



RESEARCH CONCERNING PHYSICO-CHEMICAL AND MICROBIOLOGICAL CHARACTERISTICS OF QUINOA, DRIED MILK AND OAT BRAN YOGURT

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Abstract: *Yogurt is a dairy product with high calcium content that should be consumed each day. Yogurt, a dairy product of fermentation of milk, has a gel-like texture and a sour taste because of fermentation of milk sugar (lactose) into lactic acid. It has many nutritional and health benefits. With or without fruit, diet or not, yogurt remains one of the essential food for our health.*

Quinoa is one of the most nutritious plants in the world. Its beans are rich in proteins both quantitatively and qualitatively, contain the eight essential amino acids and are a rich source of minerals (Ca, K, Zn, Fe, Mg), B vitamins and fiber, which makes quinoa a complete and modern food.

Oat bran decreases the absorption of fat and sugar. But on the same principle, they allow the absorption of vitamins and other valuable nutrients for the body. Oat bran is a good source of dietary fiber, thiamine, magnesium, phosphorus and iron proteins, in addition, they have a low sodium content.

Keywords: *dairy product, Ekomilk, health benefits, dietary fiber*

1. Introduction

Yogurt is the most specific and prevalent assortment of dairy acids products. Initially, yogurt is obtained only from sheep's or buffalo milk; currently the most widespread assortment of yogurt is made from cow's milk and is produced under different types [1, 2].

Yogurt is a dairy product from fermentation of milk, has a gel like texture and a sour taste because of fermentation of milk sugar (lactose) into lactic acid. It has many nutritional and health benefits. It is an important ally for the silhouette, is low calorie but high in nutrients. Regular

yogurt contains only 49 calories per 100 g, the fat 38 calories while yogurt made from whole milk, considered the most caloric, has only 64 calories per 100 g. It contains vitamins of group B, essential to the proper functioning of the nervous system and restore tissue affected by aging or disease, vitamin PP, which helps to increase vitamin A, which gives skin the glow and suppleness, and many minerals (calcium, potassium, sodium, zinc, and so on).

The calcium in yogurt is fully assimilated better than from milk. Yogurt with cereal for breakfast gives us energy for the day. The main advantage of the yogurt is calcium, which assimilate more easily and

better than from milk. This is because the milk components converted into yogurt become more affordable to the human body [3, 4, 5].

Yogurt is a good source of phosphorus, B complex vitamins, monounsaturated fats. Because of its contents, yogurt reduces the risk of cardiovascular disease, prevents high cholesterol, gastrointestinal disorders, and, at the same time holds off constipation. We can enjoy the benefits of yogurt if we eat the whole grains-wheat or just the oat flakes [6, 7]. Yogurt with cereal strengthens the immune system and supports the normal functioning of the muscular system.

Cereals are an ideal ingredient of a healthy breakfast. Containing fiber, minerals, vitamins and carbohydrates, grains are very important to maintain balance and therefore health food. You will be in top form and you'll be able to accomplish all your goals. Fatigue and hunger will be removed. It was found that the grain also prevent heart diseases, obesity, diabetes, intestinal problems, and even different types of cancer [8, 9, 10].

Quinoa has a similar composition and use of cereals (wheat, oats, barley and rye), it is generally assimilated, but is actually a pseudo cereal as it stands at the crossroads of cereals and grasses, being related to spinach and beets. It is a very strong and less demanding plant able to survive at high altitudes and cold thin air, the scorching sun or sandy terrain. There are many varieties of quinoa, but the most appreciated of all this is Quinoa Real (royal quinoa) having large grain and increased nutritional load.

An extensive list of anti-inflammatory nutrients appears in quinoa. But regarded controversial aspect is the presence of saponin. This is a bitter nutrient soluble in water, which is the outer layer of the seed. Quinoa saponins has been shown to have anti-inflammatory properties and antioxidant properties, however through

the thermal preparation, it is removed. The current research is trying to establish the link between inflammatory effects of quinoa and the saponin. Even with this limitation, the number of anti-inflammatory nutrients to the quinoa remains impressive.

The content of fiber and protein helps to regulate the blood sugar. Because chronic inflammation is a key factor in developing type 2 diabetes, inflammatory nutrients found in quinoa reduces the risk of developing this disease. Inflammatory nutrients help protect the blood vessels, which reduces the risk of cardiovascular disease, including atherosclerosis. The high fiber content manages to lower the blood cholesterol, control blood sugar levels and helps maintain weight [11, 12, 13].

Evaluations show that it is a complete nutritional source of protein (14% by weight), comparable to milk as a source of fiber and phosphorus, as well as being rich in magnesium and iron. Quinoa is a great source of calcium, very appreciated by vegetarians, but also by people who are lactose intolerant. Quinoa is rich in riboflavin substance known to reduce the frequency of migraines, having a beneficial effect on the brain and muscle cells.

