



Effects of Probiotic Supplementation and Fast Freezing on Quality Attributes of Chicken Breast Meat

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Keywords: chicken breast muscle, fast freezing, oxidation, probiotics
Meat and Muscle Biology 1(2):170

doi:10.221751/rmc2016.164

Objectives

There has been a growing interest in the supplementation of microbial dietary probiotics in the poultry industry due to their known benefits on chickens' growth performance, health and possibly oxidation stability of muscle. While freezing is one of the most common methods preserving meat products, some adverse impacts of freezing/thawing on chicken muscle (e.g., increased purge loss and/or accelerated oxidation) have been well documented. Since fast freezing has positive impacts on improving quality attributes of frozen/thawed meat, it would be reasonable to hypothesize that probiotic feeding coupled with fast freezing can provide synergistic impacts on preventing freezing/thawing related quality defects of chicken meat. Therefore, the objective of this study was to evaluate the effects of probiotic feeding and freezing rate on the quality attributes of frozen/thawed chicken breast muscle.

Materials and Methods

One hundred and sixty-eight Ross 708 male broiler chicks were randomly assigned into two feeding treatments for 45 d- basal diet and the basal diet with 250 ppm Sporulin (1.0×10^6 cfu/g of feed; containing 3 strains of *Bacillus subtilis*). After harvest, both sides of chicken breast muscles were separated, individually vacuum-packaged, and randomly assigned to one of two freezing treatments. Fast-freezing were conducted in a liquid nitrogen freezing cabinet (operating temperature at -70°C), while slow-frozen samples was performed in a -30°C conventional freezer. After stored in the -30°C freezer for 10 mo,

the samples were thawed in a 2°C cooler for either 24 h or 72 h. The pH, WHC (thaw/purge loss and drip loss), color, lipid content, peroxide value (POV), and 2-thiobarbituric acid reactive substances (TBARS) were determined. Data were analyzed using the PROC MIXED procedure of SAS (SAS Inst. Inc., Cary, NC). Least squares means for all traits were separated (F test, $P < 0.05$).

Results

No interactions between three main effects (probiotic feeding, freezing rate and storage period) on the measurements were found ($P > 0.05$), except for TBARS value. Probiotic feeding had no impacts on WHC ($P > 0.05$), but fast-freezing considerably reduced thaw/purge loss of the chicken samples ($P < 0.05$). Significant decreases in POV and TBARS values were observed in the probiotics-fed chicken breast samples. Further, breast muscles from probiotic-fed chickens assigned to fast-freezing exhibited the lowest TBARS value, irrespective of storage after thawing ($P < 0.05$). The probiotic feeding, freezing rate and storage period after thawing had no or little impacts on color characteristics of chicken breast muscles ($P > 0.05$).

Conclusion

These findings indicate that the combination of probiotic supplementation and fast-freezing substantially reduced and/or delayed lipid oxidation of frozen/thawed chicken breast muscle. Further studies on determining underlying biochemical mechanism by which probiotic feeding improves the lipid oxidation stability of chicken meat would be warranted.