# Summary of Studies Supporting USDA Product Licensure

| | |
|---|---|
| Establishment Name | Boehringer Ingelheim Animal Health USA Inc. |
| USDA Vet Biologics Establishment Number | 124 |
| Product Code | 4847.A0 |
| True Name | Encephalomyelitis-Rhinopneumonitis-Influenza Vaccine, Eastern & Western & Venezuelan, Killed Virus, Tetanus Toxoid |
| Tradename(s) / Distributor or Subsidiary (if different from manufacturer) | Vetera 6xp - No distributor specified |
| Date of Compilation Summary | November 27, 2020 |

**Disclaimer: Do not use the following studies to compare one product to another. Slight differences in study design and execution can render the comparisons meaningless.**

| | |
|---|---|
| **Study Type** | Efficacy |
| **Pertaining to** | Clostridium tetanus |
| **Study Purpose** | Demonstration of efficacy against Clostridium tetanus |
| **Product Administration** | One dose, administered intramuscularly |
| **Study Animals** | 10 guinea pigs (10 vaccinates) |
| **Challenge Description** | Not applicable |
| **Interval observed after challenge** | Not applicable |
| **Results** | 6 weeks after the injection, vaccinate serum samples were collected and pooled, then tested for antitoxin content by indirect Enzyme-Linked Immunosorbent Assay.<br><br>A satisfactory value which met the requirements per 9 CFR 113.114(c) was achieved. |
| **USDA Approval Date** | February 15, 2011 |

| | |
|---|---|
| **Study Type** | Efficacy |
| **Pertaining to** | Eastern equine encephalomyelitis |
| **Study Purpose** | Demonstration of efficacy against Eastern equine encephalomyelitis |
| **Product Administration** | Two doses, administered intramuscularly, 14 to 21 days apart |
| **Study Animals** | 12 guinea pigs (10 vaccinates, 2 controls) |
| **Challenge Description** | Not applicable |
| **Interval observed after challenge** | Not applicable |
| **Results** | Serum samples were tested by a plaque reduction, serum neutralization test, 14 to 21 days after the second injection.<br><br>Vaccinates and controls were evaluated in terms of Eastern equine encephalomyelitis per the criteria in 9 CFR 113.207(b) and the requirements were met. |
| **USDA Approval Date** | February 15, 2011 |

| | |
|---|---|
| **Study Type** | Efficacy |
| **Pertaining to** | Venezuelan equine encephalomyelitis |
| **Study Purpose** | Demonstration of efficacy against Venezuelan Equine Encephalomyelitis |
| **Product Administration** | Two doses, administered intramuscularly, 14 to 21 days apart |
| **Study Animals** | 12 guinea pigs (10 vaccinates, 2 controls) |
| **Challenge Description** | Not applicable |
| **Interval observed after challenge** | Not applicable |
| **Results** | Serum samples were tested by a plaque reduction, serum neutralization test, 14 to 21 days after the second injection.<br><br>Vaccinates and controls were evaluated in terms of Venezuelan equine encephalomyelitis per the criteria in 9 CFR 113.207(b) and the requirements were met. |
| **USDA Approval Date** | February 15, 2011 |

| | |
|---|---|
| **Study Type** | Efficacy |
| **Pertaining to** | Western equine encephalomyelitis |
| **Study Purpose** | Demonstration of efficacy against Western equine encephalomyelitis |
| **Product Administration** | Two doses, administered intramuscularly, 14-21 days apart |
| **Study Animals** | 12 guinea pigs (10 vaccinates, 2 controls) |
| **Challenge Description** | Not applicable |
| **Interval observed after challenge** | Not applicable |
| **Results** | Serum samples were tested by a plaque reduction, serum neutralization test, 14 days after the second injection.<br><br>Vaccinates and controls were evaluated in terms of Western equine encephalomyelitis per the criteria in 9 CFR 113.207(b) and the requirements were met. |
| **USDA Approval Date** | February 15, 2011 |