Oat bran is rich in insoluble fiber and pectin, contributing to the absorption of significant amounts of water. Thus, if we take oat to each of main meal fiber mass contained facilitates digestion. They help to stabilize blood sugar levels, helps to reduce blood cholesterol levels. Fibers are not absorbed by our body. By allowing the body to rapidly eliminate all or part fats and carbohydrates in foods eaten in a day, oat bran manages to reduce the number of calories ingested. That is why they have won over the years a leading position in weight loss diets.

2. Experimental

Raw material for yogurt is mainly represented by cow's milk, by the content of varied nutrients especially proteins, milk is a particularly valuable food for nutrition especially children, sick people or those working in toxic environments.

Physico-chemical analysis of the milk samples are performed using Ekomilk TOTAL analyzer. Milk analyzer provides rapid test results of: fat, protein, non-fat substance, lactose, density, freezing point, added water, pH, temperature and conductivity in fresh milk [14, 15].

Determination of milk acidity is carried out by titration with sodium hydroxide, in the presence of phenolphthalein as an indicator. Determination of dry matter of yogurt with ML-50 thermobalance, rapid and uniform heating with halogen lamp

and technology SRA (Secondary Radiation Assist).

Determining the total number of germs of yogurt samples. The method allows assessment of the degree of contamination of the product by seeding on nutrient solid media, and colony count results [14]. Insemination is made in two Petri dishes for each dilution: place 1 ml dilution first and then sterilized solid medium in a test tube. Thermostating at 37°C for 48 hours after which it makes the counting of the colonies [14].

Determination of the number of coliform bacteria of milk samples. The principle is based on the property of coliform bacteria to ferment lactose, producing gas release.

3. Results and Discussion

The main objective of this work is to obtain a yogurt with added quinoa. In addition to that, another object is to obtain yoghurt with different nutrients such as milk powder, and the mixture of oat bran and oat bran quinoa (Table 1).

Table 1
Yogurt samples analyzed

Samples	Yogurt with Quinoa	Yogurt with milk powder	Yogurt with oat bran	Yogurt with oat bran and quinoa	
Lp1		5g			
Lp2		10g			
Lp3		15g			
Lq1	5g				
Lq2	10g				
Lq3	15g				
Lt1			5g		
Lt2			10g		
Lt3			15g		
Lq1 + Lt1				2.5g	2.5g
Lq2 + Lt2				5g	5g
Lq3 + Lt3				7.5g	7.5g

Symbols

Lp1, Lp2, Lp3: Yogurt with milk powder;

Lq1, Lq2, Lq3: Yogurt with Quinoa;

Lt1, Lt2, Lt3: Yogurt with oat bran;

Lq1+Lt1, Lq2+Lt2, Lq3+Lt3: Yogurt with oat bran and quinoa.

Were made 3 determinations for each sample at three different concentrations (Table 1).

3.1. Physico-chemical analysis

Analysis of milk, raw material was performed by Ekomilk obtaining the following results:

- fat content 3.28 %
- non-fat substances content 9.94%
- protein content 3.74 %
- lactose content 5.45%
- density 1.0343
- pH 6.43

Due to the increasing amount of milk powder (LP3 = 15g milk powder), increases dry matter. Low in fat content of

grain, quinoa and oat bran causes a lower dry matter. After storage of yogurts, cereals absorb water and dry matter

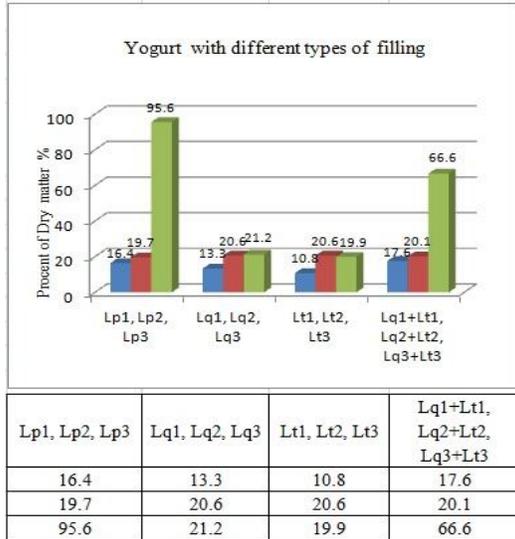


Figure 2. Evolution of the dry matter

Determination of acidity of yoghurt samples after the first day. The results of this determination are shown in Figure 3.

