



Worthwhile Operational Guidelines & Suggestions

BROILER PROCESSING TIMELY INFORMATION – JANUARY, 2009

Bone darkening

The presence of a dark discoloration (burgundy or black appearance) around the bones (mostly the drumstick, thigh, and wish bone) of fully-cooked poultry is a sporadic problem for the processors and consumers, as darkened bones and meat makes the product unappealing.

The occurrence of bone darkening is typically associated with previously frozen-thawed poultry. The discoloration is the result of bone marrow leaching through the bone onto the surrounding tissue. The bones of young animals (i.e., broiler chicken) are more porous and contain more red marrow (rich in both red and white blood cells) than those from older/mature birds. Freezing whole or cut-up broiler chicken results in the formation of ice crystals within the tissues, which in turn rupture the cells in the bone marrow. Red-colored iron containing, heme-pigment (hemoglobin) in blood cells subsequently migrates through the porous bone tissue and denature (darkens) upon heating. Removal of femur prior to cooking greatly reduces the severity of bone darkening.

Skeletal maturity and integrity is very important in rapidly growing broiler chickens. Even when the weight gains are optimal, the formation of tight and compact bone matrix may be lagging behind. Besides bone porosity, a number of other factors have been identified to contribute to bone darkening, including market age (young > old), gender (males > females), nutrition (calcium, phosphorus, and vitamin D), extent of blood loss (short > long bleed-out time), rate of freezing (slow > rapid; due to the formation of large ice crystals), rate of thawing (rapid with immediate cooking < slow and delayed cooking), cooking time (prior to < after freeze/thaw), and type of cooking (microwave < oven). Good news: although unappealing, bone darkening problem does not affect the texture, flavor, odor, and, more importantly, the safety of the final product.



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