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Evaluation of Bacteriostatic Effect of Rosemary and Oregano Essential Oil Against a Non-Pathogenic Surrogate of Salmonella spp. (E. coli ATCC 9637)

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INTRODUCTION

Bacterial growth in meat products is a major concern in the food and meat industry because it can lead to spoilage and foodborne illnesses in consumers. This affects the taste, texture, aroma, and overall quality of the meat product. Moreover, it poses a safety concern to buyers and consumers Controlling bacterial growth in meat products is thus an essential process in maintaining food quality and safety.

Salmonella is a common pathogenic bacteria associated with meat products. *Salmonella* is a Gram-negative rod-shaped bacteria that can cause salmonellosis, of which typhoid fever and enterocolitis are most common. Salmonellosis symptoms include fever, diarrhea, abdominal pain, nausea, and may result in severe dehydration, death, and chronic sequelae such as arthritis.

Due to the danger these microorganisms present, other non-pathogenic microorganisms with similar responses to stimuli may be used in research studies. These surrogate microorganisms allow for less risk for researchers and their facilities, while still allowing for valid and useful results.

This study aims to observe the effect of selected concentrations of of Rosemary (REO) and Oregano Essential Oil (OEO) in inhibiting the growth of *Salmonella* surrogate (*E. coli* ATCC 9637) in (1) culture media and (2) in raw chicken stored at 4°C.

METHODS

Essential oils were commercially obtained. Final concentrations of 1.5% v/v for REO and 0.15% v/v for OEO were prepared using 0.1% peptone water containing 0.15% w/v agar as emulsifying agent. Bacterial load of *E. coli* ATCC 9637 was adjusted to achieve a final concentration of 1 x 10^4 CFU/mL prior to use. Experiments were performed in duplicate.

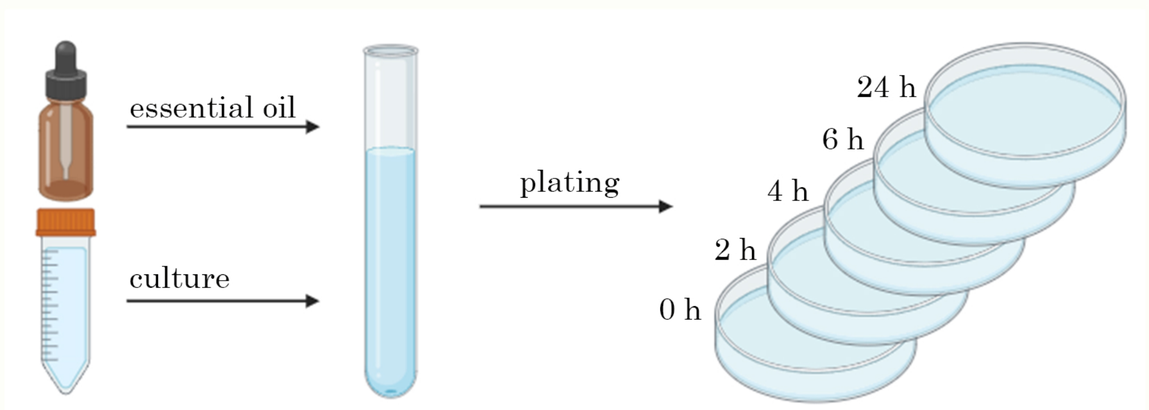

Figure 1. Methodology for the evaluation of bacteriostatic effect of REO and OEO in culture

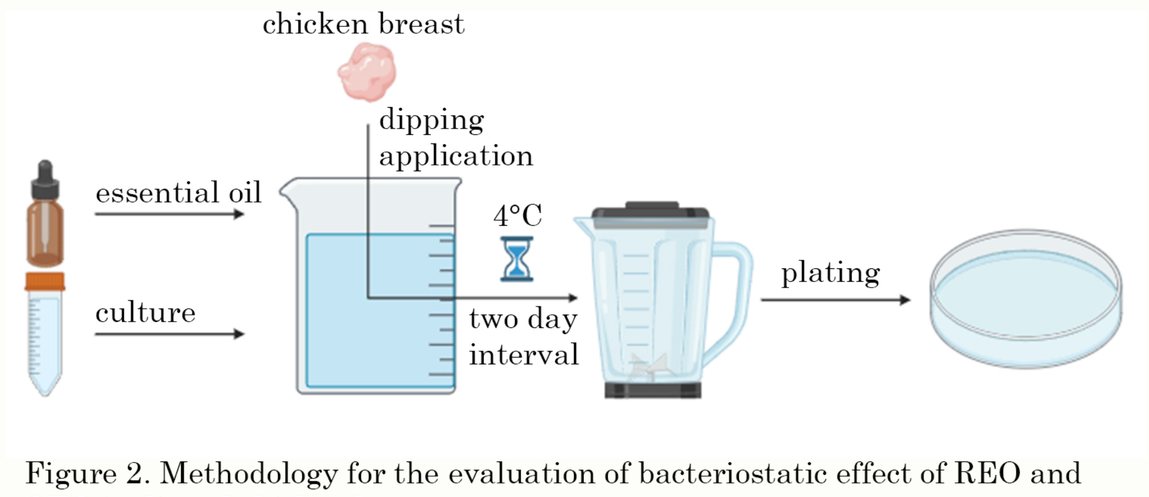

Figure 2. Methodology for the evaluation of bacteriostatic effect of REO and OEO in dipped chicken breast meat

