the dietary cholesterol reaching the intestinal epithelium and consumption of oats provides increased satiety and delayed return of hunger i.e. "second meal effect" through the lowered postprandial glycemic and insulinemic response. It is the need of the hour that the community groups and educational institutions such as schools and colleges should be targeted to propagate the health benefits associated with consumption of wholegrain products especially the oats and oat products.

Dietary fiber and its role in human health

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An important part of a healthy diet is eating fiber rich foods. In Oman and Arab countries people were consuming a lot of fiber along with their daily meals. This was a healthy habit. However in the younger generation of Oman and many other countries the consumption of fiber instead of increasing seems to be on the decrease. The greater availability of fast food and junk food combination with a poor fiber content put our younger generation at a higher risk for Type 2 Diabetes, Obesity, high blood pressure and high cholesterol level in blood. So it is very important to develop and deepen the awareness and understanding usefulness and significance of including whole grain foods, high fiber vegetables, fruits and beans in our daily foods.

Fibers are having a very important role in our human health. Fiber helps our body to absorb sugar and starches more slowly. This means blood sugar rises gradually over a longer period, instead of skyrocketing after a meal. Like a sponge, fiber absorbs water and swells, making you feel full long after you eat it. The more bulky, high fiber foods you eat the less fat you will consume. Fibres sweeps cholesterol up and whisk it away, which helps the cholesterol levels in your blood. To get these amazing benefits, increase your fiber intake gradually. It is also important to drink plenty of water with a high fiber diet.

Strategies for inclusion of whole grains in our regular recipes

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The objective of this presentation is to understand and appreciate the different ways of whole grain consumption by a common man, product recognition, and the easy way of whole grain inclusion in daily diet with standardized recipes. To develop a wholesome awareness of whole grains and its product identification, uses in recipes and equip the public with the methods of inclusion of whole grain and sub products in daily recipes in an easy and interesting way which will even enhance and change the food habits of a common man. Understanding the good food habits in this era is very important because of the invasion of junk foods in the daily busy life of a common working person. Interesting way of whole grain inclusion in daily food recipes will encourage people to switch to a fiber balanced complete diet. Developed awareness in whole grain consumption and its importance will lead a community or a nation to practice good food habits leading to a healthy living.

Indian traditional foods based on ragi (finger millet)

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Ragi (*Eleusine coracana*) is known as Finger millet in English, and is considered as a rich source of calcium, iron, protein and fiber. It is grown extensively in South India in the sates of Karnataka and Andhra Pradesh, where it is consumed as a staple food, especially by the poor and working class people. It is also grown and consumed in othe rcountries like Africa, Nepal, Sri Lanka etc. But for its unpleasent colour, ragi is a wonderful gift from God particularly to those vulnearble groups of people below the poverty line. It is especially valued for its content of amino acid *methionine* which is normally not present in most of the starchy grains like polished rice, maize and other starchy foods like cassava and tapioca which are consumed as staple foods. The nutritional values of ragi are very high. Nutritional components of 100 grams of ragi are : protein (7.6 g), fat (1.5 g), carbohydrates (88 g), calcium (370 mg), vitamin A (0.48 mg), Thiamine-B1 (0.33 mg), Riboflavin-B2 (0.11mg), Niacin-B3 (1.2 mg), and fiber (3 g).

A number of products is made out of ragi. The present work reports on the traditional as well modern foods made from ragi in India, which are consumed as health foods and bariatric foods by elders, as weaning foods by children and as geriatric foods by old. Some of the traditional foods are : (i) Ragi gruel, (ii) Ragi porridge (*Ragi Ambali*), (iii) *Ragi mudde*, (iv) Ragi dosa; some processed foods are : (i) Ragi bread, (ii) Ragi-Spinach bread), (iii) Ragi biscuits , (iv) Ragi malt (prepared from germinated seeds). Most of these products are consumed along with some side dishes like chutney, sambar, chicken curry or mutton gravy etc, which actually impart taste to the dish. The grains are also used to make fermented drinks (beer) in countries like Nepal and Africa. The straw from the finger millets is used as fodder.

Whole grain dietary guidelines for diabetes

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All over the world, the prevalence of diabetes is increasing at an alarming rate. The objective of this presentation is to discuss the specific whole grain guidelines for the diabetes. A comparison between whole grain Vs refined grain in terms of identification will be explained. The labeling practices for whole grain products have a significant role in the purchase of these products.

Sensory qualities of whole wheat samoon bread

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Samoon is one of the commonly consumed bread types in many Arab countries. The major ingredient in the preparation of samoon bread is refined wheat flour (around 85%). In this study, changes in sensory qualities of samoon bread while replacing refined wheat flour with whole wheat flour at 5 levels (i. refined flour 100% + whole wheat flour 0% (RF100), control ii. refined flour 75% + whole wheat flour 25% (RF75–WWF25) iii. refined flour 50% + whole wheat flour 50% (RF50–WWF50) iv. refined flour 25% + whole wheat flour 75% (RF25–WWF75) v. refined flour 0% + whole wheat flour 100% (WWF100)) were investigated. In general, the developed samoon breads obtained scores from 6 to 7 (like slightly to like moderately) in all sensory attributes (n=45 panelists). Although the whole wheat blended samoon breads scored lower than the control in visible attributes such as crust color, surface texture, and overall surface appearance, there were no differences in mouth feel and taste.

Acceptability of whole wheat Khubs and Rikhal

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Reformulating the regularly consumed traditional foods by replacing refined grain with whole grain is a practical approach to increase the intake of whole grains. In this study two products (Khubs and Rikhal) which are normally prepared with refined wheat flour were reformulated with whole wheat flour at 3 levels (a. RF100 – 100% refined flour (control) b. RF50–WWF50 – refined flour 50% + whole wheat flour 50% c. WWF100 – whole wheat flour 100%). The sensory evaluation was conducted with 45 panelists for the control and reformulated products. WWF100 Rikhal received more likeliness score than other two products in all tested sensory attributes except crust color. The crust color and appearance of the whole wheat blended Khubs received lower score than the control. However, mouth feel, chewability and taste attributes of RF50–WWF50 and WWF100 Khubs were on par or higher than their counter control. There are ample opportunities to reformulate traditional foods by incorporating whole grains, and educate the people about the health benefits of this reformulation.