

Introduction

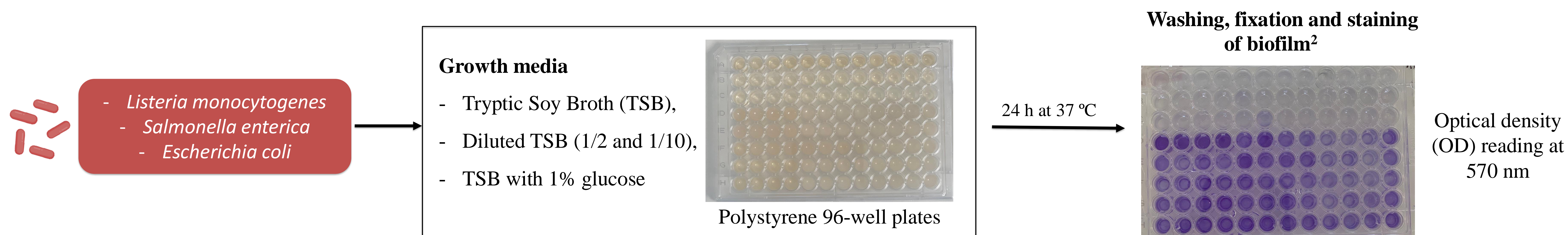
Biofilm formation is influenced by many factors and varies between strains. Each strain uses different strategies and expresses different genes to promote biofilm formation and adherence. These processes are dependent on the environmental resources available. For some strains, the ability to form or not form a biofilm is strongly dependent on the biofilm growth conditions, such as the availability of nutrients. *Listeria monocytogenes*, *Salmonella* spp., and *Escherichia coli* are pathogenic bacteria associated with biofilm formation. Biofilm formation promotes the development and spread of infections difficult to treat, and contributes to antimicrobial resistance, which is a current concern.¹

Purpose

- This study aimed to evaluate the biofilm formation of *Listeria monocytogenes* (two serotypes), *Salmonella enterica* (four serotypes) and *Escherichia coli* strains on the surface of polystyrene under different nutrient conditions.

