Hatchery Research Update

Poultry Research Centre **Factsheet #4** **November 21, 2007**

In This Issue

- The unique challenge of hatching egg sanitation
- A safe, environmentally friendly sanitizer
- But does it work?

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Testing a New Hatching Egg Sanitizer

- Lowering the number of bacteria on hatching eggs can improve hatchability and chick quality by reducing the number of contaminated eggs and the number of chicks that hatch with bacterial infections.
- Current industry practices for sanitizing hatching eggs involve fogging incubators with formaldehyde or hydrogen peroxide. However, chemicals like formaldehyde can be harmful to worker health.
- Electrolyzed oxidative water (EO water) is a non-toxic and fairly low-cost sanitizer that might be an alternative to current hatching egg sanitation methods. Research has shown that EO water is effective in killing bacteria such as *E. coli, Listeria,* and *Salmonella*.
- For hatching eggs it is not only important that sanitizers kill bacteria, but that the sanitizers do not damage the eggshell, the cuticle (protective protein coating on the egg shell), or have a negative effect on the health of the embryo. No research has evaluated the effect of acidic EO water on hatchability and chick quality.
- The goal of this study was to see if spraying acidic EO water on hatching eggs could reduce the number of bacteria on the eggs and improve hatchability and chick quality.

It Sounds Good – But Does It Kill Bacteria?

Experimental Approach: Broiler hatching eggs were collected from a commercial flock and randomly divided into two treatment groups: one group was sprayed with EO water (EO) and the other was not (Control). Fifteen eggs from each treatment were evaluated to determine the numbers of *E. coli, Salmonella* and total aerobic bacteria on each egg.

Results: *E. coli* and *Salmonella* were not detected on the eggs, regardless of whether or not they were sprayed with acidic EO water. This means that the eggshells were not contaminated with these specific bacteria, likely as a result of good management practices at the farm level. Spraying the eggs with acidic EO water did decrease the number of total aerobic bacteria (bacteria which need oxygen to grow) found on the eggshells (see graph on next page). This means that acidic EO water has the ability to be an effective eggshell sanitizer.

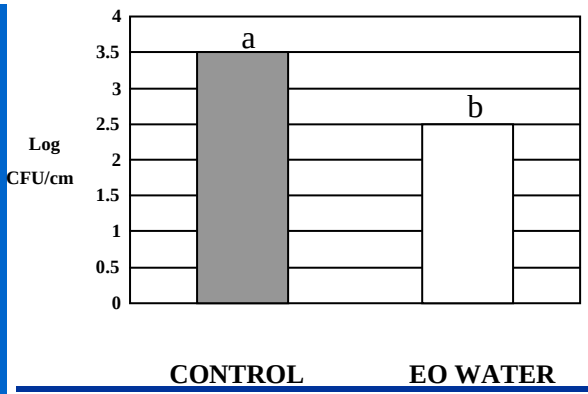
Ongoing Research Projects:

The influence of genetics on embryo metabolism
Managing genetic strains for differences in embryo growth and heat production.

Chick quality and egg size
Is it flock age or simply egg size that affects chick quality?

Using infrared thermograpy to assess chick quality
Testing a new and innovative method for detecting navel infections at hatch.

Rooster age influence on chick quality
Investigating the role of the broiler breeder male in broiler hatchability and chick quality.



The Bottom Line: Spraying eggs with acidic EO water can significantly reduce the total number of bacteria on the surface of the eggshell.

In the graph to the left, values with the letter "a" are statistically different than values with the letter "b".

What About Hatchability?

Experimental Approach: Eggs from EO (sprayed) and Control (unsprayed) groups were incubated and hatched at the Alberta Hatching Egg Producers Hatchery at the University of Alberta. All hatched chicks were weighed and evaluated for chick quality. Any eggs that did not hatch were broken open to determine if the egg was fertile, and if fertile, the approximate day of incubation when the embryo died.

Results: The eggs sprayed with EO water lost the same amount of moisture during incubation as those eggs that were not sprayed. This was an important result, since it helps to confirm that spraying eggshells with acidic EO water did not damage the eggshell cuticle (the protective coating on the outside of the eggshell). Eggs with damaged cuticles, or cuticles that were completely removed, would lose more water than eggs with undamaged cuticles. There were no differences in percent embryonic deaths, hatchability or chicks culled at hatching between the EO and Control eggs. This means that acidic EO water does not appear to harm the developing embryo.

The Bottom Line: Spraying hatching eggs with EO water does not harm the developing embryo or the eggshell cuticle.

The Long Run – Impact on Broiler Chick Quality

Experimental Approach: All saleable chicks hatched were placed in floor pens and grown out for 39 days. Mortality and feed consumption were recorded throughout the grow-out period, and the birds were weighed on day 39 before being shipped to a commercial processing plant for slaughter.

Results: Broiler mortality measured at 7 and 14 days after hatching was lower in chicks hatched from the EO (sprayed) eggs than in chicks hatched from Control eggs (see table on next page). This shows that while no difference in chick quality between

Research Sponsors:

- Maple Leaf Poultry, Wetaskiwin Hatchery
- Alberta Livestock Industry Development Fund (ALIDF)
- Profound Technologies, Inc.

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EO and Control chicks was observed on the day of hatch, the EO treatment may have provided some benefit to the chicks, reducing broiler mortality early in the grow-out period.
From 21 to 39 days of age there were no significant differences in mortality between broilers from Control and EO groups.

	Cumulative Mortality (%)					
Treatment	Day 7	Day 14	Day 21	Day 28	Day 35	Day 39
Control	1.50[a]	1.88[a]	3.00[a]	4.25[a]	6.00[a]	7.25[a]
EO	0.13[b]	0.38[b]	1.63[a]	2.75[a]	4.00[a]	5.13[a]

In the above table and all other tables in this report, values with the letter "a" are statistically different than values in the same column with the letter "b".

There were no differences in 39 day broiler weight between Control and EO broilers. There were also no differences in feed conversion ratio between broiler from eggs sprayed with acidic EO water and broilers from Control eggs over the entire 39 day grow-out period.

The Bottom Line: Spraying hatching eggs with acidic EO water resulted in the lower mortality in broilers from 0 to 14 days of age. Spraying eggs with EO water did not affect final broiler body weights at 39 days of age.

Looking to the Future - Industry Implications

Even though spraying hatching eggs with acidic EO water did not improve hatchability, it was important to determine that EO water does not have a negative effect on hatching eggs or chicks. Spraying hatching eggs with EO water did not harm the embryos.

The reduced early broiler mortality seen in chicks hatched from eggs sprayed with acidic EO water shows that there may be benefits to this treatment which last into the broiler grow-out period.

The lowered levels of bacteria on eggs sprayed with EO water have important implications: Acidic EO may provide a non-toxic, effective egg sanitizer and a sanitizer for use in hatcheries.

This research is part of a continuing embryology and chick quality research program at the University of Alberta.

This report has been produced in keeping with our goal to connect with industry on a continuous manner, both in the receiving of input and the transferring of knowledge.

This factsheet prepared by E. O'Dea