Studies on the Use of Hulless Barley and Flaxseed in Arabic Bread

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Introduction

- Wheat processing industry is the biggest food industry in Kuwait, with flat bread and pan bread being their major products.
- Average daily production of Arabic bread is 4 million pieces by Kuwait flour Mills and Bakeries.
- Baked products are based on wheat and other grains.
- Hulless Barley and Flaxseed are attractive grains for the production of foods due to their high content of soluble fiber, omega-3 fatty acid and antioxidants.

- They Provide health benefits (anticancer, prevent CHD, lower blood cholesterol, control blood sugar, enhances the immune system).

- Because of these health benefits, we plan to study the use of adding hulless barley and flaxseed in different percentages to largely consumed Arabic flat bread.

Background Literature

- Barley(King of grain) is a nutritious grain consumed for millions of years.
- It is available year round.
- Flaxseed has been used in German breads and is now becoming popular in other developed countries.
- Relationship between diet and health is gaining wider attention and the literature on these topics is accumulating.

- It is known that prevention is better than cure. Recently many functional foods are being produced using phytochemical–rich grain.
- So far no scientific study is reported on the use of the combination of hulless barley and flaxseed in the production of flat bread.

Varieties of Barley

There are three main types of barley:

1. Pearled barley: It is highly polished, steamed and refined because most of the fiber and the bran layer is removed.
2. Whole barley: It is moderately refined and contains less fiber.
3. Hulless barley grain: It contains the most fiber value compared to the other two types.

Composition of Barley

Water	9.44%
Protein	12.48%
Total Fat:	2.30%
Ash	2.29%
Carbohydrate	73.48%
Total dietary Fiber	17.30%
Energy	354Kcal

- Good source of minerals (calcium 33 mg, iron 3.60 mg, phosphorus 264 mg, magnesium 133 mg, Zinc 2.77 mg, potassium 452 mg, sodium 12 mg)

- Vitamins (thiamin 0.646 mg, riboflavin 0.285 mg, niacin 4.604 mg, vitamin B-6 0.318 mg)

Composition of Flaxseed

- Protein 21%
- Fat 41%
- Dietary Fiber 28%
- Ash 4%
- Other Carbohydrate * 6%

* Other carbohydrates include sugar, phenolic acids, lignans and hemicelluloses

Objectives

The overall objective of this study is to incorporate flaxseed and hulless barley into flat Arabic breads to produce wholesome foods with improved nutritional value for Kuwaiti customers.

The specific objectives are:

- To study different percentage of adding whole or fine flaxseed into commonly consumed Arabic flat bread.
- To study different percentage of adding hulless barley into commonly consumed flat bread.

- To study a combination of different percentage of adding hulless barley and flaxseed into commonly consumed Arabic bread.
- To compare the effects of adding whole and fine flaxseed with hulless barley on the quality of baked products.
- To optimize the addition of different levels of combination of flaxseed and hulless barley to commonly consumed Arabic bread in relation to their baking and sensory evaluation quality.

Output

On the completion of this research work the following output is expected:

- Application-oriented technological information of producing nutritionally superior baked products will be available.
- Information on the effect of flaxseed and hulless barley addition on the consumer acceptability and sensory quality of baked products.
- Suitable technology for the production of variety of baked products for local consumption will be available.
- A new product will be available, giving the people a chance to choose between varieties of healthy products.

Justification

- Current health advice supports the use of plant based food and the increased use of carbohydrates. This encourages the use of fiber rich foods such as bread and cereals. These foods are excellent vehicles for flaxseed and hulless barley incorporation to produce healthy products.

- In the recent project “National Nutrition Survey of Kuwait” it was found that the recommended intake of dietary fiber was not achieved by any age and gender group.

Benefit to Kuwait

- The Kuwait diet is rich with different kinds of food. Kuwaitis mainly consume Arabic flat bread, white toast bread and highly polished rice. Due to the high consumption of bread in our daily diet, improvement in its nutritional quality is welcomed.

- Adding flaxseed and hulless barley to the diet will, therefore, increase the intake of omega-3 fatty acids and improve the n-6/n-3 fatty acids ratio and dietary fiber.

