Broiler Processing, Product Quality, and Yield

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Meat quality is usually defined as a measurement of attributes or characteristics that determine the suitability of meat to be eaten as fresh or stored for reasonable period without deterioration. During the production and processing of poultry for consumption, many factors influence final product quality. Final product quality is measured through a variety of parameters including physiological composition, microbiological status, processing parameters, and sensory parameters.

Production Parameters

Parameters during broiler production will influence final product quality.
Genetics: Many meat quality traits have high heritability. Bird genetics can influence feathering, growth rates, and meat traits. Poor feathering can lead to an increase in scratches, breast blisters, and potentially cellulitis. Alternatively, heavy feathering can lead to a need to increase defeathering time or adjust pickers, potentially leading to skin tearing or wing damage. Growth rate influences the presence of myopathies. Meat traits such as color, pH, drip loss, and shear can also be influence by bird genetics.

Health: Bird health has a major impact on meat quality. Skin leukosis, dermal cell carcinoma, reovirus, bacterial infections, and septicemia/toxemia can all lead to poor quality, loss of yield, and condemnations.

Nutrition: Feed formulation and feed quality can have strong positive or negative impacts on product quality. Feed ingredients will influence skin color, meat color, and meat pH which impact the visual appearance and functional properties of the product. Oxidative stability and fatty acid profiles will influence the microflora and shelf life. The presence of mycotoxins in poor quality feed can lead to capillary hemorrhage, therefore influencing color and yield.

Stocking Density: The appearance of the skin can be influenced by stocking density. Increased densities have been shown to lead to increases in dermatitis, bruising, and scratches on carcasses at processing.

Litter Management: Like stocking density, the birds' environment during growout plays in important role in the appearance of the carcass. Poor litter management can lead to issues such as hock burns, breast blisters, paw burns, high levels of ammonia exposure, and potentially infectious process from secondary infections.

Bird Management: Bird stress will influence product quality and yield. Green muscle disease is caused by excessive physical movement or flapping, inflammation of the pectoralis major and minor muscles, lack of blood flow to the pectoralis minor due to the inflammation, and finally

tissue necrosis. Heat and cold stress can lead to muscle damage, reduced protein functionality, and pse-like meat.

Harvest and Transport Parameters

Harvest Injury: Harvesting birds for processing inherently increases injuries. However, the frequency of injury can be reduced through well trained catch crews utilizing proper catching techniques and transport module maintenance. Management during catching to keep birds as calm as possible while avoiding piling will reduce resulting injuries.

Transport: Heat and cold stress during transport have long term impacts on meat pH, color, cook loss and water holding capacity. Extreme stress will lead to increased frequency of DOAs and thus total losses of birds with maximum inputs.

Processing Parameters

Unloading: Tipping and shacking have the potential to lead to wing damage and bruising.

Stunning and Neck Cut: Electrical stunning should be maintained to minimize hemorrhages and broken clavicles/wings. Controlled atmosphere stunning can be adjusted to minimize wing damage during stunning, defeathering issues, and broken paws. Efficiency of neck cut can influence a successful bleedout reducing red wing tips.

Scalding: Underscalding can lead to barking and issues downstream with defeathering. Overscalding leads to meat discoloration due to cooking.

Defeathering: Aggressive defeathering can lead to carcass damage, particularly if the meat is prone to spaghetti breast. Less aggressive defeathering can lead to excess feathers remaining on carcasses.

Evisceration: If not well adjusted for bird size, evisceration equipment can cause viscera or carcass damage, reducing yields. Flock variability can also negatively affect evisceration outcomes.

Chilling: Carcass chilling strongly influences final product quality and yield. Overexposure to antimicrobials such as PAA during immersion chilling can cause bleaching. Water pH can influence both microbial reduction and water pickup. Air chilling can lead to poor skin appearance if there is a lack of moisture added during the chill process.

Deboning: Time between slaughter and deboning in addition to rates of temperature decrease can influence both pH decline and subsequent meat texture.

Overall, a multitude of factors will influence quality and yield of processed broiler meat products. Although many factors occur during production and would require longer term plans for adjustment, much can be done between harvest and deboning to improve product quality and yield outcomes.