Methods

Assessment of 24 h biofilm formation



Results

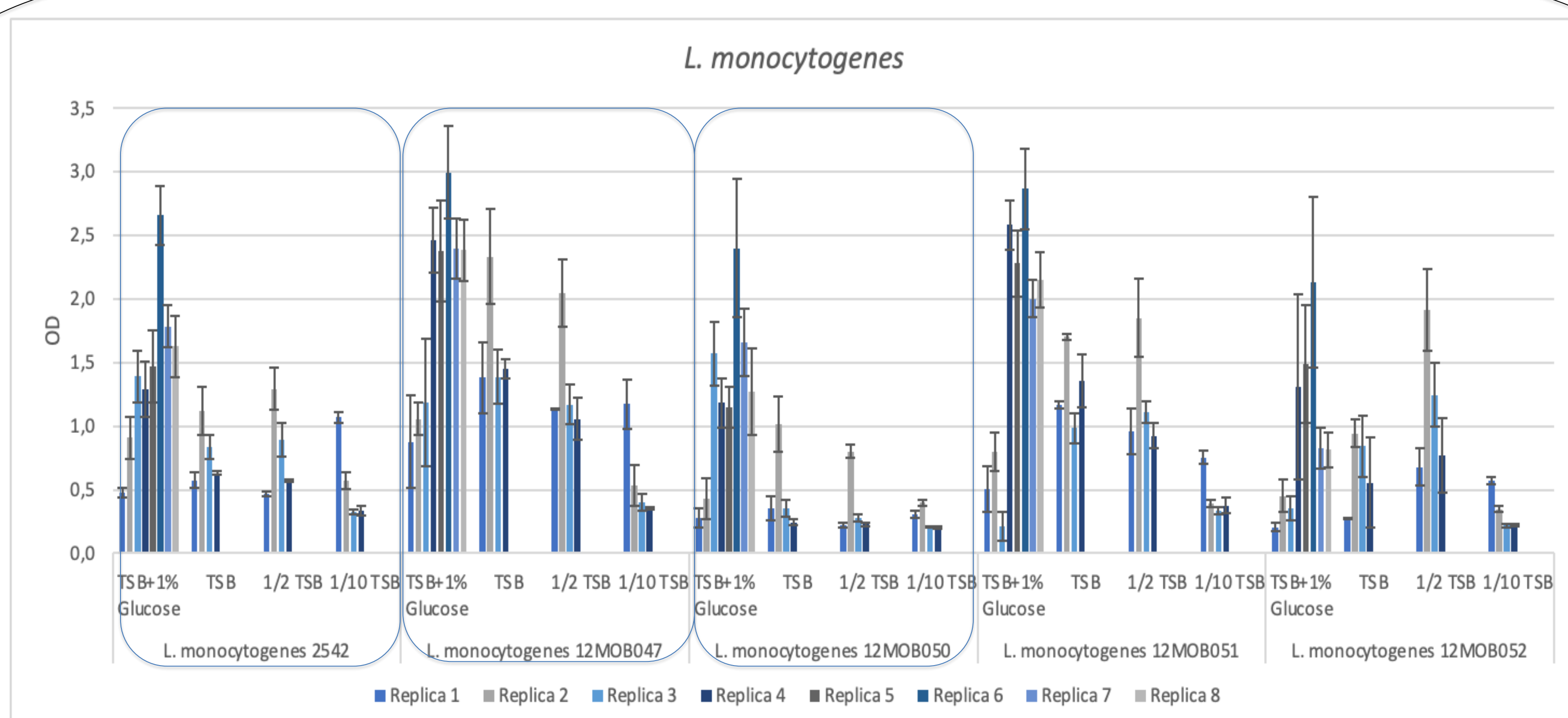


Figure 1. Average OD values obtained in each replicate of crystal violet staining wells for *Listeria monocytogenes* strains.

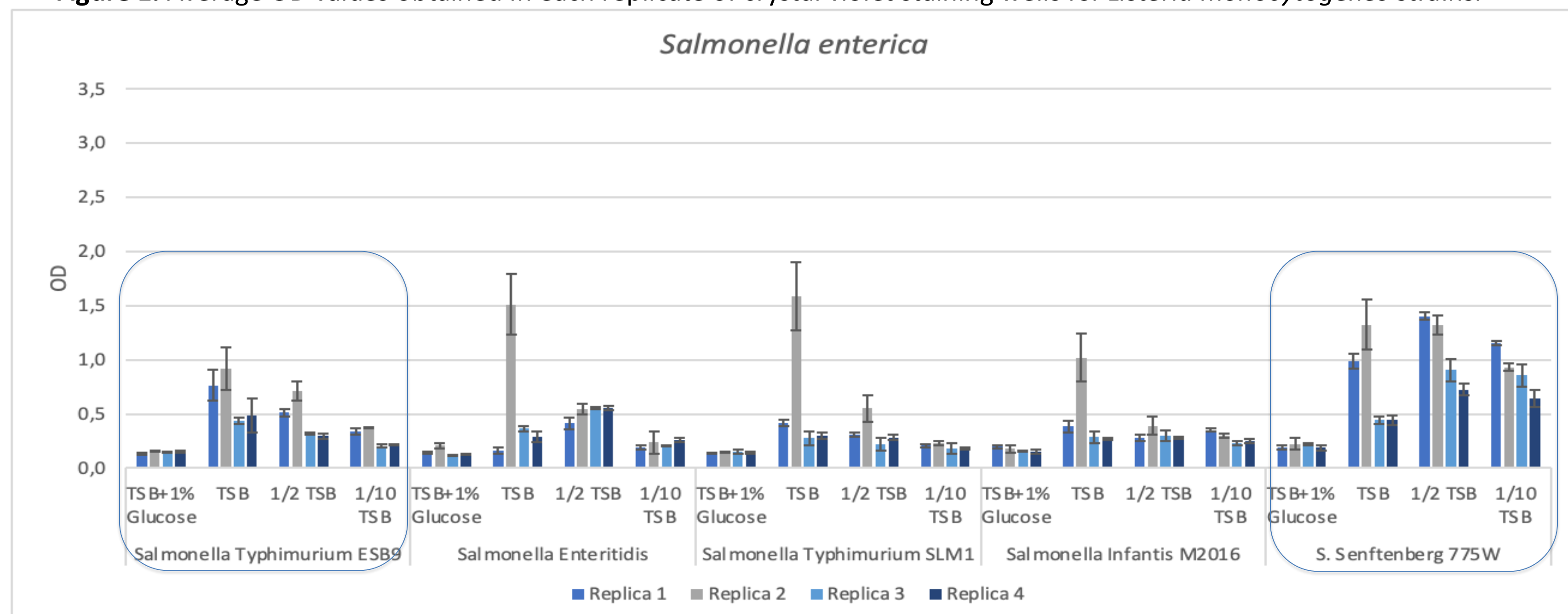


Figure 2. Average OD values obtained in each replicate of crystal violet staining wells for *Salmonella enterica* strains.

