The Influence of Light & Volume on Coccidiosis Vaccine Uptake in the Hatchery

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Hatchery Vaccine Uptake

Proper mass application is critical to the success of any broiler vaccination program.
Hatchery Vaccine Uptake

All live coccidiosis vaccines require oral ingestion.

Hatchery Vaccine Uptake

University of Delaware
Lasher Lab Vaccine Uptake Study
Spray Application was best.

Intestinal Health Magazine, Pages 7-8, Volume 3, 2009
Hatchery Vaccine Uptake

University of Delaware
Lasher Lab Vaccine Uptake Study
Sprayer vs. In ovo

<table>
<thead>
<tr>
<th>Route</th>
<th>% Vaccine Take</th>
</tr>
</thead>
<tbody>
<tr>
<td>In ovo</td>
<td>25 %</td>
</tr>
<tr>
<td>Sprayer</td>
<td>88%</td>
</tr>
<tr>
<td>Gavaged (Control)</td>
<td>100%</td>
</tr>
</tbody>
</table>

Based on *individual* bird shed rates 5 to 8 days post-hatch.

*Intestinal Health Magazine, Pages 7-8, Volume 3, 2009*

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Hatchery Vaccine Uptake

Spray Cabinets

Can we Impact Vaccine Uptake Further?
Hatchery Vaccine Uptake

"Increasing relative photointensity at the time of spray application may provide a method of increasing ingestion of spray-applied products.


Foster Farms PNW
Hatchery Vaccine Uptake

The following spray cabinet studies are based on a population of 15 to 45 birds per treatment pen or cage.

All treatments done in triplicate.
Hatchery Vaccine Uptake

Chick Room Light Intensity

<table>
<thead>
<tr>
<th>Exposure Time</th>
<th>Light Intensity</th>
<th>% Change of Oocyst Shed</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 minutes</td>
<td>88.0 Foot Candle (High)</td>
<td>58% greater shed than control.</td>
</tr>
<tr>
<td>20 minutes</td>
<td>21.0 Foot Candle (Medium)</td>
<td>Control</td>
</tr>
<tr>
<td>20 minutes</td>
<td>0.6 Foot Candle (Low)</td>
<td>52% less shed than control.</td>
</tr>
</tbody>
</table>

Merial Study 0511

Hatchery Vaccine Uptake

Timed Chick Room Light Intensity

Post Spray Cabinet Chick Holding Area

<table>
<thead>
<tr>
<th>Exposure Time Post Spray</th>
<th>Light Intensity</th>
<th>% Comparison of E. maxima Oocyst Shed</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 minutes</td>
<td>80 FC</td>
<td>59% shed rate of gavaged control group.</td>
</tr>
<tr>
<td>10 minutes</td>
<td>80 FC</td>
<td>81% shed rate of gavaged control group.</td>
</tr>
<tr>
<td>15 minutes</td>
<td>80 FC</td>
<td>85% shed rate of gavaged control group.</td>
</tr>
<tr>
<td>20 minutes</td>
<td>80 FC</td>
<td>100% shed rate of gavaged control group.</td>
</tr>
<tr>
<td>Control</td>
<td>Gavaged</td>
<td>100% shed rate control group.</td>
</tr>
</tbody>
</table>

Merial Study 0911
Hatchery Vaccine Uptake
Sprayer Light Source

Inspired by Caldwell Paper

Hatchery Vaccine Uptake
Intermittent Timed Chick Room Light Intensity
Post Spray Cabinet Chick Holding Area

<table>
<thead>
<tr>
<th>Exposure Time Post Spray</th>
<th>Light Intensity</th>
<th>% Comparison of <em>E. maxima</em> Oocyst Shed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous 5 minutes</td>
<td>300 FC</td>
<td>48% shed rate of gavaged control group.</td>
</tr>
<tr>
<td>Continuous 10 minutes</td>
<td>300 FC</td>
<td>92% shed rate of gavaged control group.</td>
</tr>
<tr>
<td>Intermittent 8 minutes</td>
<td>300 FC</td>
<td>100% shed rate of gavaged control group.</td>
</tr>
<tr>
<td>Control</td>
<td>Gavaged</td>
<td>100% shed rate control group.</td>
</tr>
</tbody>
</table>

Merial Study 1111
### Hatchery Vaccine Uptake

#### Sprayer Light Source

Coccidia Oocyst Shed Comparison of *E. maxima*

<table>
<thead>
<tr>
<th>Sprayer Light Intensity</th>
<th>Exposure Time Post Spray</th>
<th>Post Light Intensity</th>
<th>% Comparison of <em>E. maxima</em> Oocyst Shed</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 FC</td>
<td>Continuous 10 minutes</td>
<td>25 FC</td>
<td>27% of gavaged control group.</td>
</tr>
<tr>
<td>300 FC</td>
<td>Continuous 10 minutes</td>
<td>25 FC</td>
<td>85% of gavaged control group.</td>
</tr>
<tr>
<td>450 FC</td>
<td>Continuous 10 minutes</td>
<td>25 FC</td>
<td>97% of gavaged control group.</td>
</tr>
<tr>
<td>600 FC</td>
<td>Continuous 10 minutes</td>
<td>25 FC</td>
<td>69% of gavaged control group.</td>
</tr>
<tr>
<td>Control</td>
<td>Gavaged</td>
<td>N / A</td>
<td>100% shed rate control group.</td>
</tr>
</tbody>
</table>

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#### Hatchery Vaccine Uptake

