Salmonella Control and Molting of Egg-Laying Flocks—Are They Compatible?[1]

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In the commercial egg industry induced molting is widely used to increase the productive life of a flock. Properly done, molting can lengthen a flock's productive life from 70 to 105 weeks of age and for an additional 25 to 30 weeks if a second molt is used.

The objective of recycling a layer flock is to reduce costs and maximize profits. Several methods have been used to induce a molt. Feed removal accompanied by alteration of the photoperiod has been the primary method to achieve an egg laying pause. Feed withdrawal causes a reduction in body weight of the hens resulting in flock molt. Removing feed until the hens have lost 25 to 30 percent of their body weight usually results in improved post-molt eggshell quality and egg numbers than when lesser weight losses are achieved.

Stress and Molting

One accepted practice used to minimize outbreaks of salmonellosis in layer flocks is the implementation of management practices that result in reduced stress. Stress is often the common catalyst in clinical outbreaks of salmonellosis in both layer and broiler flocks. Using the acceptable molting procedure of feed removal for 10 to 14 days to achieve weight loss unavoidably stresses the birds. Their immune system is therefore suppressed and the flock's susceptibility to salmonella infection is increased.

In the layer industry, preventing disease is important not only for those diseases that affect the flocks directly, but also those which the flock or their eggs may transmit to humans. Therefore, when implementing management programs to maximize the prevention and/or control of salmonella, especially Salmonella enteritidis (SE), the possible consequences of incorporating a molting program into an operation must be seriously considered based on recent research findings.

The stress resulting from an induced molt significantly depresses the cellular immune response in laying hens and will increase the severity of a concurrent intestinal SE infection. Molted birds shed significantly higher numbers of SE during a forced molt as compared to unmolted birds. The ceca and colon of the molting hens also have more severe inflammation than non-molted birds.

Hen age at the time when feed is removed to force a molt does not appear to have an effect on the shedding rate of SE. Very little difference exists among age groups of hens with regard to alterations in the severity of the SE infections in fasted birds. Fasted birds shed significantly more SE than fed hens, and molting causes an increase in the transmission of SE to uninfected hens housed in adjacent cages. Within 24 hours after the feed is removed from the hens there is an increase in the number of SE organisms within the digestive tract.

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Molting increases a hen's susceptibility to SE infection, and molting could conceivably alter the SE situation in a flock from that of a minor problem involving only a few birds to one where a large number of birds are affected. Thus, increased shedding of SE during a forced molt could likely increase the SE load in a layer house, making it more difficult to eliminate SE during clean-up and decontamination of a layer facility.

Mechanisms of Increased Susceptibility to SE Infection

There have been many proposed mechanisms that may be responsible for the increased susceptibility of molted laying hens to SE infection. One possibility is that molting causes a depression in a hen's cellular immunity. This reduces the number of helper T cells in circulation since dietary restriction is known to reduce immune responsiveness and to increase susceptibility to disease.

It is known that peristalsis is important in the prevention of intestinal colonization by disease organisms. Fasting may impair the protective function of peristalsis since it is known to be depressed upon food removal. Fasting also influences the normal protective microbial populations indigenous to the local environment.

No matter what specific or combination of factors are involved in causing increased susceptibility of laying hens to SE infection, the fact remains that laying hens undergoing a forced molt by feed removal are under stress and are more likely to become salmonella shedders as compared to non-molted hens.

Importance of Rodent Control

Since molted hens have an increased susceptibility to infection by SE from the environment, rodent control is essential, especially if molting is being considered as a management practice. Mice can be a significant amplifier of SE infection in a layer operation. These mice can shed large numbers of SE (up to 10^5 organisms per fecal pellet) in their feces. Under the best sanitary conditions the potential threat from SE always exists for the next flock if rodents are not controlled. Mice carrying very low numbers of SE could easily be a source of infection in a layer flock during molt. The infected molting hens could then serve as a second amplifier of SE infections, reinfecting the molted hens and mice with the disease organisms. If rodents are not controlled in large layer operations the prevention of salmonella, especially SE, is virtually impossible.

Summary

Induced molting of commercial layers is a common practice used in the poultry industry to extend a layer flock's productive life. Molting programs impose stress, and this, in turn, increases a flock's susceptibility to salmonella infection, especially from SE. Research continues to provide insights and information on the effects that various molting procedures, such as feed removal, have on the well-being of the hen. It may be possible to lessen the negative effects and the susceptibility of layers to salmonella infection once sufficient data have been collected on the interaction between molting procedures and stress. The potential benefits of extending flock productivity through forced molting should be weighed against the possibility of increased disease susceptibility caused by the stress brought on by feed removal.