YOGURT AS A PROBIOTIC AND pH VARIABILITY

ALUMNADO:

Elena Peña Armenta (4 ESO B IES Fidiana)
Vedant Patel (4 ESO B Fidiana)
Lola Cosgaya Ortiz (4 ESO B Fidiana)

PROFESORA TUTORA: Mª del Mar Moreda Moreno

I CONGRESO CIENTÍFICO INTERNACIONAL EUROCIENCIA JOVEN CÓRDOBA 2022

Cofinanciado por la Unión Europea

INDEX

INTRODUCTION

Lactic fermentation is responsible for yogurt's formation, since it comes from milk. In this case, lactic acid bacterias, precisely, *Lactobacillus bulgaricus* and *Streptococcus thermophilus* are the ones which carry out the process .These bacterias act synergistically, meaning that each of them stimulate the other's development.

The bacterial function is predominantly the formation of the acidic flavour (due to the lactic acid production from lactose), inhibition of pathogens organisms, gelification of milk, reducing the amount of lactose, milk acidification and scent formation.

Furthermore, temperature is another important variable to take into account in yogurt formation. That's why we have carried out the analysis of both variables at two different temperatures.

OBJECTIVES

- To study the variability of pH in respect to the time in homemade fermented yogurt at different temperatures (37.5ºC, 45º C and 55ºC)

- To prove the existence of variation in number of bacterial colonies according to the course of time, in fermented yogurt at different temperatures.

- To prove the temperature which is needed in the process of fermentation while creating homemade yogurt, and what would happen if the temperature is raised.

- To check the difference in numbers of bacterial colonies in commercial yogurt and homemade yogurt after 1h of fermentation

HYPOTHESIS

Meaningful differences are noticeable in pH values during the fermentation process. Thus, making the intervals of temperature while fermenting the yogurt, within 37°C-45° and also 55°C, different and alternating.

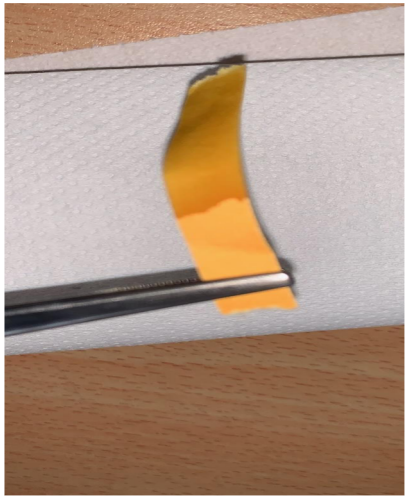
As well as pH levels, significant differences can be seen in the number of observable colonies within the temperatures of 37°C-45°C and with the time.

THEORETICAL BASIS

pH: pH is a scale which measures the potential of hydrogen ions H+ in a solution. pH levels differ in proportion to the probability of finding H+ ions and OH- ions, they can be:

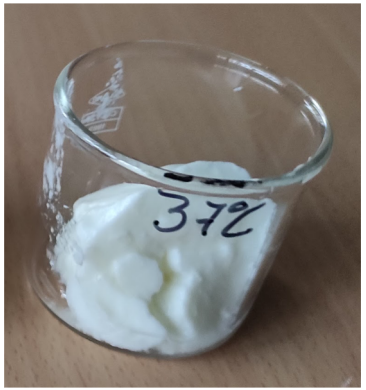
- Neutral (pH=7)
- Acidic (pH<7)
- Alkaline (ph>7)

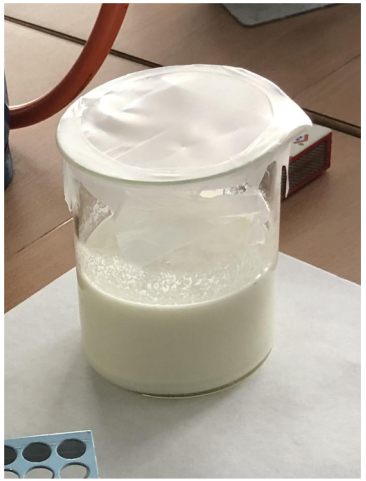
Therefore pH, measures acidity or alkalinity in a solution.



