



Studying the Chemical composition and Physiochemical properties of the Local Kurdish Yogurt(Mast)

Karzan Taufiq Mahmood, Donia Salman Khalaf & Dyari Hamakarim Mohamad

¹College of Agriculture science- Sulaimani University, Bakrajo Street, Sulaimaniyah- Iraq

E-mail: doneasalman@yahoo.com

Article info	Abstract
<p>Original: 19/11/2017 Revised: 04/01/2018 Accepted: 06/02/2018 Published online:</p> <p>Key Words: dairy technology, yogurt, local products, Chemical and Physical properties</p>	<p>Local Kurdish yogurt (LKY) which is known as Mast has some physical, chemical properties that are effect on the sensory properties, so these properties in the following results are obtained: that showed were significant differences ($P \leq 0.05$) of pH among the samples of Kurdish yoghurt(Mast). The lowest pH value of yogurt was in Chaqzh (3.71), while the pH of the Jeshana yogurt was (4.51), which is the highest compared to the rest of the samples. Total acidity in Kulajo yogurt was (1.22%) and was the highest percentage. On the other hand, the lowest percentage in laboratory yogurt (0.58%).In the study of chemical properties it was observed that the significant differences ($P \leq 0.05$) were found among the samples. The percentage of moisture and ash in yogurt of Zrgwez samples were highest percentages (85.83% and 0.994%), respectively, whereas the Shekhlanger yogurt had the lowest values of each fat and ash percentages (2.63 and 0.991), respectively. The highest fat content was noticed in Sarkapkan yogurt (4.93%). The percentage of protein tested showed that the yogurt produced in the laboratory had the highest percentage (4.66%), while the lowest percentage was shown in Sarkapkan yogurt (2.54%). Finally, the highest and lowest percentages of total solids were noticed in both yogurt samples of Kanymaran and Zrgwez (17.09 and 14.17%), respectively. Whey separation (syneresis) is one of the physical properties which were tested in this study. The results showed that the significant difference ($P \leq 0.05$) was found among the samples, the highest percentage of whey syneresis was observed in Sarkapkan (40.07%) and the lowest percentage of syneresis observed in Kanimaran (30.02%). The yogurt hardness as another physical property of LY, the data showed that significant difference ($P \leq 0.05$) were found among the samples, the results showed the highest percentage of hardness was given in Kanymaran yogurt (361.5 g), and the lowest percentage was observed in Chaqzh yogurt (210 g).</p>

Introduction

Consumption of yogurt is very popular in Kurdistan in addition, North America, Europe and the Middle Eastern countries. Yogurt plays an important role in the diets of these communities. Furthermore, it is customary for yogurt to be consumed not only as a refreshing drink, but also as a main ingredient during the preparation of a wide variety of dishes including salads and soups; such food habits and its ensuing consumer attitudes may well be a contributory factor to the high annual consumption [1; 2].

Yogurt was likely first discovered by the nomadic people living in the Middle East, and it has been consumed for thousands of years by different civilizations. Today, yogurt is commonly made by fermenting cow's milk using a symbiotic culture of the bacteria *Lactobacillus delbrukii subsp. bulgaricus* and *Streptococcus salivarius subsp. thermophilus* under controlled temperatures and environmental conditions, especially in industrial

production [3]. The process of yogurt making is still a complex process which combines both art and science together. The microorganisms of the yogurt starter cultures play an important role during the production of yogurt, especially in the development of acid and flavour. However, in order to understand the principles of yogurt making, it will be useful to describe separately the various stages of manufacture and their consequent effects on the quality of yogurt, the original production of fermented milk products derived from the need to prolong the shelf-life of milk instead of being disposed [4]. Yogurt manufacture was initially based on knowledge and empirical processes without standard procedures or investigation of the steps that occur during the entire process. Only after the late 20th century, when yogurt became a profitable commercial good, its manufacture became industrialized and the processes were standardized. During the last 20 years, interest in yogurt manufacture has increased tremendously for scientific and commercial reasons. Scientific findings have suggested new dairy products that benefit human health (probiotic cultures, fortification with bioactive compounds) as well as with improved sensory, especially textural characteristics. Thus, consumer demand for yogurt and similar fermented dairy products has increased. The local Kurdish yogurt (LKY) is the most popular dairy product among all the dairy products in Kurdistan and it is consumed widely, so the study of this products is very important and because the study on local Kurdish yogurt are limited the present research is aimed to the original method definition for producing local Kurdish yogurt in Sulaimani governorate and study of some physicochemical properties in LKY.