RESULTS

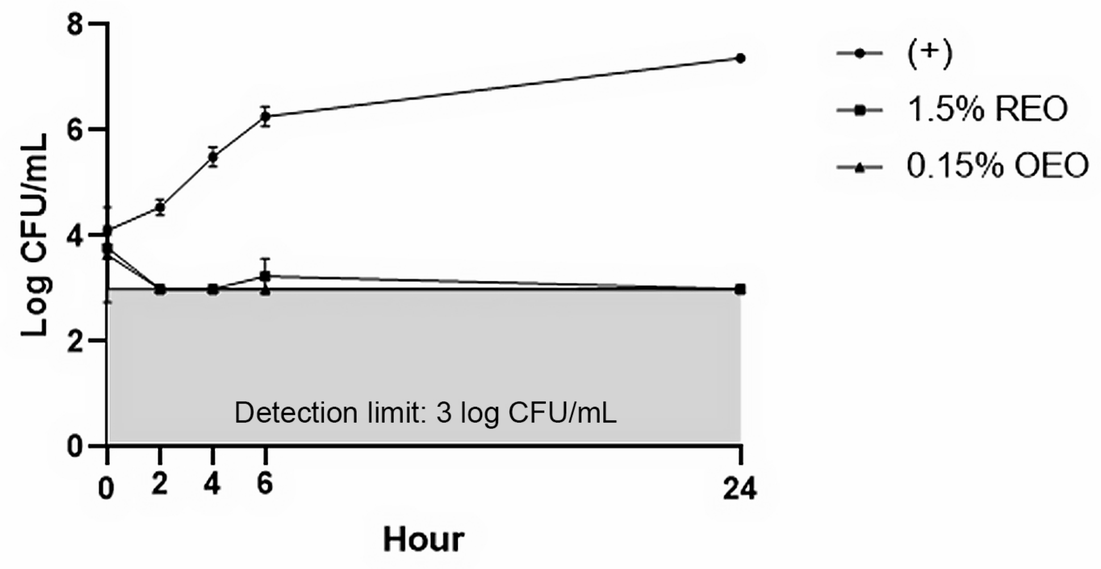

Figure 3. Growth of E. coli ATCC 9637 (log CFU/mL) in vitro across treatments

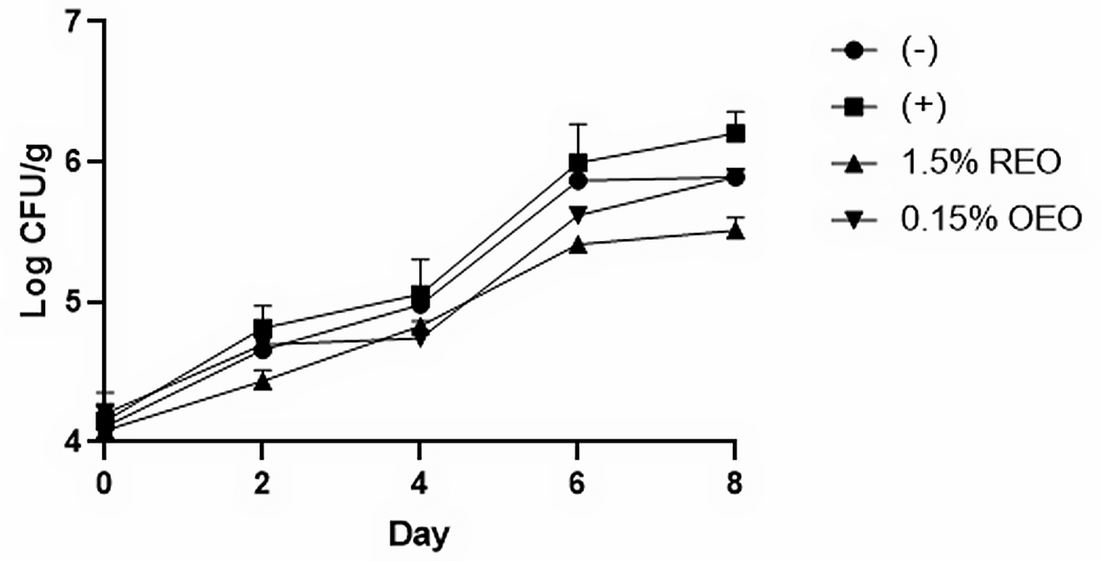

Figure 4. Growth of E. coli ATCC 9637 (log CFU/g) on raw chicken breast across treatments. Error bars represent average values and standard deviations calculated from the four data points.

CONCLUSION

Treatment with the essential oils in culture resulted in no growth at the end of the 24 hr growth period, while treatment with REO and OEO in raw chicken breast resulted in a 0.69 logreduction and 0.31 log reduction, respectively, compared to the positive control. This shows that rosemary and oregano essential oil has promise as natural antimicrobial agents.

REFERENCES

Fig. 1 and 2 were partially generated using BioRender.com