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LEBANON INDUSTRY VALUE CHAIN DEVELOPMENT - LIVCD PROJECT **NEWSLETTER**

PROCESSED FOOD VALUE CHAIN | **New Technology of Processing Freekeh**

FREEKEH HISTORY

Freekeh or farik (فريكة) is roasted green wheat that is native to the Levant region. According to legend, freekeh originated around 2300 BC, when the attackers of a Syrian village set the green wheat fields on fire before they retreated. When the villagers returned, they tried to salvage their wheat crop by rubbing away the burnt chaff. They discovered that because of the high moisture content of the kernels, they were merely roasted, and were left with a greenish color and a smoky, nutty flavor. This led to the tradition of intentional harvesting wheat while still green and the grain is at the milky stage, and then carefully roasting the green wheat spikelet. The commonly used name "freekeh" is from the classical Arabic word "farīk", which refers to the rubbing action used to remove the charred hull.[1]

[1]Nature's Organic Grist.
http://www.naturesorganicgrist.com/Freekeh.pdf

FREEKEH PROJECT OVERVIEW

Based on market studies, the LIVCD project determined that freekeh had a high market demand locally, regionally, and in developed markets such as the US and Europe where freekeh is recognized for its superior health benefits. However due to lack of compliance with international food safety standards, Lebanese freekeh could not be exported.

Another obstacle identified by the LIVCD team, was that most of the freekeh sold in high-value markets, was labeled as freekeh but in fact it was just crushed wheat.

LIVCD team designed a new freekeh process that eliminates food safety concerns while maintaining the desired health benefits and flavor. To insure high and consistent quality of freekeh in the new process, it was critical to eliminate any chance for error by using automation.

To achieve this objective, LIVCD partnered with National Instruments (NI) to benefit from its advanced technological solutions as well as its CSR program "Planet NI". As a result, two machines, a roaster and a drier were designed and built by NI's partner, Mekatronico using NI's technology. The new affordable machines automated the process in a way that insures the product can be economically produced at high capacity with consistent high quality while meeting international food safety standards.

To overcome the limited supply and high cost of wheat used for freekeh, the LIVCD team in collaboration with the Lebanese Agricultural Research Institute (LARI) introduced to farmers a new variety of wheat developed by ICARDA that has a desirable large grain and high yield in arid regions.

This variety is suitable for rural areas in the south which face arid conditions and are thus typically left uncultivated. This new variety has a yield that is more than double that of the local variety.

To address the problem of improper labeling of freekeh in high-value export markets, LIVCD is working with the Lebanese Standards Institution (LIBNOR) to detail freekeh specifications and then have them adopted by the CODEX Alimentarius international food standards.

LIVCD OVERVIEW

The Lebanon Industry Value Chain Development project (LIVCD) is funded from the United States government's presidential initiative "Feed the Future" through the United States Agency for International Development (USAID). LIVCD is a five year, $41.7 million project that aims to improve Lebanon's economic stability and generate income for small businesses while creating jobs for the rural population, in particular women and youth.

The project takes a value chain approach in upgrading several sectors including rural tourism, olive oil, grapes, cherries, avocado, apples, honey, and processed foods.

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IMPACT ON WOMEN COOPERATIVES

The LIVCD team with the women of Hariss Cooperative tested the machines using the new variety of wheat and verified that each cooperative will be able to produce at a fraction of the original cost at least 2 tons each season, which will bring them significant additional income. Moreover, the machines were designed to process other grains that have high market demand such as "bourghul", which further increases the cooperatives' income.

The new process creates opportunities for women-run cooperatives in rural villages by placing the entire freekeh-making process under their control, while in the traditional process, the women's role was limited to packaging freekeh sold to them in bulk at high prices.

FREEKEH'S NUTRITIONAL FACTS AND HEALTH BENEFITS

Freekeh is low in fat and high in protein and fiber. Relative to quinoa, freekeh has more protein and twice as much fiber. (A 100g serving of freekeh has 14.3 grams of fiber and 14.3 grams of protein, versus quinoa's 7.1 and 13.1, respectively)[2]. Compared to other grains, "It is higher in protein, fiber, vitamins, minerals and lower in glycemic index," says Vandana R. Sheth, RDN, CDE, spokesperson for the Academy of Nutrition and Dietetics.

Research has found that low glycemic index is appropriate for managing diabetes. Freekeh is also rich in Zeaxanthin and Lutein which are good for both muscle degeneration and the eye health. Lutein and zeaxanthin are plant pigments called carotenoids that protect the retina from oxidative changes caused by ultraviolet light.

[2]Department of Food Science and Nutrition, University of Minnesota.