Materials and Methods

The chemicals laboratory and equipment's that used in this research were (Sulphuric acid, Amyl alcohol, Hydrochloric acid, Ethanol %96, Copper Sulfate, Iodine, Boric Acid, Potassium sulfate, Hot plate, Gerber Centrifuge, Mantel, Analytical balance accuracy to 0.0001g, Oven, Hotplate magnetic stirrer, Incubator, Digital pH-meter, Muffle furnace, Kjeldahl apparatus, Water bath, Texture analyzer, Fume hood.

Collected samples and Yogurt manufacture: The samples were collected from the three regions in Sulaimani province (Center and the conservative parties) that included Ranya, Kalar and Sulaiman's country sides, and explained below: (1) Ranya region: Sangasar, Sarkapkan and Kanymaran. (2) Kalar region: Kulajo, Shekhlanger and Tazade. (3) The elimination of Sulaimani: Chaqzh, Jeshana and Zrgwez. In laboratory, a yogurt was manufactured by using pure standard starter culture (*Streptococcus salivarius* Sub sp. *thermophilus* and *Lactobacillus delbrucii* sup sp. *bulgaricus*) as in Kurdish traditional method, boil the cow's milk for 20 min, that obtained from College of Agriculture the University of Sulaimani in Bakrajo field then cooled to body temperature and add inoculation with standard starter culture about 1-2%, and incubated at room temperature with covered for about 12 hours.

Determination of Chemical composition in Kurdish Yogurt: the yogurt samples collected and then overnight stored in 4 C°, and analysis performed in three days. The same tests were conducted to the laboratory manufactured yogurt which used traditional method and standard starter culture to manufacturing.

Fat content: Fat content of yogurt samples were determined by using Gerber method

Protein content: Protein content of yogurt samples was assessed by Kjeldahl method as described by [5], using 6.38 as the nitrogen conversion factor.

Moisture content: Moisture was determined by drying for 5 h in a vacuum oven at 100 °C [5].

Ash content: Ash content was determined by use 5g of samples and ignition at 550-600 °C in an electric muffle furnace [6].

pH and Titratable Acidity: The pH of yogurt samples was measured by using a digital pH meter. Titratable acidity of yogurt samples was measured by following method [7]. The titratable acidity was expressed as % lactic acid.

Physico-chemical properties

The Syneresis: Syneresis of yogurt samples was determined in triplicate by siphon method. Each sample about (40 - 42) g was placed in funnel on the cylinder for about 3 hours to separate the liquid content and then measured the separated part. The percentage of syneresis was calculated by equation:

$$\% \text{Syneresis} = [\text{volume of separated water (ml)} / \text{weight of sample (g)}] * 100$$

Texture analysis: Texture of samples were determined by use texture profile analyzer by TPA method [8] With TRIGGER: 0.5, DEFORMATION: 50mm, SPEED: 1mm/s, SPENDIL: TA-PFS.

Results and Discussion

Chemical composition of the Local Kurdish yogurt.

Moisture content: (Figure: 1) illustrates the moisture content as percentage for local Kurdish yogurt samples taken from different locations. In general, significant differences were found between the yogurt samples ($p \leq 0.05$). The Zrgwez and the Kanymaran yogurt had the highest (% 85.8) and lowest (% 82.9) moisture content value respectively. There were no differences between Zrgwez, Chaqz and Jeshana yogurt, also no significant differences were observed between Kulajo and Laboratory yogurt. The change in moisture content affect by the additions that increased solid not-fat (SNF) content such as mainly lactose, protein and mineral matter, or adding powder milk. In Kurdistan, boiling of the milk had long been practiced during the manufacture of yogurt as a method of increasing the concentration of milk solids.

