

**EFFICACY OF EDIBLE COATING AND
PACKAGING METHODS ON THE
STORAGE STABILITY OF
CHICKEN MEAT BALLS**

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*Thesis submitted in partial fulfilment of the
requirements for the degree of*

**MASTER OF VETERINARY SCIENCE
in
LIVESTOCK PRODUCTS TECHNOLOGY**

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CERTIFICATE

This is to certify that the thesis entitled "EFFICACY OF EDIBLE COATING AND PACKAGING METHODS ON THE STORAGE STABILITY OF CHICKEN MEAT BALLS" submitted in partial fulfillment of the requirements for the degree of MASTER OF VETERINARY SCIENCE IN LIVESTOCK PRODUCTS TECHNOLOGY to the TamilNadu Veterinary and Animal Sciences University, Chennai-51 is a record of bonafide research work carried out by S. ARUN PRABHU, under my guidance and that no part of this thesis has been submitted for the award of any other degree, diploma, fellowship or other similar titles or prizes and that the work has not been published in part or full, in any scientific or popular journal or magazine.

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ABSTRACT

Title : EFFICACY OF EDIBLE COATING AND PACKAGING METHODS ON THE STORAGE STABILITY OF CHICKEN MEAT BALLS

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Chicken meat balls from broiler meat enrobed with cornflakes were prepared, to which hurdles such as natural essential oils (EO) in edible coating and two packaging methods namely vacuum packaging (VP) and modified atmosphere packaging (MAP) were combined and attributes during the refrigerated storage were studied. The entire study was conducted as four experiments. In experiment I, the basic formulation of the chicken meat balls, and the enrobing recipe and method was standardized. In experiment II, the optimum inclusion levels of different EO in edible coating were standardized based on the physicochemical and sensory characteristics. In experiment III, ginger oil (GiO) and oleoresin capsicum (ORC) selected from previous experiment were added in the edible coating of chicken meat balls individually and in combination and the optimum level in combination was selected for further application with added hurdle. In experiment IV, the chicken meat balls with EO combination in edible coating was packaged in aerobic packaging (AP), VP and MAP along with a control meat ball without EO in AP, and the storage stability were assessed at regular intervals under refrigeration ($4\pm 2^{\circ}\text{C}$) temperature up to 25 days. The fresh meat balls samples were analyzed for physico-chemical, sensory and microbiological qualities.

In experiment I, chicken meat balls with 10% potato and enrobed with mix containing cornflakes was selected for further experiments as control (C).

In experiment II, the The DPPH scavenging activity of the EO in vivo and in vitro study showed that the antioxidant potential of the EO increased with increase in the concentration. In the sensory evaluation, characteristically the flavour scores and the overall acceptability scores decreased with increase in the concentration of EO. GiO (0.25%) and ORC (0.25%) were selected for further studies.

In experiment III, it was found that the combination of GiO and ORC at 0.25% level each in vivo and in vitro had highest DPPH activity and the overall acceptability scores were comparable to that of control and hence the EO combination was selected for further experiment.

In experiment IV, it was found that the DPPH scavenging activity significantly ($P \leq 0.01$) decreased with the increase in storage period with highest value on 0 day and lowest value on 25th day. The VP and MAP packed samples significantly ($P \leq 0.01$) retained the DPPH scavenging activity. The TBARS values of the refrigerated stored enrobed chicken balls markedly increased with increase in storage days. Among the treatments, enrobed meat balls with essential oil, packed with VP and MAP had significantly ($P \leq 0.01$) lower TBARS and tyrosine values.

Appearance, flavour, crispiness, juiciness and overall acceptability scores of the refrigerated stored samples steadily and constantly decreased over the storage period. Among treatment MAP packed samples had significantly highest appearance flavour, crispiness, juiciness and overall acceptability scores. MAP significantly ($P \leq 0.01$) had the highest overall acceptability score.

The total viable count of the refrigerated stored samples had an initial decrease on 7th day of storage, showed a linear and steady increase throughout the storage period except a slight decrease at 15th day of storage. Staphylococcal count of refrigerated stored samples increased with the increase in storage period which was significantly ($P \leq 0.01$) low at 0 day of storage. VP and MAP had significantly ($P \leq 0.01$) lower count and C had significantly highest count followed by AP. The psychrophilic count of the refrigerated stored samples increased with the increase in storage period with a lowest value on 5th day of storage. The yeast and mould count was significantly ($P \leq 0.01$) highest on 25th day and among treatments, lower in VP and MAP packed samples.

Based on the present study, it had been concluded that chicken meat balls prepared with the addition of 10% boiled and mashed potato and enrobed with cornflakes was sensorially acceptable with satisfactory physico-chemical properties. Incorporation of GiO and ORC at 0.25% each in combination as a "hurdle" in the edible coating exhibited an enhanced antioxidant property as measured by DPPH activity with good sensory scores. In addition, packaging of this EO incorporating chicken meat balls with VP and MAP as a second "hurdle" was further able to control the lipid oxidation and microbial proliferation and thus extend the shelf-life of the product up to 20th day under refrigeration ($4 \pm 2^\circ\text{C}$) storage compared to the control and EO added product in AP.