Bone darkening in broiler chicken bone-in thighs

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Summary

The study is designed to quantify the factors responsible for bone darkening in bone-in broiler chicken thighs and to suggest ways to reduce the incidence.

Introduction

1. Bone darkening is a colour defect in cooked bone-in broiler chicken meat where tissue around the bone (femur) is discoloured with a burgundy/black appearance possibly due to:
   - bone marrow leaching resulting in hemoglobin (Hb) release through the bone onto surrounding meat;
   - oxidation of myoglobin (Mb), main pigment in muscle.
2. Bone darkening occurs in up to 30% bone-in broiler chicken thighs processed in Alberta (industry sources) and there is consumer bias against chicken dark meat in North America.

Hypothesis and Experimental Design

1. Bone growth is slow as compared to overall body growth. Rapid growth rate leads to less skeletal maturity and more porous bones at slaughter due to less calcification leading to leakage of pigments.
2. Little information is available on factors responsible for bone darkening in bone-in broiler chicken thighs.
3. An understanding of the contributory factors may lead to control strategies and processing, storage and preparation techniques that can be used to reduce the incidence.

=>We will raise broilers on reduced growth rate curve. Porosity and density will be measured to correlate them with the bone darkening.

Objective

- To determine factors affecting the bone darkening in broiler chicken bone-in thigh meat.

Experimental Design

Experiment 1

- Quantifying factors responsible for darkening.
- Chemical analysis: thigh meat colour, pH, hemoglobin, myoglobin, iron content, bone density, porosity.

Experiment 2

- Relationship between bone growth rate, bone porosity and darkening.
- Broilers will be fed to achieve either normal or reduced growth as reduced growth is expected to improve bone quality by decreasing bone porosity.

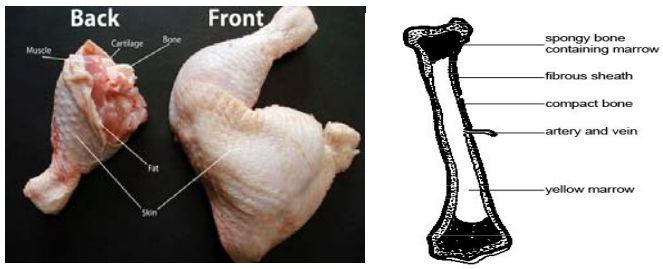

Figure 1: The thigh (femur bone) with meat (left) and anatomical structure (right)

Experiment 3

- Effect of packaging under various modified atmospheres on the incidence of darkening.

Long Term Benefits

1. The study will increase consumer confidence of dark meat and provide knowledge of causative factors for the problem.
2. Ultimate goal of the project is searching for the potential solutions based on our study.

Future Approach based on Study

Nutrition, management, environment and genetics can be modified if cause of the bone darkening is known.

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