THEORETICAL BASIS

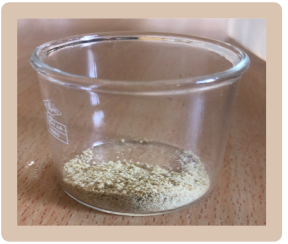
Yogurt: is a lactic product obtained by the fermentation of milk. In the process of lactose fermentation (it oxides partially) to obtain metabolic energy and a waste product mainly formed of lactic acid. Lactose produces energy which is used by lactic bacterias while lactic acid is eliminated. The coagulation of milk is the result of the precipitation of proteins in milk, and it happens due to the decrease of pH levels (acidification). This being the process of making yogurt





MATERIALS

- Growing chambers
- Cotton
- Bacterial culture
- Parafilm
- Agar
- Bouillon cube
- Water
- Cooking plate
- Pressure cooker
- Bunsen Burner
- Eppendorf tubes
- pH stripes
- Sterilization stripes
- Probe
- Sewing loop
- Filters
- Blender
- Commercial yogurt
- Milk
- Petri Dishes
- Spoon
- Micropippete


PLANIFICATION OF THE INVESTIGATION AND METHODS

1st SESSION

→Sterilization of materials.

→Creation of agar plates.

→Preparation of homemade yogurt

2nd SESSION

3rd SESSION

→ To seed bacterias in Petri dishes and incubation for its subsequent recount

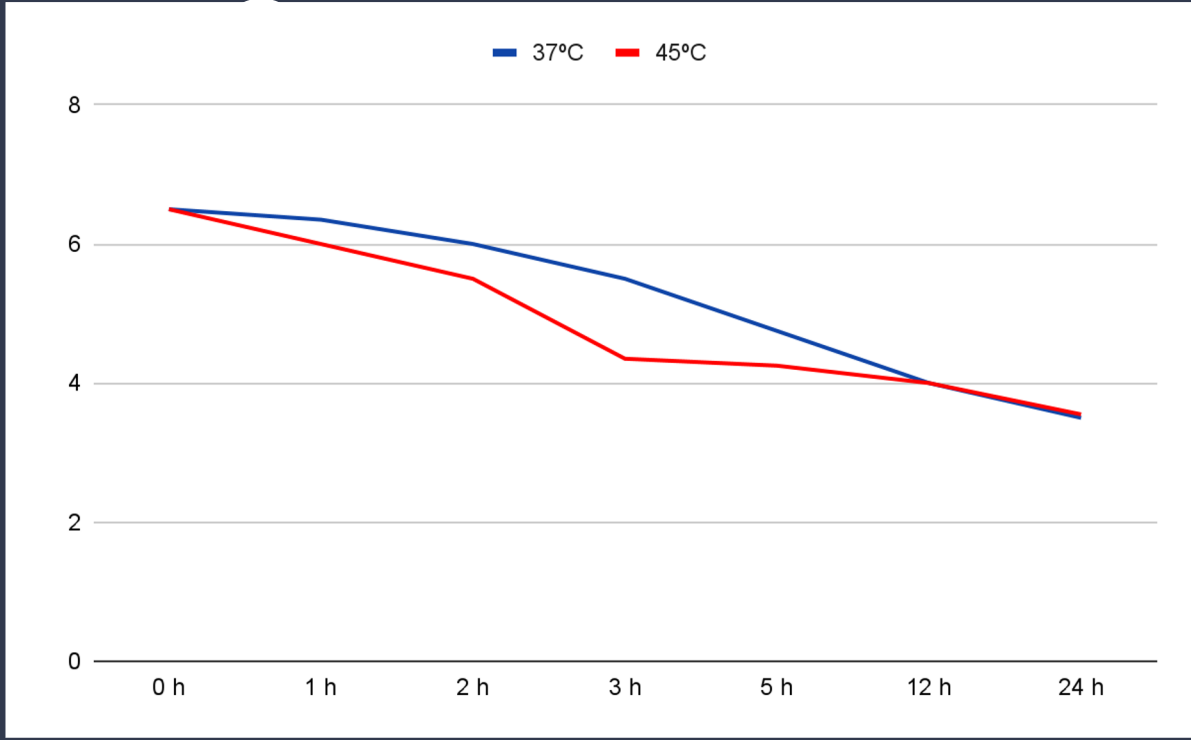
➔ Measurement of the bacterial colonies on both types of yogurt (37.5ºC, 45ºC) after a period of incubation.