Protein content: Protein content of yogurt samples as shown in (figure: 2) were varied between 2.54% and 4.66%. The protein content percentage was significant ($p \leq 0.05$) among the samples. The maximum value was recorded for Laboratory yogurt and the minimum value was for Sarkapkan yogurt sample. This deferent might be due to Animal feed and cow breeds in different locations [9]

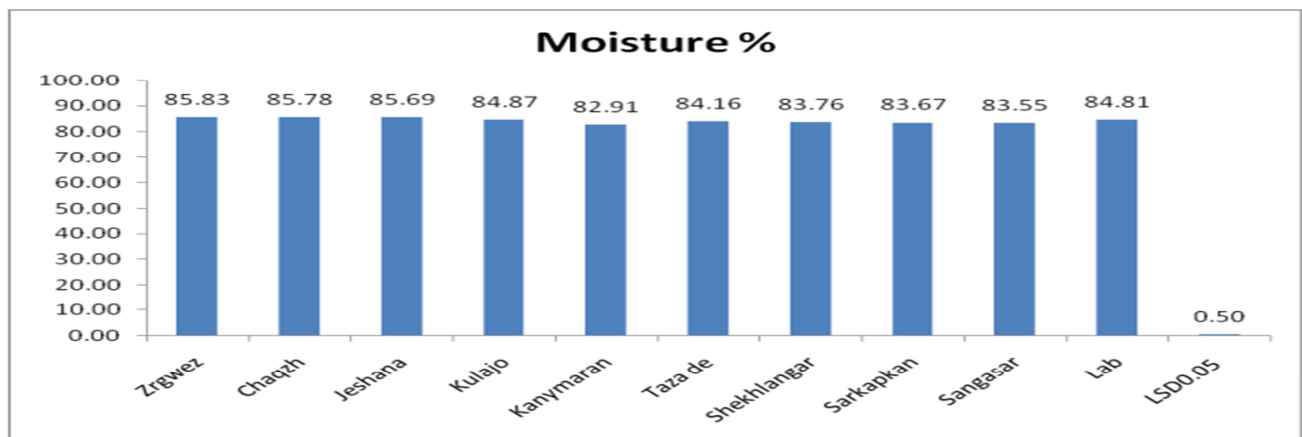


Figure-1: moisture content of the Local Kurdish yogurt samples

FAO and WHO [10] showed that the minimum protein content must be (2.7 %), while according to the Turkish Food Codex [11], protein content of yogurt must be at least 4%. The results in the (figure: 4) showed that laboratory yogurt sample only has an acceptable amount of protein when compared with the Turkish Food Codex [11]. The lowest protein content was $2.54 \pm 0.256\%$ in the Sarkapkan yogurt sample, whereas no significant difference observed among each of Kanymaran, Zrgwez and Chaqz yogurt samples (3.59, 3.52, 3.39%), respectively. Protein percentage effects on the physical characteristic (texture), because the protein

content play an important role during the manufacture of yogurt, and helps to give a good net by interaction between the different types of protein and acid gel formation [9].