<table>
<tr><td>Study Type</td><td>Efficacy</td></tr>
<tr><td>Pertaining to</td><td>Equine herpesvirus type 1 (EHV-1)</td></tr>
<tr><td>Study Purpose</td><td>Demonstration of efficacy against respiratory disease caused by EHV-1</td></tr>
<tr><td>Product Administration</td><td>Two doses, administered intramuscularly, 21 days apart</td></tr>
<tr><td>Study Animals</td><td>40 horses (20 vaccinates, 20 controls), 4-5 months of age</td></tr>
<tr><td>Challenge Description</td><td>Equine herpesvirus type 1 administered 15 days post-final vaccination</td></tr>
<tr><td>Interval observed after challenge</td><td>Horses were observed daily for 14 days post-challenge</td></tr>
<tr><td>Results</td><td>See raw data on following pages.<br><br>The horses were assessed for the presence of nasal discharge as signs of respiratory disease. The severity of nasal discharge was classified as “normal”, “mild”, or “moderate” according to the following classification of the nasal scores.<br><br>
<table>
<tr><th>Disease status</th><th>MaximumNasal Score</th></tr>
<tr><td>Normal</td><td>0 or 1</td></tr>
<tr><td>Mild</td><td>1.5 or 2</td></tr>
<tr><td>Moderate</td><td>4 or 6</td></tr>
</table>
<br>The number of horses in each category were:<br><br>
<table>
<tr><th></th><th>Normal</th><th>Mild</th><th>Moderate</th></tr>
<tr><td>Control</td><td>0</td><td>10</td><td>10</td></tr>
<tr><td>Vaccine</td><td>6</td><td>11</td><td>3</td></tr>
</table>
</td></tr>
<tr><td>USDA Approval Date</td><td>January 28, 2009</td></tr>
</table>

