

The Differentiation and Quantification of Bacterial Colonies Cultured on Plant Based Yogurt and Animal Based Yogurt

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Abstract

The variety of dairy products available on the market have now changed with the advent of alternative plant-derived milks. Many believe that these plant-based milks may be a healthier and a more sustainable option in contrast to dairy products. The production of both respective types of yogurts requires fermentation which is a process that is carried out by bacteria, hence the presence of live cultures. Fermentation of dairy products is a result of lactose sugars being metabolized by bacteria, probiotics, of which the final metabolic product is lactic acid. Due to the popularity of alternative yogurt, it is essential to explore the differences in probiotic contents of yogurt products. This study's purpose was to find the differences in probiotic content between cow milk yogurt and oat milk yogurt. Using the serial dilution technique to count the bacterial contents of the products, the experiment consisted of calculating the colony forming units (CFU) in the original yogurt samples. After three experiment trials each, the data showed that average CFU/mL values for cow milk was substantially higher, 94,000,000, than that of the average oat milk values, 13,333 CFU/mL. The results supported the hypothesis for this experiment, that cow milk yogurt contained a higher CFU compared to oat milk yogurt. Future work could delve deeper into the different morphologies and species of bacteria present in animal and plant derived yogurts.

Introduction

This experiment aims to find the difference between the probiotic components of traditional animal-based yogurt and plant-based yogurt.

We chose to replicate a study titled "Comparative studies of yogurt produced from animal and selected imitation vegetable milk" (Kemisola, 2022) which showed an increased probiotic count and CFU value in cow milk yogurt as compared to plant milk yogurt.

The main research question derived was: what are the differences in the probiotic properties between cow milk and oat milk-based yogurt?

The proposed hypothesis for this experiment is as follows: cow milk yogurt will contain a higher CFU value as opposed to the oat milk yogurt.

Methods

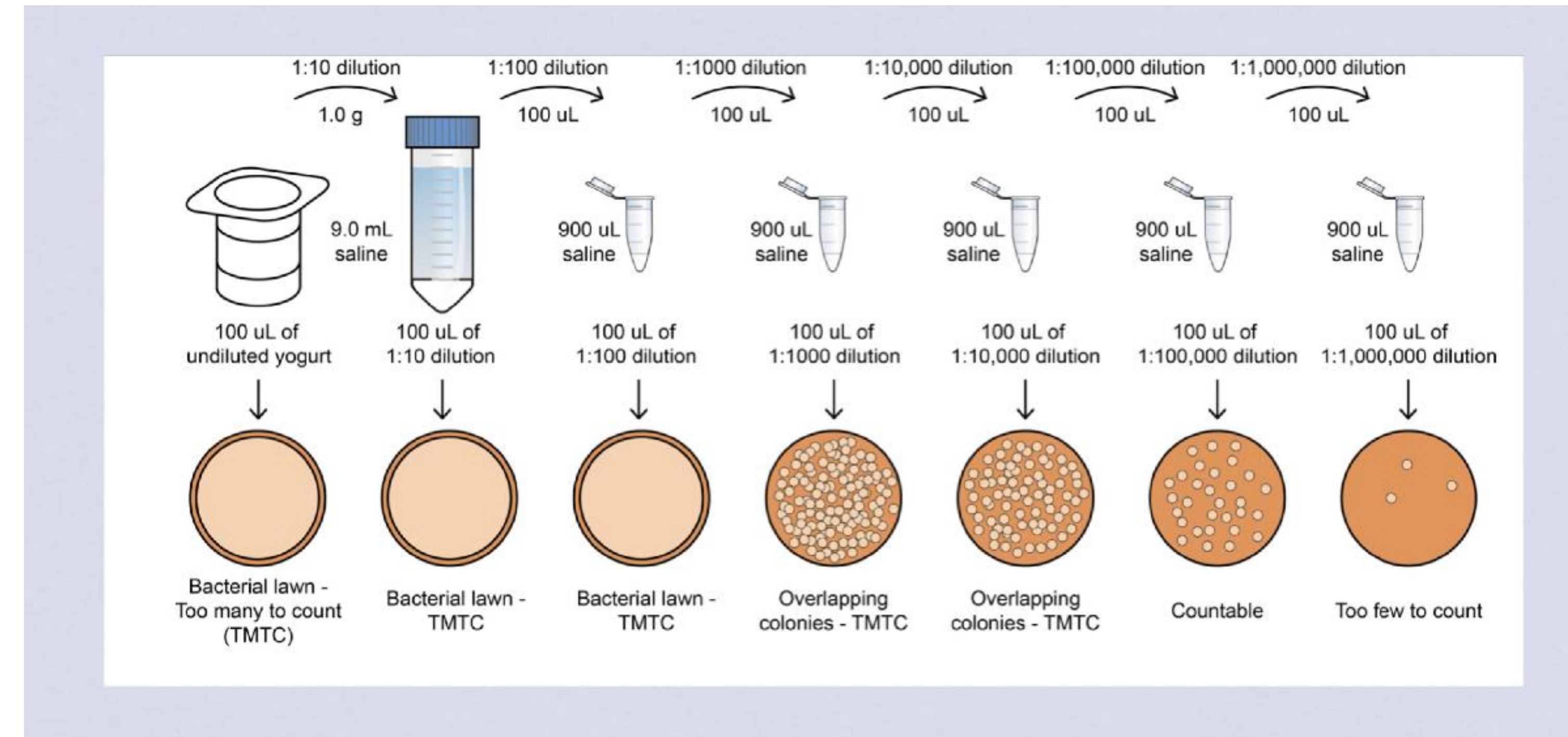


Figure 1. The of this experiment experiment. Yogurt cultures (1g) were aseptically added to weigh plates, diluted in saline solution, spread on MRS plates, and incubated at 37°C for 1-3 days.