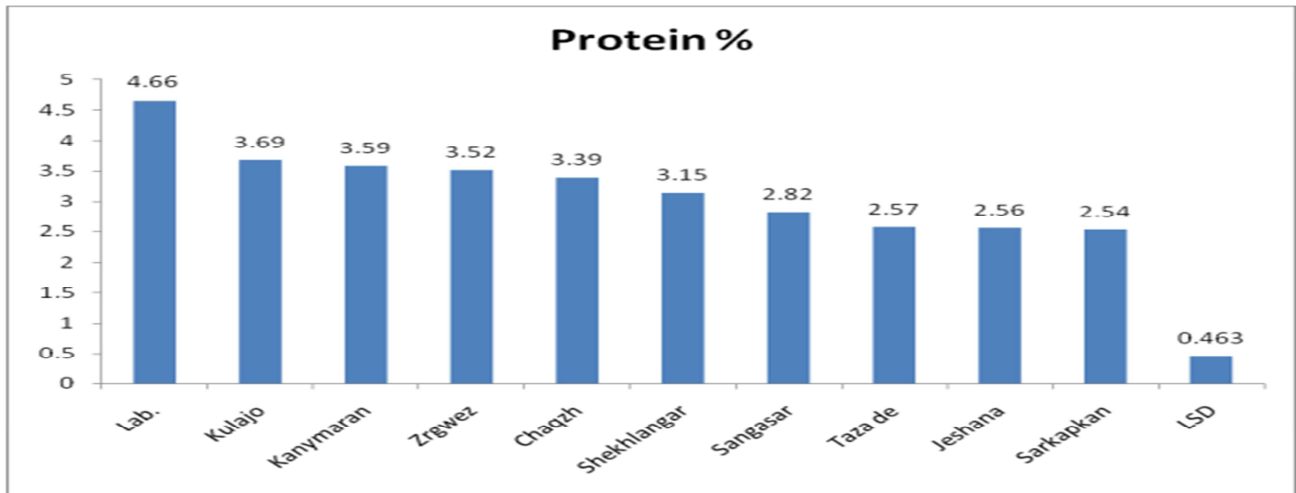


Figure-2: Protein content of the Local Kurdish yogurt samples

Fat content : (Figure: 3) display fat content, there were significant ($p \leq 0.05$) between the local Kurdish yogurt samples. The results show the highest value was in Sarkapkan yogurt (% 4.933), while the lowest value was in Shekhlanger yogurt sample (% 2.627). [9] mentioned fat level of yogurt affect by cow that different in strain which the fat content in Shorthorn was %3.65, while in Jersey was %5.14. And may be adulterated by adding oil or ghee on the surface of yogurt after manufacturing [12].according [13] and Australia New Zealand Food Standard Code Recommendations [14] that Percentage (%) of fat in yogurt must not be less than 3.25%, so each of fat content in Shekhlanger, Tazade, Laboratory yogurt samples were out of the standard.

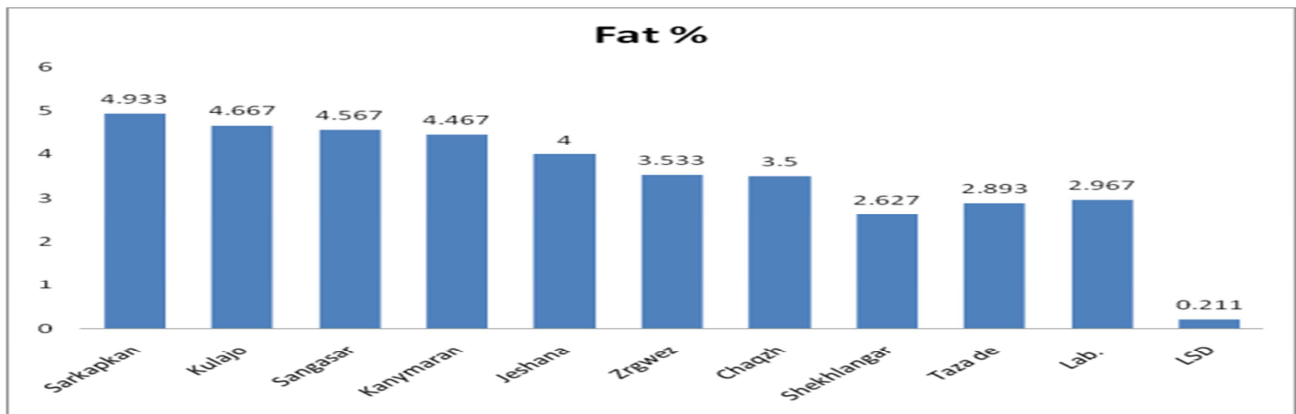


Figure-3: Fat content of the Local Kurdish yogurt samples

Ash content: The mineral content in Kurdish local yogurt samples are shown in (figure: 4), there were significant differences ($p \leq 0.05$) between the samples. The highest value was recorded in Zrgwez yogurt sample (0.9935%), and Shekhlanger yogurt sample gained the lowest value (0.9906%).Even Zrgwez and Sarkapkan yogurt samples had significant difference with shekhlanger sample while no difference observed between another samples. These ratios were higher than reported by [15], 0.72% and 0.73% respectively.