## Nasal Discharge:

Day Postchallenge

| Treatment | ID | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Controls (20 horses) | 1 | | | | | 1.5 | | | 1.5 | 1.5 | 1 | 1.5 | | | | |
| | 2 | | | | | | 1.5 | | 1.5 | 1.5 | 1 | 1.5 | 1.5 | 1 | | |
| | 3 | | | | | | 1.5 | | | 1.5 | 2 | | | 1.5 | | |
| | 4 | | | 1 | | 2 | 1.5 | | 1.5 | 1.5 | 1.5 | 1.5 | | | | 1.5 |
| | 5 | | | | 2 | 2 | 2 | 1 | 4 | 2 | 2 | 1.5 | 1.5 | | 1.5 | |
| | 6 | | | 1 | | 4 | 6 | 4 | 4 | 4 | 4 | 2 | 2 | 2 | | |
| | 7 | | | | | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 2 | 4 | 1 | | 1 | 1 |
| | 8 | | | | | | | | 1.5 | 2 | 2 | 4 | 1.5 | 4 | 2 | 1.5 |
| | 9 | | | | 1 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 2 | 1.5 | | | | |
| | 10 | | | 1 | | | 1 | | 1.5 | 1.5 | 2 | 4 | 4 | | 1.5 | 1.5 |
| | 11 | | | | | | 1.5 | 1.5 | 1.5 | | 2 | | 1.5 | 1.5 | 1.5 | |
| | 12 | | | | | | 1.5 | 1.5 | | 2 | | | | | | 1.5 |
| | 13 | | | | | | 2 | 1.5 | 1.5 | 2 | 2 | 2 | 1.5 | 1.5 | 1.5 | 4 |
| | 14 | | | | 1.5 | 2 | | 1.5 | | 1.5 | 1.5 | 1.5 | | | 2 | 2 |
| | 15 | | | | 1 | 2 | 1.5 | 1 | 1.5 | | 4 | | 1 | | 4 | 1.5 |
| | 16 | | | | | 1.5 | 1.5 | 2 | 2 | 2 | 2 | 1.5 | 1 | 1 | 4 | 2 |
| | 17 | | | | | 1.5 | | 1 | | | 1.5 | 2 | | 1.5 | 1.5 | |
| | 18 | | | | | | 1 | 1.5 | 1.5 | 4 | 4 | 2 | 1.5 | 4 | 1.5 | 2 |
| | 19 | | | | 1 | 2 | 1.5 | | 1.5 | 2 | 4 | 1 | 1.5 | | 1 | |
| | 20 | | | | | | 1.5 | 1.5 | 2 | 1.5 | 2 | | | | 1.5 | |
| Vaccinates (20 horses) | 1 | | | | | 1 | | 1 | | | | 1.5 | | | | |
| | 2 | | | | 1 | | | | | | | | | | | |
| | 3 | | | | | | 1 | 1.5 | 4 | | 1.5 | 1.5 | | | 1 | |
| | 4 | | | | 1 | | | | | | 2 | 1 | | | | |
| | 5 | | | | 1 | | | | 1 | 1 | | | | | | |
| | 6 | | | | 1 | 1.5 | | | | | | 1.5 | 2 | 2 | 2 | 1.5 |
| | 7 | | | | | | | 2 | | | | | 1.5 | | | |
| | 8 | | | | | | | | | | | | | | | |
| | 9 | | | | | 2 | 1.5 | 2 | 2 | 6 | 2 | 1.5 | | 1.5 | 4 | 2 |
| | 10 | | | | | | | | 1 | | | | 1 | 1.5 | | |
| | 11 | | | | 1 | | 1.5 | | 2 | 2 | 1 | 1.5 | | | | |
| | 12 | | | | 1 | | 1.5 | 2 | 1.5 | 2 | 2 | 2 | | 2 | 2 | 1.5 |
| | 13 | | | | 1.5 | | | | | | 1.5 | 1.5 | | | 1.5 | 1.5 |
| | 14 | | | | | | | 1 | 1 | | | 1 | | | 1.5 | |
| | 15 | | | | 1 | | | | | | | | | | | |
| | 16 | | | | 1 | | 1.5 | 1.5 | 1 | | | 1.5 | | | | |
| | 17 | | | | | | | | | | | | | | | |
| | 18 | | | | | | 1 | | | 1.5 | | 1.5 | | | | |
| | 19 | | | | | | | | | | | | | | 6 | 2 |
| | 20 | | | | | | | | | | | | | | | |

## Scoring:

Blank is 0 = none;
1 = slight serous, as may be observed in both normal and diseased horses;
1.5 = very slight mucopurulent discharge;
2 = moderate clear serous discharge, or slight mucopurulent discharge;
3 = abundant serous discharge;
4 = moderate mucopurulent discharge;
6 = heavy mucopurulent discharge

<table>
<tr><td>Study Type</td><td>Efficacy</td></tr>
<tr><td>Pertaining to</td><td>Equine herpesvirus type 4 (EHV-4)</td></tr>
<tr><td>Study Purpose</td><td>Demonstration of efficacy against respiratory disease caused by EHV-4</td></tr>
<tr><td>Product Administration</td><td>Two doses, administered intramuscularly, 21 days apart</td></tr>
<tr><td>Study Animals</td><td>40 horses (20 vaccinates, 20 controls), 4 months of age</td></tr>
<tr><td>Challenge Description</td><td>Equine herpresvirus type 4 administered 14 days post-final vaccination</td></tr>
<tr><td>Interval observed after challenge</td><td>Horses were observed daily for 14 days post-challenge</td></tr>
<tr><td>Results</td><td>See raw data on following pages.<br><br>The horses were assessed for the presence of nasal and ocular discharge as signs of respiratory disease. The severity of the combined findings (nasal and ocular discharge) were classified as “mild” or “moderate” according to the following classification:<br><br>
<table>
<tr><th>Disease status</th><th>Nasal score</th><th>Ocular score</th></tr>
<tr><td>Normal = 0</td><td>0 or 1</td><td>0 or 1</td></tr>
<tr><td>Mild = 1</td><td>0 or 1</td><td>2</td></tr>
<tr><td>Mild = 1</td><td>1.5, 2, or 3</td><td>any</td></tr>
<tr><td>Moderate = 2</td><td>4 or 6</td><td>any</td></tr>
</table>
<br>Moderate respiratory disease was observed in 8/20 placebo controls and 1/20 vaccinated horse, and mild disease was observed in 12/20 placebo controls and 17/20 vaccinated horses.<br><br>None of the placebo controls remained healthy following challenge, whereas 2 vaccinates showed no signs of respiratory disease.</td></tr>
<tr><td>USDA Approval Date</td><td>May 31, 2011</td></tr>
</table>

