Deep Pectoral Myopathy
(Green Muscle Disease) in Broilers

Deep pectoral myopathy (DPM) is a degenerative muscle disease of poultry commonly referred to as green muscle disease. Green muscle disease is a hidden problem in today's large broiler chickens that is not detected until these birds are deboned at the processing plant. It is characterized by necrosis and atrophy of the deep pectoral muscle, which is commonly referred to as the breast tender (Bilgili and Hess, 2008). Green muscle disease is not a new disease, but it is becoming increasingly more common in meat-type broiler chickens selected for high breast meat yield.

The disease was first described by Dickinson et al. (1968) in adult turkeys. It was later noted by Page and Fletcher (1975) in broiler breeder hens and finally reported in young broiler chickens by Richardson et al. (1980). As the number of broilers marketed at a heavy body weight for the further processed industry continues to grow, so do the reported occurrences of DPM. According to some researchers (Bilgili et al., 2000), the condition appears to be more common in males than females. However, there is some disagreement on this matter (Lien et al., 2012). The problem is also seen in free-range broilers.

What Causes the Problem?

It is believed that **contraction of the breast fillet and the tender**, the muscles responsible for the up-and-down strokes of the wings**, is responsible for the problem**. These major (breast fillet) and minor (tender) pectoral muscles account for most of the flight muscles in birds. Even though domestic poultry do not fly, these muscles are still involved in wing movement (Bilgili and Hess, 2002). It is generally recognized that DPM is the result of a restriction in blood supply that develops in the tender mainly because the tender is surrounded by a tough inelastic muscle covering or membrane and the sternum. As a result, the muscle mass of the tender is unable to swell in response to physiological changes that occur when muscles are exercised, as in wing flapping (Jordan and Pattison, 1998).

Martindale et al. (1979) indicated that during wing exertion, the tenders increase in weight by as much as 20 percent because of increased blood circulation to the muscle. Unable to expand due to being trapped between the sternum and the tough membrane, the increase in weight exerts pressure within the tender, restricting and/or stopping the blood supply to the muscle. This creates an oxygen deficiency and causes necrosis, or the localized death of cells and tissues through interruption of the blood supply.

Increased bird activity that results in wing flapping is thought to be the major cause of green muscle disease. However, a host of factors working alone or perhaps together may be responsible for the increase in wing flapping. These factors include—

- the speed at which a grower walks the house or picks up mortalities
- light dimmer operation (gradually increasing/decreasing light levels)
- the light intensity in the house and the lighting program used
- bird activity level in the house in the days before catch
- the number and length of feed outages during a flock (equipment malfunctions or feed mill issues)
- the feed withdrawal program
- excessive noise that disturbs the birds (running the mower or brush hog near the chicken house)
- handling of birds during catching

Even though the condition is called green muscle disease, it takes several days after the initial wing-flapping event before the muscle actually becomes "green." The immediate damage leaves the muscle very red, and there may be hemorrhaging of blood from ruptured vessels in the tender. When seen in the processing plant, this condition is often associated with catching (increased activity) and may last up to 48 hours. After the initial event and over the next few days, the tender gradually begins to take on a bruised or discolored look associated with necrosis. This initial bruised area often appears to start in the middle of the tender but may spread until the entire tender (or perhaps both tenders) is eventually involved. As time passes (perhaps a week or even longer after the initial event), the tender takes on the characteristic green color for which the condition is named. The **green color is the result of the gradual breakdown of hemoglobin and myoglobin** in the damaged muscle tissue.

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What Can Be Done?

Currently, the condition is a major challenge to the poultry industry, in part because it does not appear to have an impact on bird health in the broiler house and, therefore, usually goes undetected until processing. In addition, it may randomly affect part or all of one or both tenders. It has proven difficult to predict if, or how many, green tenders will occur in a flock at processing. However, **green tenders have no appeal to the consuming public** and are, therefore, removed from the food supply when the birds are processed. This creates an economic loss to the industry because it affects the most valuable part of the carcass (the breast) (Bianchi et al., 2006). While the number of birds displaying green muscle disease is currently small compared to the overall number of birds processed, that number is increasing, and indications are that incidence of the disease may continue to increase as breast meat yield continues to be a primary focus of the industry and broilers are taken to heavier market weights.

Management **practices that minimize wing flapping appear to be the best defense** against the disease. Limiting the amount of time spent in the broiler house to only what is necessary may be beneficial. However, this does not mean you should neglect the flock! You must still check the birds on a regular basis, repair equipment, remove mortalities, and monitor ventilation, air quality, temperature, ammonia levels, litter condition, and so forth. Just avoid any excessive activity that may cause unnecessary wing flapping. Move slowly through the house when checking the birds, removing mortalities, or repairing equipment. Use extra care near migration fences where the birds often have a tendency to pile up, especially if pushed too fast.

Minimize excessive noise levels both inside and outside the house that could frighten the birds, especially if you have a flighty flock that may already be nervous. This might mean delaying cutting the grass a few days to avoid disturbing the flock. Work with the minimum amount of light that will allow you to successfully perform your duties (mortality collection, equipment check, repairs, etc.) in the broiler house. Birds will respond to an increase in the brightness of the light with an increase in their activity level. Therefore, avoid going from 0.03 or 0.04 foot candles of light to full bright with just the push of a button on your dimmer. Use the sunrise/sunset feature if your dimmer has that capability, or increase the light level only partially instead of all the way when you enter the house.

Summary

Green muscle disease is becoming more common in the broiler industry, especially in broilers grown to heavier body weights for the deboning market. It is characterized by necrosis and atrophy of the breast tenders and is believed to be associated with increased bird activity and excessive wing flapping in the days (and perhaps weeks) before harvest. It is a challenge to the industry because it does not appear to impact health in the bird and often goes unnoticed until birds are deboned during processing. Management practices that lessen or minimize wing flapping throughout the flock appear to be the best defense against the disease.

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