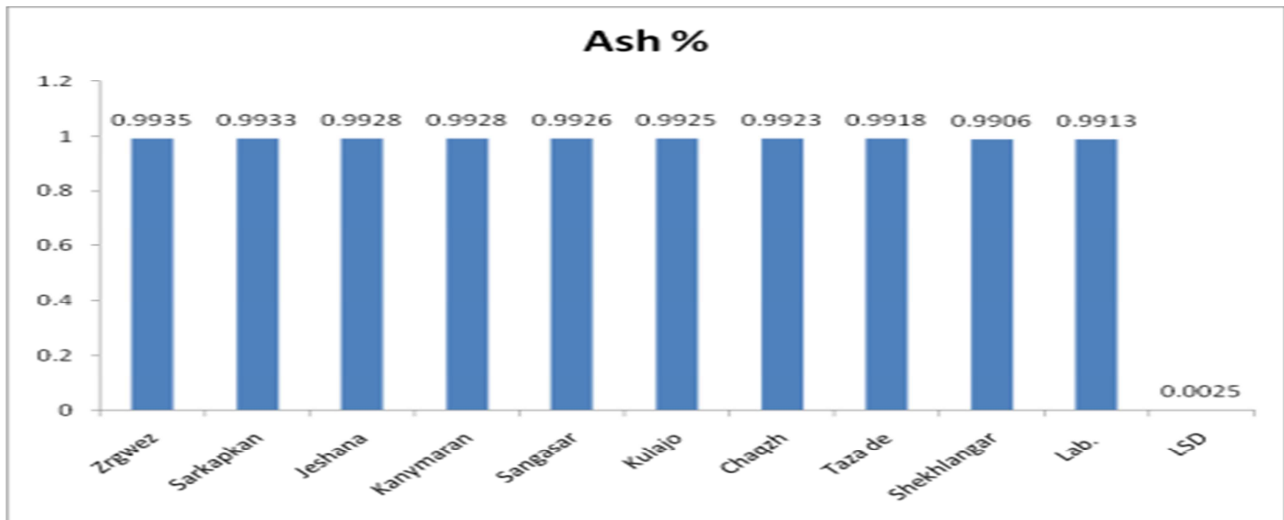


Figure-4: Ash content the Local Kurdish yogurt samples

Total Solids content: (Figure: 5) displays the total solids content as percentage, there were significant difference ($p \leq 0.05$) between the samples. Kanymaran yogurt sample had a highest value (17.09%) of total solids content, while Zrgwez yogurt sample had the lowest value (14.173%) of total solids content. This may be due to add water to the milk to increase the volume Also, remove and evaporating different ratio of water from the milk during processing play a big role to increase of total solids content. As well as, it may be related to add the total solids by different methods.