Results

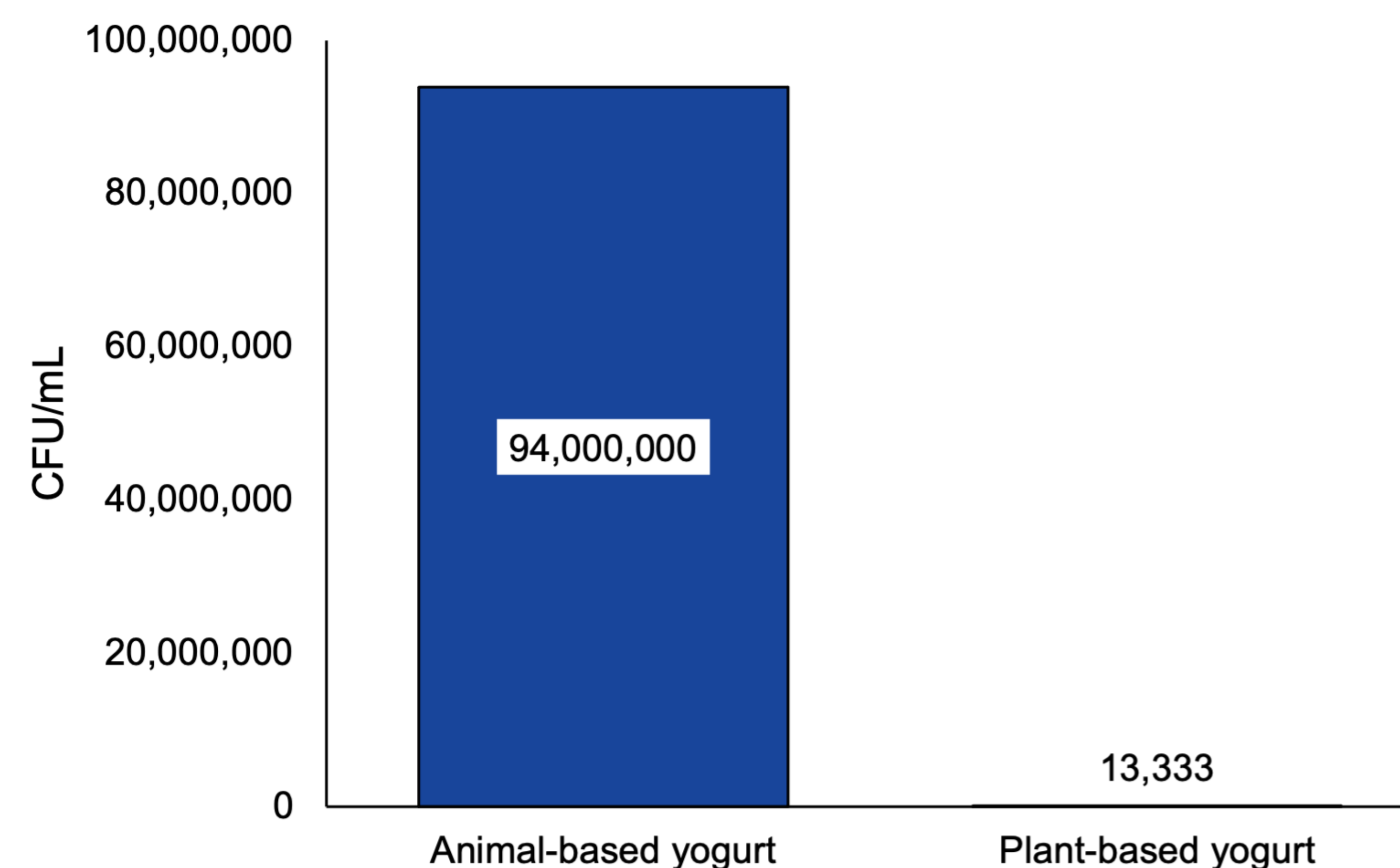


Fig 2. A comparison of average CFU counts between oat yogurt and cow milk yogurt. There is a suggested difference, with a larger count for the animal based-yogurt.

Results

The results suggest that animal-based yogurt had more bacteria than plant-based yogurt.

Animal yogurt more bacterial growth than plant yogurt. Bacterial growth in animal yogurt stopped at a dilution of 1:1,000,000 while the growth in PY stopped at a dilution of 1:1000.