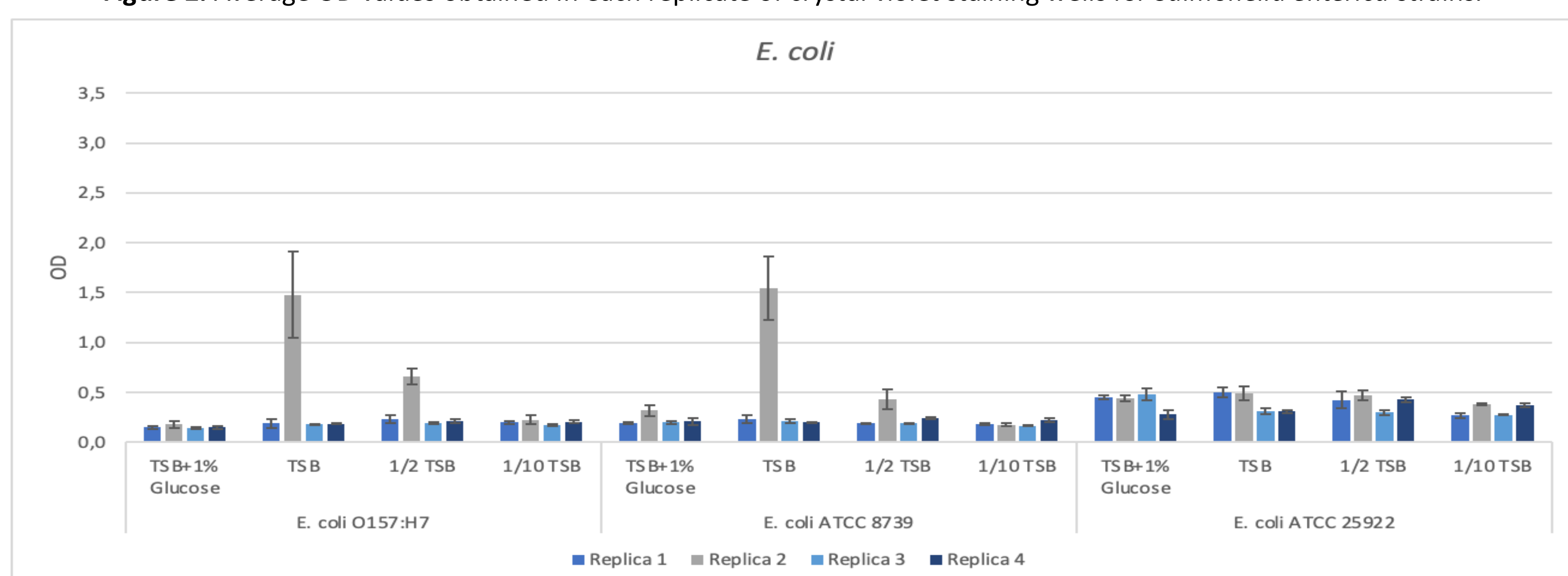


Figure 3. Average OD values obtained in each replicate of crystal violet staining wells for *Escherichia coli* strains.

Discussion and conclusions

- Although this technique shows variability in results across different replicates, it remains possible to verify that:
 - For three *L. monocytogenes* strains tested (2542, 12MOB047, and 12MOB050), the growth medium had a significant effect on biofilm formation ($p < 0.05$) (Figure 1);
 - For two *S. enterica* strains tested (Typhimurium ESB9 and Senftenberg 775W), the growth medium also had a significant effect on biofilm formation ($p < 0.05$) (Figure 2),
 - In contrast, no significant differences were observed for the *E. coli* strains (Figure 3).
- In conclusion, the greatest biofilm production of *L. monocytogenes* strains occurred in richer nutrient conditions (TSB with 1% glucose), in contrast to *S. enterica* strains (TSB).

Significance

- The differences found between strains belonging to the same species/genus highlight the importance of carefully selecting experimental nutrient conditions when studying biofilm formation, and of being cautious when comparing results from different studies. While these studies provide valuable insights, the results are highly dependent on the experimental conditions, which may not mimic the complexity of biofilm formation in natural environments.

References

- Ciccio et al. (2022). Biofilm formation and genomic features of *Listeria monocytogenes* strains isolated from meat and dairy industries located in Piedmont (Italy). *International Journal of Food Microbiology*, 378, 109784. <https://doi.org/10.1016/j.ijfoodmicro.2022.109784>
- Stepanovic et al. (2007). Quantification of biofilm in microtiter plates: overview of testing conditions and practical recommendations for assessment of biofilm production by staphylococci. *APMIS*, 115(8):891-9. https://doi.org/10.1111/j.1600-0463.2007.apm_630.x

Acknowledgements

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