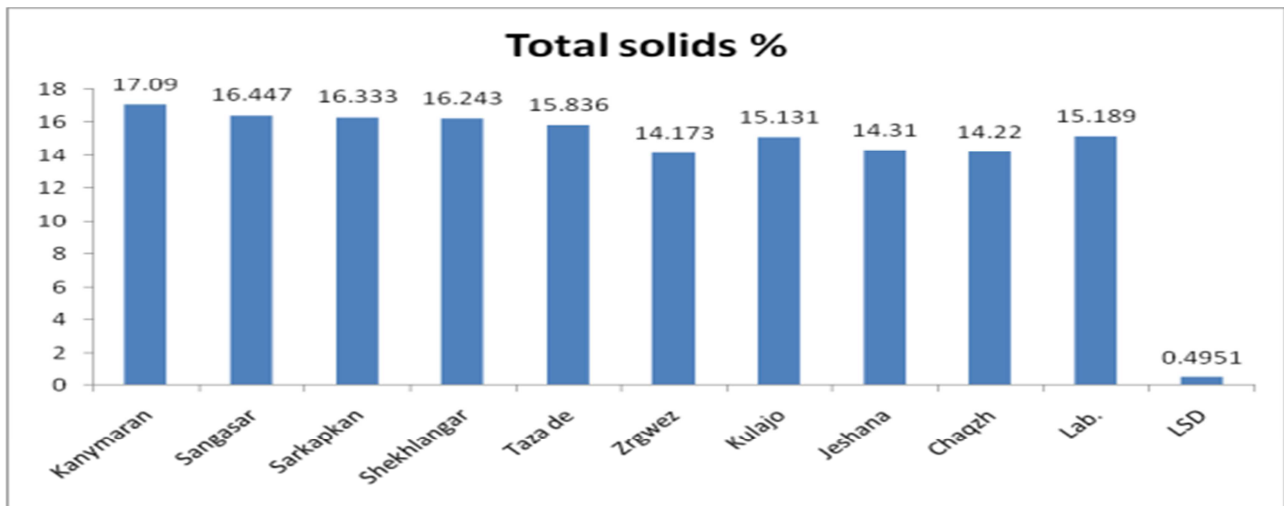


Figure-5: total solids content of the Local Kurdish yogurt samples

pH value: (Figure:6) demonstrates the pH value, there was significant differences between the samples ($p \leq 0.05$), the highest value was in Jeshana yogurt sample (4.513), and the lowest pH value was recorded in Chaqzh yogurt sample (3.707). A number of factors affect the pH value such as inoculation, incubation and storage temperature, the age of the milk, microbial load, and the starter that use in the production processing [16].

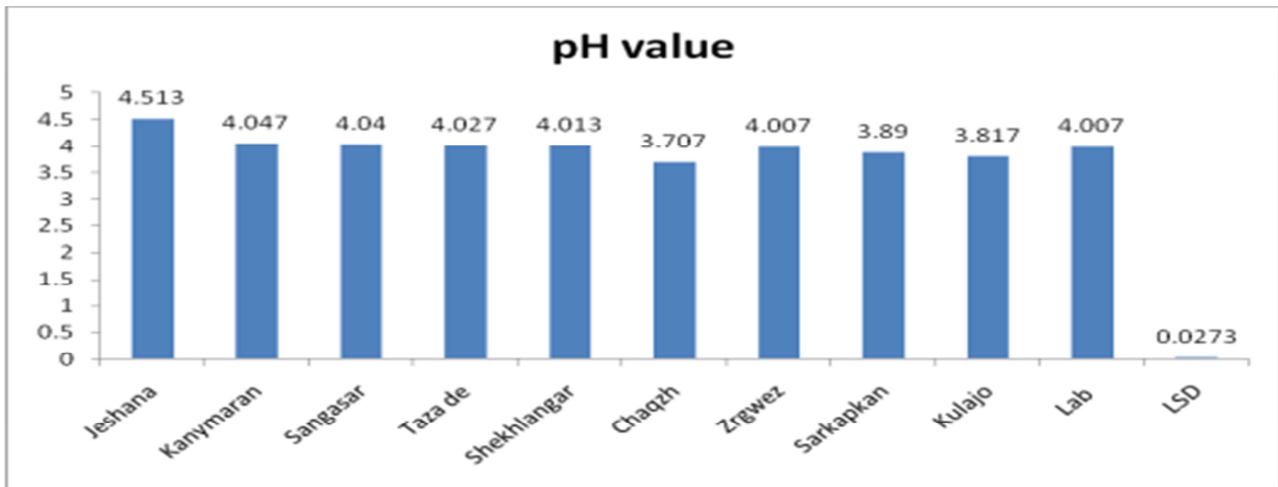


Figure-6: the pH values of the Local Kurdish yogurt samples

Acidity: (Figure: 7) shows the acidity there was significant deferent between the samples ($p \leq 0.05$), Kulajo yogurt was get the highest value (1.215), while the lowest value was in Laboratory yogurt (1.001).the rate of acid development by ST and LB, but the non-starter microorganisms, long time incubation and large amount of local starter were responsible of high acidity in the most samples, especially lactic acid bacteria that found in the local starter, and contributed to give acid taste in some samples compared with a laboratory sample which had a low acid.