TRADITIONAL PROCESS FOR ROASTING FREEKEH

Step 1

Harvesting of green wheat. Farmers harvest local variety of wheat prior to maturity while the spikelets are still green and the grain has high moisture content.

Step 2

Sun Drying of harvested green wheat. Harvested green wheat is spread on the side of the road before roasting to be sun dried for up to 24 hrs.

Step 3

Roasting of green wheat. After sun drying, the wheat is bunched into multiple small piles on the side of the road. The farmer then roasts each pile while constantly turning the wheat using a pitch fork resulting in roasted green spikelets of wheat. This practice does not insure even roasting and it exposes the product to hygiene issues.

Step 4

Drying of roasted spikelets. Once all piles have been charred, the roasted green wheat spikelets are spread once again on the side of the road for them to be sun dried for up to 24 hrs.

Step 5

Seed dehulling. After sun drying, the dried roasted wheat is dehulled and the roasted grain can finally be called freekeh! The fresh freekeh is chewy, slightly sweet, and has a desirable natural smoky flavor.

Step 6

Drying of freekeh seeds. After the seeds are dehulled, they are spread on the floor of a shady area, typically in a room or on the patio, and allowed to dry over a period of 24 hours or more. The process of drying exposes the product to hygiene issues.

NEW PROCESS FOR ROASTING FREEKEH

Step 1

Harvesting of green wheat. Prior to maturity and while the spikelets are still green, farmers harvest a high productivity variety.

Step 2

Roasting of green wheat. Harvested green wheat is roasted close to the field using the newly designed mobile roaster that insures evenness of roasting without physical contaminants.

Step 3

Seed dehulling. After roasting, the wheat is dehulled.

Step 4

Drying and sterilizing of freekeh seeds. Using the new automated drier, freekeh grains are sterilized and evenly dried at high temperature. The machine automatically stops the drying process once the moisture content of the grains reaches a target that is not conducive for bacterial growth during storage.

By introducing a highly productive wheat variety and by leveraging a global technology company's CSR program, Lebanese entrepreneurial women in rural areas are now able to significantly increase their income by selling in local and export markets high quality freekeh, bourghul and similar grains.

FREEKEH'S NUTRITIONAL FACTS versus other grains and pasta

Proximates Per 100 Grams	GREENWHEAT FREEKEH	WHITE RICE	BROWN RICE	DRY WHITE PASTA
Moisture % m/m	10.8	12.5	11	9.2
Protein % m/m	up to 12.6	6.6	7.7	11.2
Unsaturated Fat % m/m	2.7	0.5	2.4	1.1
Total Carbohydrate	72	79.1	77	70.3
Energy kj	1471	1470	1530	1430
Dietary Fibre % m/m	up to 16.5	2.3	3.9	5
VITAMINS PER				
Abscorbic Acid (C) mg	<1	0	0	0
Thiamin (B1) mg	0.35	0.08	0.35	0.07
Riboflavin (B2) mg	0.22	0.02	0.05	0.06
Retinol (A) ug	<5	0	0	0
Alpha-Tocopherol (E) mg	0.43	N/A	N/A	N/A
MINERALS PER				
Calcium mg	53	7	11	18
Copper mg	up to 0.34	N/A	N/A	N/A
Iron mg	up to 4.5	0.7	1.2	1
Potassium mg	up to 440	49	165	142
Magnesium mg	up to 110	34	120	30
Sodium mg	6	5	5	5
Zinc	up to 1.7	1.1	2.1	0.6

Freekeh analysis by AGAL. Other analysis from Nutritional Value of Australian Foods, National Food Authority.

QUOTES AND STATEMENTS

According to Martha Rose Shulman from The New York Times: *"One of the new old grains that peaked my interest at the conference was freekeh, a green wheat product that is popular throughout the Middle East but seems to be just catching on here. It has a smoky/earthy flavor, the result of the production process that I describe in this week's freekeh salad recipe, and it is bound to win over the hearts and palates of those who can still appreciate wheat."*

SHULMAN, M.R. (2015). Get Your Freekeh On _ The New York Times. Retrieved from: http://well.blogs.nytimes.com/2015/01/23/get-your-freekeh-on/?_r=0

Alain Nasraoui, CEO Sonaco Alrabih: *"Sonaco is a well-established manufacturer and exporter of high quality Lebanese processed foods. Over the last several years we saw growing demand for freekeh in local and export markets, especially Europe and the EU. However due to non-compliance with international food safety standards, we were not able to offer this product to our clients. But thanks to the support of USAID through the LIVCD project, we are now able to export high quality freekeh that complies with food safety standards."*

Nawal Jawad, Head of Al Imad Cooperative: *"Thanks to the support of the LIVCD project, the cooperative will be able to generate additional income to the members thanks to the improvement of the freekeh quality and its productivity."*

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