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# THE DOCTORAL RESEARCH ABSTRACTS

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**Title :** PROPERTIES OF MILLED *ZINGIBER OFFICINALE* ROSC (GINGER) RHIZOME POWDER TO COARSE, FINE AND NANO SIZES AND ITS EFFECTS ON THE STORAGE STABILITY OF SPENT HEN CHICKEN

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*Z. officinale* Rosc. (ginger) has been globally used and known to possess beneficial health properties due to the presence of various bioactive compounds. However, the poor absorption of these bioactive compounds is due to low water solubility, large particle size and complex chemical structure had restricted its bioactivity. The nanotechnology process has been reported as an advanced technology recently applied in food materials to increase the water solubility and improve bioactivity of the active ingredients. However, study on nanoparticle herbs is lacking, hence this study was conducted with the aimed to investigate the effect of nanotechnology process on physicochemical properties of nanoparticle *Z. officinale* rhizome powder. A study on the effect of this powder as a marinating agent on the storage stability of spent hen meat was also conducted. Physicochemical changes were determined using laser diffraction technique, Field Emission Scanning Electron Microscope (FESEM), The Fourier Transmittance IR (FTIR) and X-ray diffraction (XRD). Antioxidant content was estimated by Total Phenolic Content (TPC) and Total Flavonoid Content (TFC) while antioxidant activity was performed via ABTS Cation Decolorisation Assay (ABTS), DPPH Radical Scavenging Activity (DPPH) and Ferric Reducing Antioxidant Power (FRAP) assays. Phenolic acids composition was identified through SPE-HPLC analysis. Analyses of pH, colour, shear force, Peroxide Value (PV), Thiobarbituric Acid (TBA), Anisidine Value (AV), Totox Value, volatile compounds identification by GCMS-SPME method and microbiological study were conducted to determine the storage quality of chilled spent hen meat treated with synthetic antioxidant, BHA:BHT

combination (positive control), coarse particle, fine particle and nanoparticle *Z. officinale*. The results were compared to that of spent hen meat without any treatment (negative control). Sensory analysis was also conducted to verify consumers' acceptability. Milling at 550 rpm for 4 hours in dry milling were found to be the appropriate milling parameters to prepare nanoparticle *Z. officinale* rhizome with mean particle size of 223.8 nm. The TPC and TFC were in the range of 3.97 to 12.83 mgGAE/g dry weight and 14.80 – 22.35 mgQE/g dry weight respectively. Nanoparticle *Z. officinale* showed significantly high ABTS scavenging (38.08%), FRAP value (50.52%) and 34.04% better in the DPPH free radical inhibition as compared to the coarse particle *Z. officinale* rhizome powder. Nanoparticle *Z. officinale* significantly inhibited bacterial growth better than the coarse and fine particle *Z. officinale* rhizome powder. Application of nanoparticle *Z. officinale* rhizome in spent hen meat improved physicochemical properties and oxidative stability as comparable to sample marinated with BHA:BHT. Significantly low concentration of volatile compounds were detected in the nanoparticle *Z. officinale* rhizome marinated sample compared to other treated samples. Spent hen marinated with nanoparticle *Z. officinale* rhizome was the most preferred sample as depicted by significantly high sensorial mean scores (6.86 – 7.60) rated by the panelists. Hence it is suggested that nanoparticle *Z. officinale* rhizome has the potential to be used as functional ingredient that can improved the storage stability of meat and meat product.

\* (MS) = Main Supervisor      (CS) = Co Supervisor