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FACULTY OF AGRICULTURE AND MECHANICAL  
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**EFFECT OF GAMMA RADIATION COBALT-60 ON THE GROWTH OF  
SELECTED GRAM NEGATIVE PATHOGENIC BACTERIA**

By  
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A thesis submitted in partil fulfilment of  
the requirement for the award of the degree of  
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Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk : KESAN SINAR GAMMA COBALT-60 TERHADAP PERTUMBUHAN BAKTERIA PATOGEN GRAM NEGATIF oleh SITI SARAH MUSTAFFA ,no. matrik: UK15047 telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini dikemukakan kepada Jabatan Sains Fizik sebagai memenuhi sebahagian daripada keperluan memperoleh Ijazah Sarjana Muda Sains Gunaan (Fizik Elektronik & Instrumentasi), Fakulti Sains dan Teknologi, UMT.

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## DECLARATION

I hereby declare that this thesis entitled Effect of Gamma Radiation Cobalt-60 on the Growth of Selected Gram Negative Pathogenic Bacteria is the result of my own research except as cited in the references.

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## KESAN SINAR GAMMA COBALT-60 TERHADAP PERTUMBUHAN BAKTERIA PATOGEN GRAM NEGATIF

### ABSTRAK

Jangkitan bawaan makanan masih menjadi penyebab utama kepada penyakit yang boleh dihalang dan kematian di dunia. *Escherichia coli* and *Salmonella spp.* adalah di antara patogen bawaan makanan yang paling berbahaya di dalam makanan yang sedia dimakan. Dalam kajian ini, Cobalt-60 iaitu sejenis radiasi sinaran-gamma dengan kekuatan 3.7 MBq berdos 140 milliroentgen(mR) telah digunakan ke atas dua sampel bakteria patogenik bawaan makanan gram negatif iaitu *Escherichia coli* dan *Salmonella spp.*, dan keberkesanan terhadap pengurangan populasi mikroorganisma bakteria patogenik dalam larutan garam dikaji. Kajian ini ditentukan dengan menggunakan dua parameter iaitu jarak di antara sampel dengan sumber sinaran-gamma (0 cm, 5 cm dan 10 cm) dan masa pendedahan kepada sinaran tersebut (10 saat, 60 saat, 100 saat dan 180 saat). Merujuk kepada peratus penurunan, peratus penurunan *Escherichia coli* adalah lebih tinggi daripada *Salmonella spp.* Jarak pada 0 cm di antara sampel dengan sumber sinaran radiasi-gamma selama 180 saat adalah sangat sensitif kepada perencatan pertumbuhan *Escherichia coli* dan *Salmonella spp.* Untuk jarak dan masa pendedahan kepada sinaran ini, keputusan menunjukkan nilai  $\log_{10}$ CFU/ml untuk *Escherichia coli* menurun kira-kira 16% manakala *Salmonella spp.* sebanyak 11%. Oleh itu, Cobalt-60 adalah berkesan untuk merencatkan pertumbuhan bakteria patogenik.

## **EFFECT OF GAMMA RADIATION COBALT-60 ON THE GROWTH OF SELECTED GRAM NEGATIVE PATHOGENIC BACTERIA**

### **ABSTRACT**

Foodborne infections still remain as an important cause of preventable morbidity and mortality in the world. *Escherichia coli* and *Salmonella* are the most potentially dangerous foodborne pathogens in ready-to-eat foods. In this study, Cobalt-60 is a type of Gamma-ray radiation, 3.7 Mbq strength with dose 140 milliroentgen(mR) performed on two selected Gram-negative foodborne pathogenic bacteria and the effectiveness of reducing microbial population of these pathogens in saline water was investigated. Two parameters which were investigated in the study were the distance of the sample to the Cobalt-60 source and the time exposure with gamma radiation. According to percentage of reduction by gamma radiation Cobalt-60, *E.coli* was higher reduction than *Salmonella*. Distance at 0 cm between sample and gamma radiation source and 180 second time exposure of both cultures to gamma radiation Cobalt-60 showed the greatest microbial destruction. Cobalt-60 is effective to inactivate bacterial population in saline.