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Growth response and modeling the effects of Carum copticum essential oil, pH, inoculum level and temperature on Escherichia coli O157:H7

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Introduction and Objectives: Escherichia coli O157:H7 is an important human pathogen causing hemorrhagic colitis, hemolytic-ureamic syndrome and thrombotic thrombocytopenic purpura. Knowing the precise boundary for the growth-no growth interface of E.coli O157:H7 and also determining the period of time needed for bacterial growth initiation is necessary for food safety risk assessment.

Materials and Methods: This study was designed to examine the combined effects of different levels of Carum copticum (Zenyani) essential oil (0%, 0.015%, 0.03%, 0.06%), temperature (35 °C, 25 °C), pH(5, 6, 7) and inoculum (10³, 10⁵ cfu ml⁻¹) on the growth of E. coli O157:H7 in brain heart infusion broth. Growth was monitored by visible turbidity over a 30 days period.

Results: The measured 144 data points, showed significant effects for selected parameters on growth of E.coli O157:H7 (P<0.05). The experiment was carried out in triplicate. Stepwise Multiple Regression Program was used to predict the growth initiation. For obtaining a boundary model the logistic Regression Program was used.

Conclusion: The models adequately predicted the growth initiation and growth inhibition of Escherichia coli O157:H7.