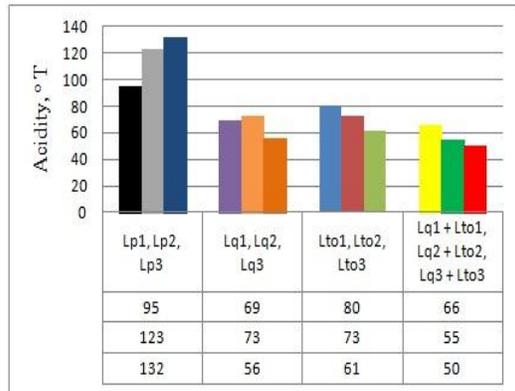


Figure 3. Determination of acidity of yoghurt samples after the first day

The acidity of the yogurt milk powder samples is higher due to the viscosity of yogurt, curd format that is more dense. The acidity of the yogurt samples with quinoa, oat bran and mixtures thereof having a constant acidity as curd formed is not so dense.

Determination of acidity of yoghurt samples after the seventh day. The results

content increases, as shown in Lq3 + Lto3. The results obtained for the dry matter of the samples of yogurt is shown in Figure 2. The results of this determination are shown in Figure 4.

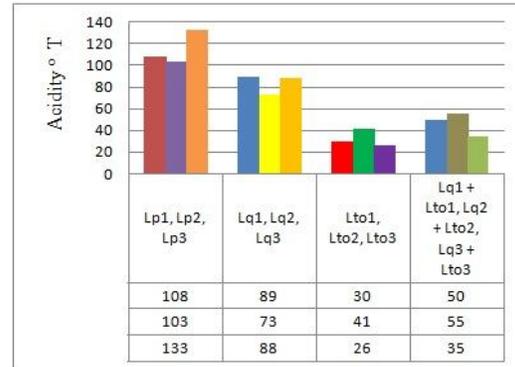


Figure 4. Determination of acidity of yoghurt samples after the seventh day

After storage, the acidity of the yogurt samples and quinoa milk powder increases, and the curd formed is more dense. The acidity of the samples with a mixture of oat bran and oat bran and quinoa decreases because the format curd and consistency of the yogurt is not compact and homogeneous.

Determination of acidity of yoghurt samples after the fourteenth day. The results of this determination are shown in Figure 5. After fourteen days storage, the acidity of the samples increases due to the formation of compact and homogenous curd without whey disposal.

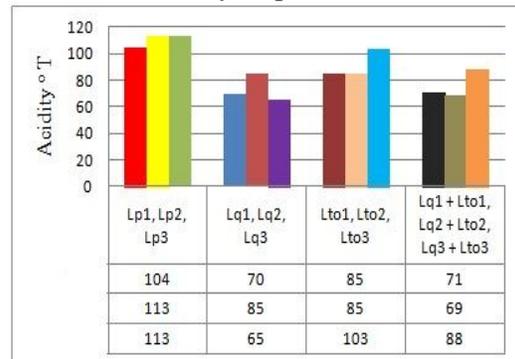


Figure 5. Determination of acidity of yoghurt samples after the fourteen day.

3.2. Microbiological analysis

Determining the total number of germs of yogurt samples. The number of the colony and their evolutions are shown in Figure 6.



Figure 6. The number of the colony and their evolutions

After Long periods of storage of test plates, the culture medium develops several colonies. From Figure 6 we can conclude that during the study period the yogurt with Quinoa has formed the most colony in all the situations.

Determination of the number of coliform bacteria. After thermostating at 37°C for 48 hours, we obtained the following results: for the first 5-positive, for the second 5-positive, for the third series 2-positive, representing 5-5-2 combination obtained is 540×10^3 colliforms $100 \text{ cm}^3/\text{milk}$.

4. Conclusions

The final products correspond to the sensory characteristics: appearance and consistency, color, taste and smell [15].

Appearance and consistency of yogurt with:

- milk powder: compact curd, homogeneous, without gas bubbles without whey removed;
- yogurt with quinoa: compact curd, homogeneous, without gas bubbles without whey removed;
- yogurt with oat bran: compact curd, homogeneous, without gas bubbles without whey removed;
- yogurts with the mixture of oat bran and quinoa: compact curd, homogeneous, without gas bubbles without whey removed.

Taste and smell: pleasant sour flavor, specific formula, quinoa and oat bran.

After determining the acidity of the milk used to make yogurt, the milk corresponds in terms of standards. Results obtained using the apparatus Ekomilk, corresponding to a fresh milk with a high fat content.

Evolution acidity of yogurt samples, indicating an increase in value. The highest values recorded are those of the quinoa milk, milk powder and oat bran due to lactic acid of fermentation of lactose. The lowest results are obtained from a mixture of quinoa and oat bran that inactivate fermenting lactose.

Evolution of the dry matter depends on the cereal quantities added to yoghurts, as the amount of oat bran and quinoa is higher the dry matter increase due to water absorption power of cereals.

From a microbiological point of view, yogurts obtained correspond to the standards.

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