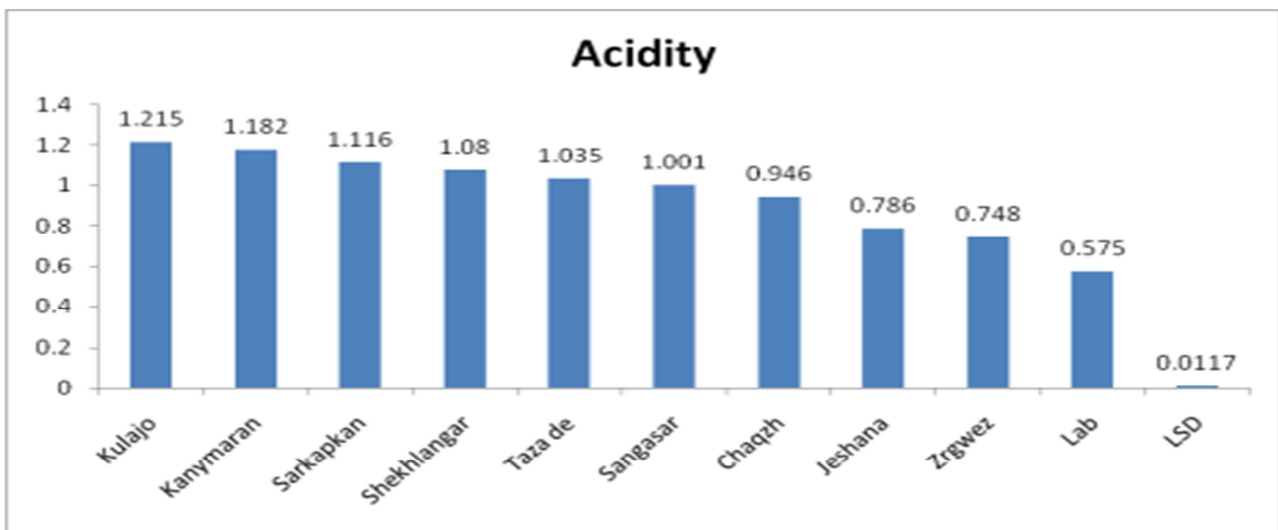


Figure-7: the acidity of the Local Kurdish yogurt samples

Physiochemical properties in local Kurdish yogurt samples

Hardness: (Figure: 8) illustrates the hardness we can see the maximum level was recorded for Kanymaran yogurt that (361.5g) and Chaqzh had a minimum level that was (210g) this different, there was significant between the samples ($p \leq 0.05$). This significant different may occur by a number of factors such as total solids

content, storage temperature, animal nutrition. The results showed samples that are collected from the country side regions of Sulaimani (such as Jeshana, Zrgwez and Chaqzh) had low score when compared to other region. This situation may be have relation that the owner of the animals used bread to feed of animals due to few capability to patronize the cow in natural pastures.