**Ocular Discharge:**

| | | Day Postchallenge | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Treatment** | **Animal** | **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |
| **Controls** | 1 | | | | | | | | 2 | | 2 | 2 | 2 | | 2 | 2 |
| | 2 | | | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | |
| | 3 | | | | 2 | 2 | | 2 | 2 | 2 | | 2 | 2 | 2 | 2 | 2 |
| | 4 | | | | 2 | 2 | 2 | 2 | 2 | | 2 | 2 | 2 | | 2 | |
| | 5 | | | | | 2 | | | | | 2 | | | 2 | 2 | 2 |
| | 6 | | | | 2 | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | |
| | 7 | | | | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | | 2 | | 2 |
| | 8 | | | | 2 | | 2 | 2 | | 2 | | | | | | |
| | 9 | | | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 10 | | | | 2 | 2 | 2 | 2 | 2 | 2 | | 2 | 2 | 2 | 2 | |
| | 11 | | | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 12 | | | | | | | | | | | | 2 | | 2 | |
| | 13 | | | | | | | | | | | | | | | |
| | 14 | | | | 2 | 2 | 2 | 2 | 2 | | 2 | 2 | 2 | 2 | | 2 |
| | 15 | | | | | 2 | 2 | 2 | | 2 | 2 | 2 | 2 | | | |
| | 16 | | | | | | | 2 | | 2 | 2 | 2 | 2 | | | |
| | 17 | | | | | 2 | | 2 | | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 18 | | | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | | |
| | 19 | | | | 2 | 2 | 2 | 2 | | | 2 | | | | 2 | 2 |
| | 20 | | | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | | | | |
| **Vaccinates** | 1 | | | | | | | | | | | 2 | 2 | 2 | | |
| | 2 | | | | | 2 | | | | | | | | | | |
| | 3 | | | | | | 2 | | 2 | 2 | | | | 2 | 2 | 2 |
| | 4 | | | | 2 | | | 2 | | | 2 | | | | | |
| | 5 | | | | | | | | 2 | | | | | | | 2 |
| | 6 | | | | | | | | | 2 | 2 | | | | | |
| | 7 | | | | | | 2 | 2 | | | | | | | | |
| | 8 | | | | | 2 | 2 | 2 | 2 | | 2 | | | | | |
| | 9 | | | | | | | | | | | | | | | 2 |
| | 10 | | | | | | | 2 | | | | | 2 | | 2 | 2 |
| | 11 | | | | | | | | | | | | | | | |
| | 12 | | | | | | | | | | 2 | 2 | 2 | | | 2 |
| | 13 | | | | | 2 | 2 | | 2 | | | | | 2 | 2 | 2 |
| | 14 | | | | | | | | | | | | | | | |
| | 15 | | | | | | 2 | 2 | | | | | | | | |
| | 16 | | | | | | | | | | | | | | | |
| | 17 | | | | 2 | | | 2 | 2 | 2 | | 2 | | 2 | 2 | 2 |
| | 18 | | | | | | | | | 2 | | 2 | | 2 | 2 | |
| | 19 | | | | | | | | | | | | | | | |
| | 20 | | | | | | | | | | | | | | | |