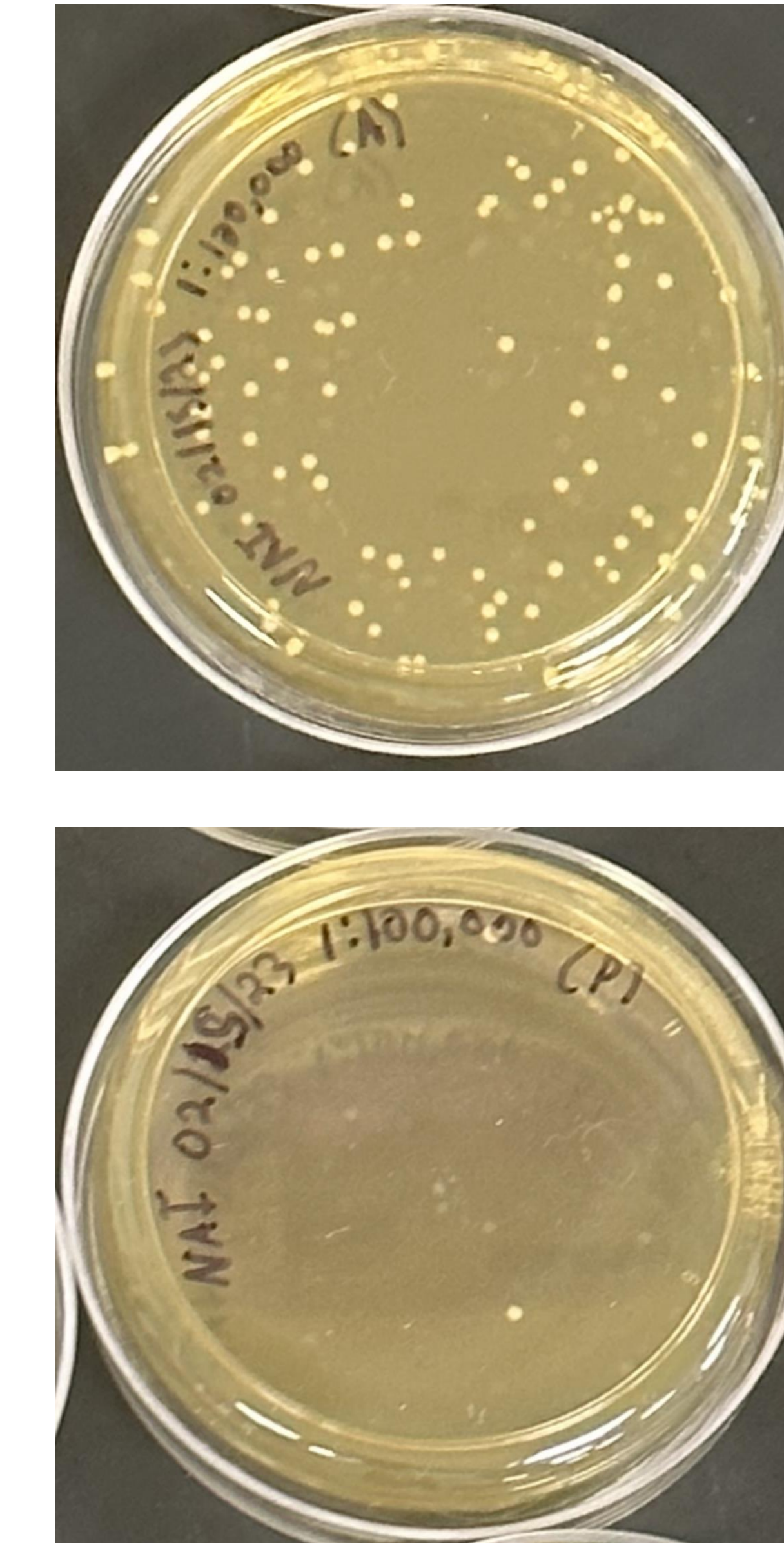


Fig 3. Agar plates indicating bacterial growth at 1:100,000 dilutions for animal yogurt (top) and plant yogurt. There are more colonies in the animal-based yogurt plate. The plant-based yogurt plate has too few to count.

Conclusion

The results support our hypothesis that probiotic contents in animal milk yogurts would contain a higher concentration of bacteria than its plant (oat milk) counterpart. Multiple reasons could explain these results. One could be the availability of carbohydrates nutrients in the different yogurts which could change the rate of fermentation and growth. Another possibility could be the types of bacteria which are present in/on animal bodies, in contrast to plants.

Furthermore, bacterial morphology was observed to differ between both samples most likely due to the types of available carbohydrates available in the milk, to undergo fermentation.

Although the hypothesis agreed with the results, it is important to not dismiss the possibility for human error. Which is why it would be better to have more time for trials.

References

Arise, A. K., Malomo, S. A., Obuo, J., Adesanya, O. F., & Esan, O. T. (2022, July 20). *Comparative studies of yogurt produced from animal and selected imitation vegetable milk*. ResearchSquare. <https://assets.researchsquare.com/files/rs-1846511/v1/ab56fb14-e74b-41a8-8b40-c2e6bc508dab.pdf?c=1658328523>