- Combination of barley and flaxseed in Arabic bread will form new healthier bread.

Research Plan

- Task I: Mobilization
- Task II: Chemical Analysis of Wheat Flour and Flaxseed and Barley.

  Task III: Developing Baked Products Formulations
- Task IV: Reporting

Task I

Mobilization:

- Procure chemicals and other baking supplies needed for the project.

Task II

Chemical Analysis of Wheat flour, flaxseed and barley:

- Flaxseed and barley will be analyzed for fatty acid profile, and dietary fiber.
- Wheat flour will be analyzed for proximate composition (moisture, fat, ash, protein) and water absorption using standard AACC methods.
- Optimize flat bread and formulation with acceptable baking and sensory quality. It will also be analyzed for proximate composition, fatty acid profile and dietary fiber.

Task III

Developing baked product formulations:

- Flat bread with white flour or whole wheat flour as control.
- Flat bread with whole or crushed flaxseed in different levels (4,6,8, and 10% levels).
- Flat bread with barley in different levels (5,10,15 and 20% levels).
- Flat bread with combination of different percentage of hulless barley and flaxseed
- Emulsifiers (SSL, DATEM)
- Bread volume and baking loss.
- Sensory quality (9-point hedonic scale).
- Objective color and instrumental texture of flat breads.

Task IV

Reporting:

- Final technical report containing the results of experimental data and statistical analysis.
- Conclusion and recommendations for the baking industry will be prepared and submitted.

Training

The research staff members, especially Kuwaiti staff, assigned to these tasks will be given on-the-job-training in the following areas:

- Preparation of flat bread containing various levels of whole as well as milled hulless barley and flaxseed, using a dough mixer, moulder, fermentation cabinet, sheeting rolls, dough divider and reel-type baking oven, and measurements of loaf volume, crust and crumb characteristics.
- Evaluation of dough quality as affected by the addition of oxidants and emulsifiers.
- Principles and techniques of sensory analysis used for assessing the acceptability of flat (Arabic) bread.

- Analysis of flour, flaxseed, hulless barley and baked goods for chemical and proximate composition.
- Objective measurement of texture and color of baked products.

Manpower Requirement

	1st Year	2nd Year	Total Manmonths	Percentage
Researcher:				
Suad Al-Hooti, PI	3.6	3.6	7.2	30% of 24 M
Jameela Al-Ghanim, PL	4.8	4.8	9.6	40% of 24 M
Professionals:				
Amani Al-Othman (NSTIC)	0.6	0.6	1.2	20% of 6 M
CAL	1.2	1.2	2.4	20% of 12 M
BTD	4.8	4.8	9.6	40% of 24 M
Technician:				
Mohammed Al-Foudari	6.0	6.0	12.0	50% of 24 M

Anticipated Budget

	1st Year	2nd Year	Total
A. Salary			
Researchers	18,312	18,312	36,624
Professionals	6,336	6,336	12,672
Technicians	3,960	3,960	7,920
Subtotal	28,608	28,608	57,216
B. Operating Expenses			
Laboratory Supplies	2,000	2,000	4,000
Operating charges	3,000	3,000	6,000
Miscellaneous (petty cash)	500	500	1,000
Subtotal	5,500	5,500	11,000
C. Capital	7,000	-	7,000
Grand Total	**41,108**	**34,108**	**75,216**