**Light Stimulation Impact on Necrotic Enteritis**

Merial Study 0911
Merial Study 0612
Hatchery Vaccine Uptake

Sprayer Light Stimulation

Oocyst Shed Pattern by Days & % Necrotic Enteritis

<table>
<thead>
<tr>
<th>Sprayer Light Intensity</th>
<th>Post Sprayer Continuous Light Intensity</th>
<th>D14</th>
<th>D18</th>
<th>D21</th>
<th>D28</th>
<th>D35</th>
<th>NE % Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-vaccinated</td>
<td>25 FC</td>
<td>2%</td>
<td>5%</td>
<td>6%</td>
<td>9%</td>
<td>78%</td>
<td>3.4%</td>
</tr>
<tr>
<td>300 FC</td>
<td>25 FC</td>
<td>5%</td>
<td>29%</td>
<td>34%</td>
<td>28%</td>
<td>14%</td>
<td>4.0%</td>
</tr>
<tr>
<td>450 FC</td>
<td>25 FC</td>
<td>15%</td>
<td>63%</td>
<td>5%</td>
<td>11%</td>
<td>6%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Oral Gavaged</td>
<td>25 FC</td>
<td>55%</td>
<td>23%</td>
<td>5%</td>
<td>10%</td>
<td>7%</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

All 3 Emeria species represented.
All groups Clostridium challenged at 19, 20 & 21 days

Merial Study 060712

Light Intensity Effect on Hatchery Vaccine Uptake

Conclusions

Enhanced light intensity has a positive effect on spray vaccine uptake.

Post spray light stimulation appears to be the most beneficial in vaccine uptake.

Time is not a constraint. Can be accomplished in 10 minutes or less.

Proper vaccine uptake tightens oocysts shed pattern.

A positive impact on necrotic enteritis mortality.
Impact of Volume on Hatchery Vaccine Uptake

Hatchery Vaccine Uptake Volume Study

Based on OPGF Days 4-8 post spray.

<table>
<thead>
<tr>
<th>Volume</th>
<th>25 mls</th>
<th>30 mls</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 ml s (Control)</td>
<td>+33 %</td>
<td>+ 109 %</td>
</tr>
</tbody>
</table>

All 3 Emeria species represented.

Merial Study 0812
Hatchery Vaccine Uptake

Volume Impact on *E. maxima*

<table>
<thead>
<tr>
<th>Vaccination Group</th>
<th>Volume</th>
<th>Lesion Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Control</td>
<td>N/A</td>
<td>2.7</td>
</tr>
<tr>
<td>Vaccinated 21 ml</td>
<td></td>
<td>0.8</td>
</tr>
<tr>
<td>Vaccinated 25 ml</td>
<td></td>
<td>0.7</td>
</tr>
<tr>
<td>Vaccinated 30 ml</td>
<td></td>
<td>0.4</td>
</tr>
<tr>
<td>Vaccinated Oral</td>
<td></td>
<td>0.5</td>
</tr>
<tr>
<td>Negative Control</td>
<td>N/A</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Challenged Groups Challenged at Day 28. Lesions evaluated Day 34

Merial Study 0213 A
Hatchery Vaccine Uptake

Oocyst Shed Pattern by Days

<table>
<thead>
<tr>
<th>Vaccination Group</th>
<th>D14</th>
<th>D18</th>
<th>D21</th>
<th>D28</th>
<th>D35</th>
<th>NE % Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-vaccinated</td>
<td>0.7</td>
<td>2.6</td>
<td>49.1</td>
<td>32.3</td>
<td>15.3</td>
<td>3.9%</td>
</tr>
<tr>
<td>21 ml</td>
<td>20.0</td>
<td>19.0</td>
<td>2.3</td>
<td>27.0</td>
<td>11.0</td>
<td>1.8%</td>
</tr>
<tr>
<td>25 ml</td>
<td>11.0</td>
<td>46.0</td>
<td>14.0</td>
<td>23.0</td>
<td>6.0</td>
<td>1.1%</td>
</tr>
<tr>
<td>30 ml</td>
<td>16.0</td>
<td>35.0</td>
<td>30.0</td>
<td>11.0</td>
<td>8.0</td>
<td>0.7%</td>
</tr>
<tr>
<td>Oral</td>
<td>34.0</td>
<td>36.0</td>
<td>18.0</td>
<td>7.0</td>
<td>5.0</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

All 3 Emeria species represented. All groups placed on built-up litter. All groups Clostridium challenged at days 19, 20 & 21.

Merial Study 0213 B

Hatchery Vaccine Uptake

Volume Study

Chick Dry Time. Room Temperature 80°F

<table>
<thead>
<tr>
<th>Volume</th>
<th>21 mls</th>
<th>25 mls</th>
<th>30 mls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Time (Minutes)</td>
<td>10-15</td>
<td>15-20</td>
<td>20-25</td>
</tr>
</tbody>
</table>

Merial Study 0213 A & B

Merial Field Observations
Hatchery Vaccine Uptake
Field Observations

% First Week Mortality

<table>
<thead>
<tr>
<th></th>
<th>Pre-Vaccine</th>
<th>21 mls</th>
<th>30 mls</th>
<th>Post Vaccine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complex 1</td>
<td>0.93</td>
<td>0.90</td>
<td>0.85</td>
<td>0.80</td>
</tr>
<tr>
<td>Complex 2</td>
<td>N / A</td>
<td>1.03</td>
<td>0.84</td>
<td>N / A</td>
</tr>
<tr>
<td>Complex 3</td>
<td>N / A</td>
<td>0.80</td>
<td>0.80</td>
<td>N / A</td>
</tr>
</tbody>
</table>

Reported Field Data 2012

Volume Effect on Hatchery Vaccine Uptake

Conclusions
Increased volume has a positive effect on spray vaccine uptake.
Birds dried in 25 minutes or less.
No negative impact based on % FWM.
Proper vaccine uptake tightens oocyts shed pattern.
A positive impact on necrotic enteritis mortality.
Thank You