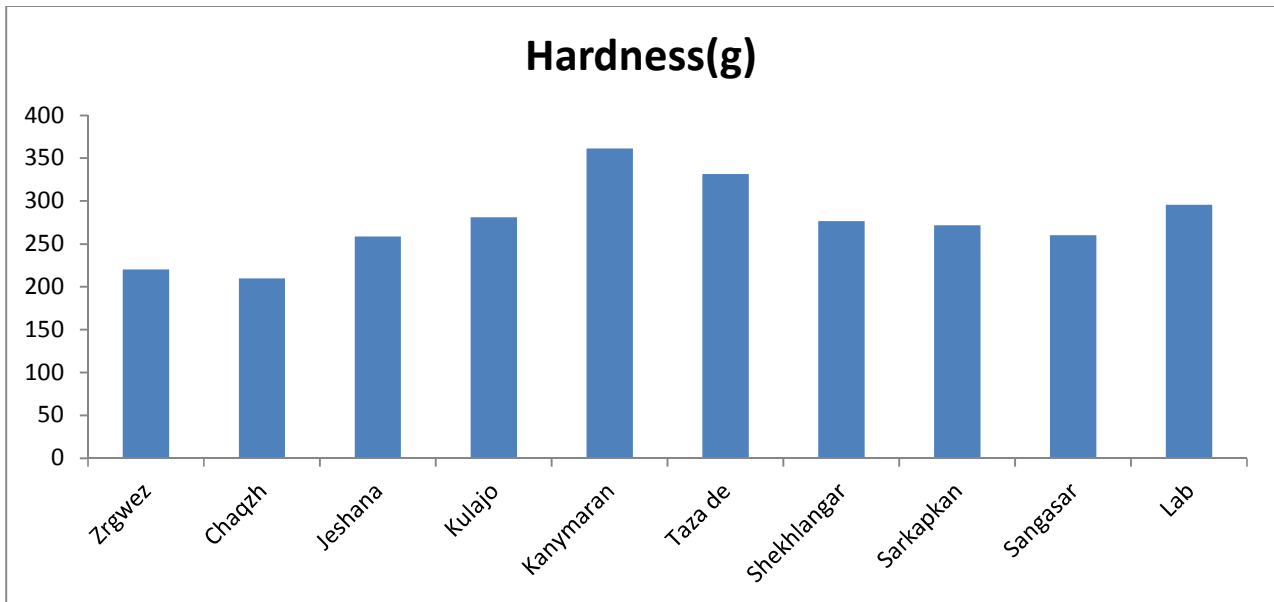


Figure-8: Hardness of local Kurdish yogurt samples

Syneris: Syneris of yogurt samples are displays in (figure: 9), there was significant deferent between the samples ($p \leq 0.05$), we can sow the largest number (40.067 %) was defined by Sarkapkan, and the lowest number (30.016 %) was defined by Kanymaran sample which the best one although Stabilizers or emulsifiers were not used during the manufacture of local and laboratory samples.

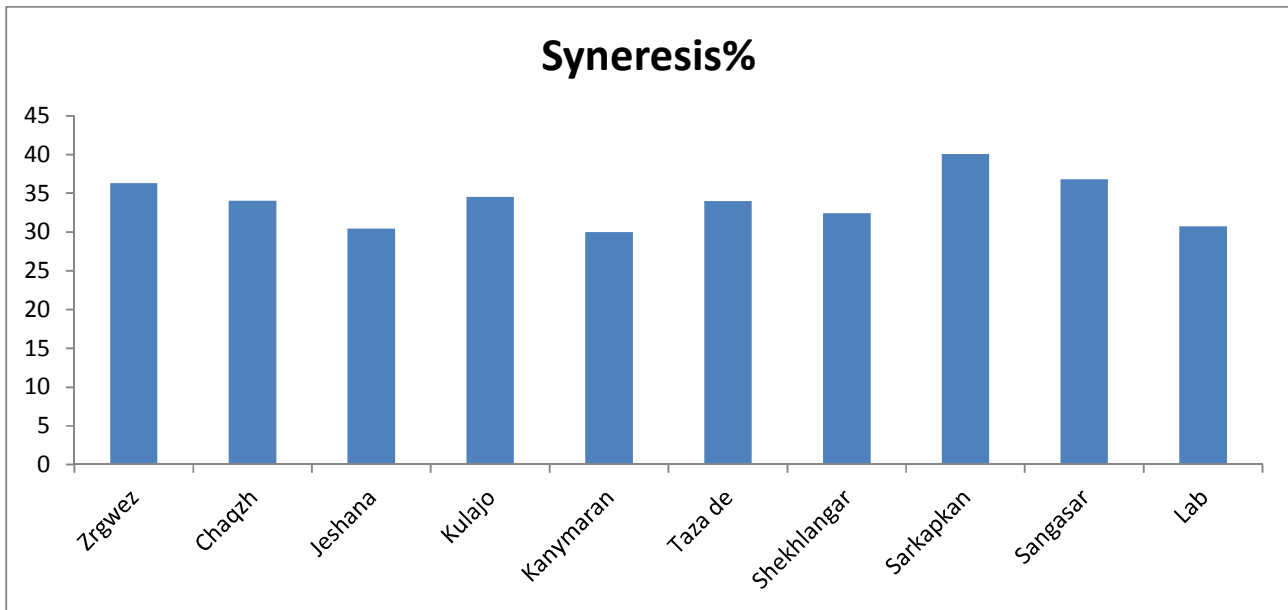


Figure-9: Syneresis of local Kurdish yogurt samples

Conclusion

Local Kurdish Yogurt (Masti Kurdi) has a special manufacturing process and special physicochemical properties which lead to special sensory properties these effects on the quality of this yogurt.

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