4th SESSION

RESULT

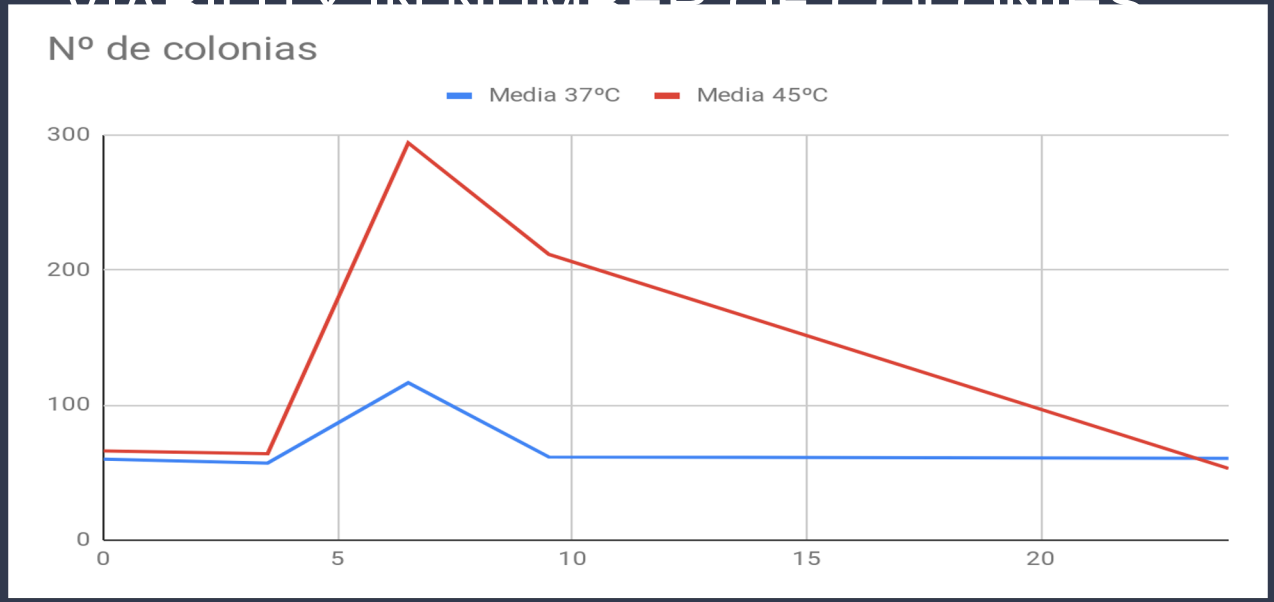
pH VARIABILITY

◈Graphic 1. pH value (Y axis) in relation to time (X axis) during the making of yogurt. The two temperature variable are shown in blue (37ºC) and red (45ºC).