Duration of the Project

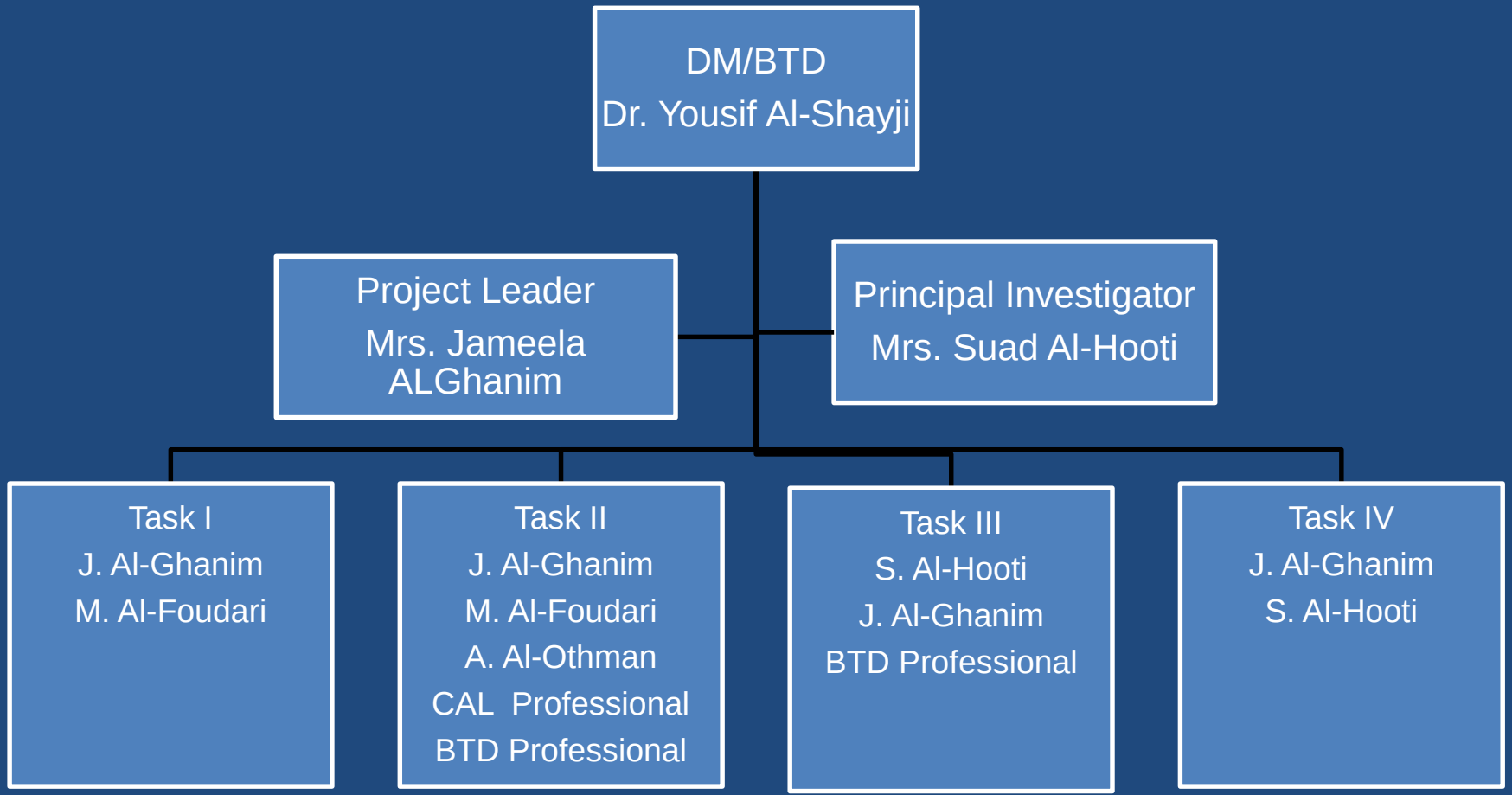
- The duration of this research project will be 24 months from the starting date.

Task Schedule

Task	Months																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
I																								
II																								
III																								
IV																								

Task I: Mobilization
Task II: Chemical Analysis of Wheat Flour, Flaxseed and Hulless Barley
Task III: Developing Baked Product Formulations
Task IV: Reporting

Organization Chart



Equipment Required

Already available:

1. Dough mixers
2. Dough Moulder
3. Fermentation Cabinet
4. TAXT2 Texture Analyzer
5. Color checker

Required:

1. Mill (2 Nos.)
2. Dietary fiber

Conclusion

Since the flaxseed and hulless barley is rich in various phytochemicals such as dietary fiber and omega-3 fatty acids, it will be useful to prepare commonly consumed baked products (flat bread). This would provide a variety of choices for healthy foods to the Kuwaiti consumers.

THANK YOU