Atlantic Poultry Research Institute

Lighting During Incubation in Combination with Sanitation of Hatching Eggs with Lysozyme

Dr. Bruce Rathgeber, Janice MacIsaac, Kayla Graham, Xujie Li

The ban of Category I antibiotics in 2014 imposed by Chicken Farmers of Canada has increased the urgency to develop management practices focused on bacterial control in the hatchery. Developing embryos and newly hatched chickens are especially susceptible to colonization by problematic bacteria. Research at Dalhousie University has indicated that application of a product based on the antimicrobial protein lysozyme from egg white to the shell surface of hatching eggs can reduce the ability of E. coli to enter and colonize the embryo. Additionally, this research has determined that the rate at which chickens hatch can be influenced by the provision of light during incubation, indicating that metabolism is potentially influenced by this change in environment. The objective of this study was to determine if provision of a photoperiod during incubation would interact with the application of lysozyme to provide added protection against invading bacteria and result in chicks more likely to thrive post-hatch.

There were a number of trials conducted in an effort to determine the impact of the spectrum of light used as well as the length of time the lights were on. Additionally, the application of lysozyme was conducted prior to incubation and/or at the point of transfer to the hatcher following 18 days of incubation.

In a study where the lights were on for various times in the last 3 days of hatching it was discovered that providing 18 hours of white LED light increased feed consumption in the first 6 h in the rearing environment compared to chicks hatched in the dark. However, providing 24 h of light had the opposite effect with chicks having a reduced feed consumption. Chicks provided 12 or 18 hours of light in the hatcher had greater 6 h post-placement weights. For broiler chickens the color of light was important. When light that was predominantly red was applied 12 h a day during incubation there was no impact on chick quality and subsequent growth performance.

There were interactions with the application of light and the use of lysozyme. When lysozyme was applied 18 days into incubation, this improved the quality of newly hatched chicks as indicated by an improvement in navel scores for chicks left in the dark. However, chicks from the hatching eggs that were sanitized with lysozyme at the start of incubation in the setter had lower 6 h post-placement weights that continued to be different when measured on day 14 and 25. This may indicate that the stage of embryo development influences the success of this type of sanitizer application. This also indicates that the level of lysozyme may need to be adjusted for the stage of embryo development.

The type of bird incubated is also important to consider. Commercial egg laying chicks were more susceptible to colonization by *E. coli* applied to the shell prior to incubation than broiler chicks. Application of red LED light during incubation increased the number of layer chicks with *E. coli* entering their yolk sacs. The opposite was true of broiler chicks hatched where no chicks were colonized by *E.coli* when incubated with a photoperiod.

It is clear from these trials that bird performance in incubation and post-hatch can be influenced by photoperiod and application of antimicrobial proteins. Further research is needed to determine the benefits of photoperiods during incubation and its effect on growth performance through to market age and to optimize the concentration of lysozyme as a sanitizing agents for hatching eggs.

Funding by: Canada/Nova Scotia Growing Forward 2 – Research Acceleration, Atlantic Agriculture Research and Innovation Initiative, Chicken Farmers of Nova Scotia