RESULTS

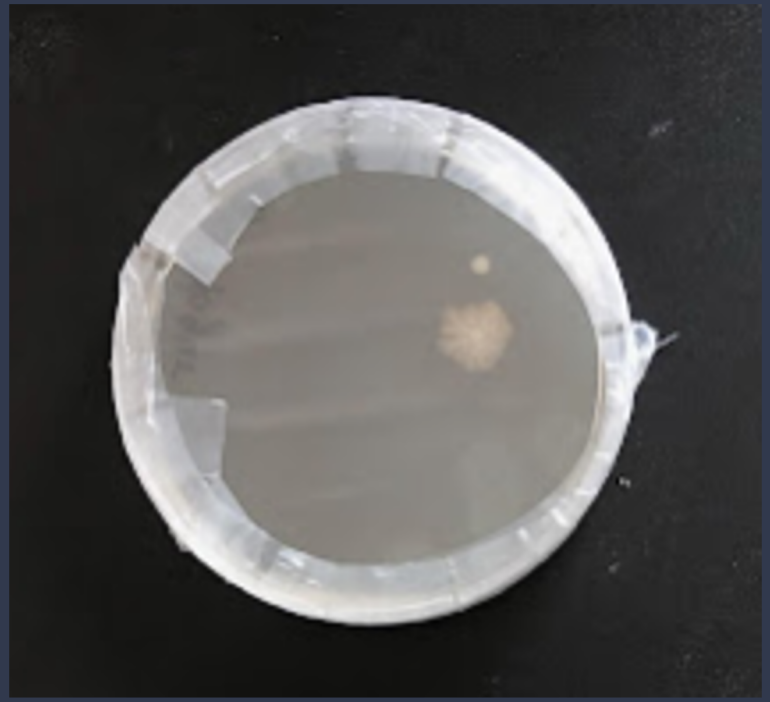
VIABILITY IN NUMBER OF COLONIES



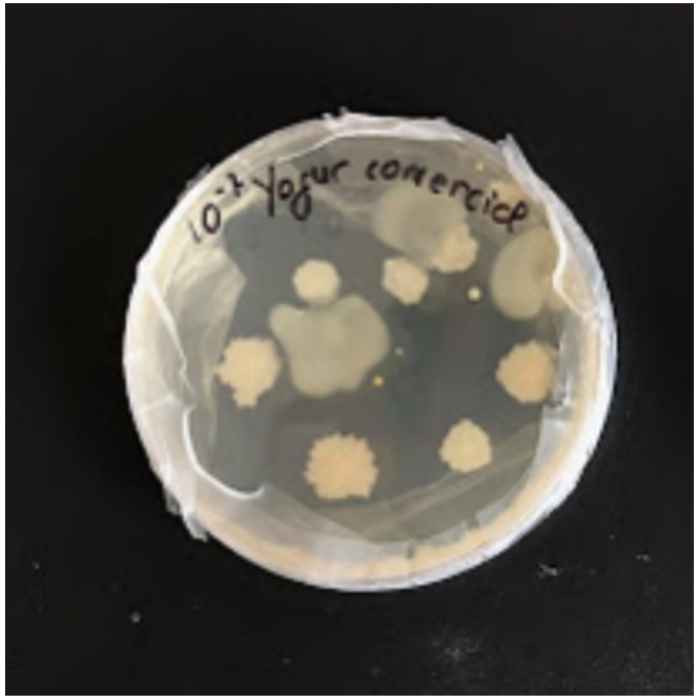
◈Graphic 2. Variation of the quantity of colonies in the petri dishes while incubating the yogurt in relation to the fermentation time.

Measurements 0, 3, 5, 6, 9, 15 and 24 hours

RESULTS



Img 1. Homemade yogurt after 1 hour of fermentation



Img 2. Commercial yogurt

CONCLUSIONS

It has been proven that we find a larger quantity of bacterial colonies in the commercial yogurt when we compared it with the homemade yogurt after one hour of fermentation, which has less bacterial colonies.

A temperature of between 37ºC and 45ºC is needed in order for fermentation to take place, due to the fact that bacterias in charge of fermentation can only carry it out at this temperature range. However, if we increase the temperature to 55º, bacterias will not survive. For this reason, the milk will not ferment.

Given the facts, it can be proven that, milk as well as yogurt are susceptible within the course of time, to tend to become a more acidic food. Thus proving its variability in pH levels

ACKNOWLEDGMENTS

On behalf of the members of this project, we would like to thank, first and foremost our coordinator and Biology teacher María del Mar Moreda, who guided, instructed and brought all of her knowledge and attention as well as dedication and encouragement to the making of this project. Furthermore, our language assistant Emily Hamill who helped us greatly throughout the process with our english language skills.

We would also like to thank our classmates, for their support and help which they provided whenever it was needed.

And last but not least, La Consejería de Educación for letting us participate in this innovative project. To Fidiciencia for letting us be part of it and to the Erasmus+ program.

BIBLIOGRAPHY

https://es.wikipedia.org/wiki/Microbiolog%C3%ADa
https://www.msdmanuals.com/es/hogar/infecciones/infecciones-bacterianas-introducci%C3%B3n/introducci%C3%B3n-a-las-bacterias
https://es.wikipedia.org/wiki/Bacteria
https://es.wikipedia.org/wiki/Unidad_formadora_de_colonias
https://es.wikipedia.org/wiki/Lactobacillus_bulgaricus
https://es.wikipedia.org/wiki/Streptococcus_thermophilus
https://curiosoando.com/con-que-tipos-de-bacterias-se-hace-el-yogur
https://concepto.de/ph/
https://gestionintegra.com/factores-que-favorecen-el-crecimiento-bacteriano/#:~:text=Los%20microorganismos%2C%20como%20seres%20vivos,en%202%20cada%20
https://www.aulafacil.com/cursos/manipulacion-de-alimentos/introduccion-a-la-manipulacion-de-alimentos/condiciones-que-favorecen-el-crecimiento-de-los-microorganismos-l29801