**Scoring:**
Blank is 0=none
1=mild or moderate
2=severe

**Nasal Discharge:** Day Postchallenge

Day Postchallenge

| Treatment | Animal | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Controls | 1 | | | | | 1 | 1 | | | 1 | 2 | 3 | | 3 | | 3 | |
| | 2 | | | | | 2 | 3 | 3 | 2 | 2 | 3 | 3 | 2 | 4 | 3 | 3 | 2 |
| | 3 | | | | | 3 | 3 | | 2 | 4 | | | 3 | 3 | 2 | 2 | |
| | 4 | | | | | | 4 | 4 | 3 | 3 | 4 | 3 | 3 | | | 2 | 2 |
| | 5 | | | | | | 2 | 3 | 3 | 3 | | 3 | 2 | 2 | | 2 | 3 |
| | 6 | | | | | | | 3 | | 2 | 4 | 3 | 3 | 2 | 3 | 2 | |
| | 7 | | | | | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 2 | | 2 | 2 |
| | 8 | | | | | | | | | 2 | | 2 | | | | | |
| | 9 | | | | | | | | 2 | 2 | 3 | 2 | 2 | 2 | 3 | | |
| | 10 | | | | | 3 | 4 | 3 | 3 | 3 | 2 | | 2 | 2 | 2 | 2 | 2 |
| | 11 | | | | | | | | | | | | | | | | 1 |
| | 12 | | | | | | | 3 | | 2 | 2 | 2 | | | | 3 | 3 |
| | 13 | | | | | | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | | | |
| | 14 | | | | | 2 | 3 | 4 | 4 | 2 | 4 | 2 | 4 | 3 | 4 | 3 | |
| | 15 | | | | | 1 | | 3 | 3 | 3 | 3 | | 3 | 3 | | | 2 |
| | 16 | | | | | 3 | 3 | 3 | 4 | 2 | 4 | 4 | 3 | 4 | 2 | 2 | 2 |
| | 17 | | | | | | 1 | | 2 | 2 | 3 | 2 | | 3 | 3 | | |
| | 18 | | | | | 2 | | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 |
| | 19 | | | | | | | 1 | 4 | 2 | 3 | | 3 | | | 2 | 3 |
| | 20 | | | | | 2 | | | 2 | 2 | | 3 | | 2 | 2 | 2 | |
| Vaccinates | 1 | | | | | | | | | 2 | | | | | 2 | 3 | |
| | 2 | | | | | | | | | | | | | | | | |
| | 3 | | | | | | | | | | 1 | 2 | | | | 3 | |
| | 4 | | | | | 1 | | | | | | | | | | | |
| | 5 | | | | | | | | | 2 | | | | 3 | | | 2 |
| | 6 | | | | | | | | | | | 3 | | | | | |
| | 7 | | | | | | 1 | | | | | | | | | | |
| | 8 | | | | | | | | 2 | 3 | 1 | 3 | | | | | |
| | 9 | | | | | | | | | | | | 1 | | | | 2 |
| | 10 | | | | | | | | | | | 3 | | 2 | | | |
| | 11 | | | | | | | | | 2 | | | | | | | |
| | 12 | | | | | | | | | 3 | 2 | 3 | 1 | 3 | | | 2 |
| | 13 | | | | | | | | 1 | 3 | | | | 2 | 2 | 2 | |
| | 14 | | | | | | | | | | 2 | | | | 2 | | |
| | 15 | | | | | | | | | 2 | | | | | | | |
| | 16 | | | | | | | | | | | | 1 | | | | |
| | 17 | | | | | 2 | | | | | 3 | | | | 3 | 2 | |
| | 18 | | | | | | | | | | 4 | 2 | | 2 | | 2 | |
| | 19 | | | | | | | | | | | | | | | | |
| | 20 | | | | | | | | | 2 | | | 3 | 3 | | | |

**Scoring:**

Blank is 0 = none

1 = slight clear serous, as may be observed in both normal and diseased horses;

1.5 = very slight mucopurulent discharge, one or both nostrils;

2 = moderate clear serous discharge, easily seen in one or both nostrils;

3 = abundant clear serous discharge typically seen only in diseased horses;

4 = moderately mucopurulent, in large quantities in both nostrils;

5 = heavy mucopurulent discharge in large amounts in both nostrils

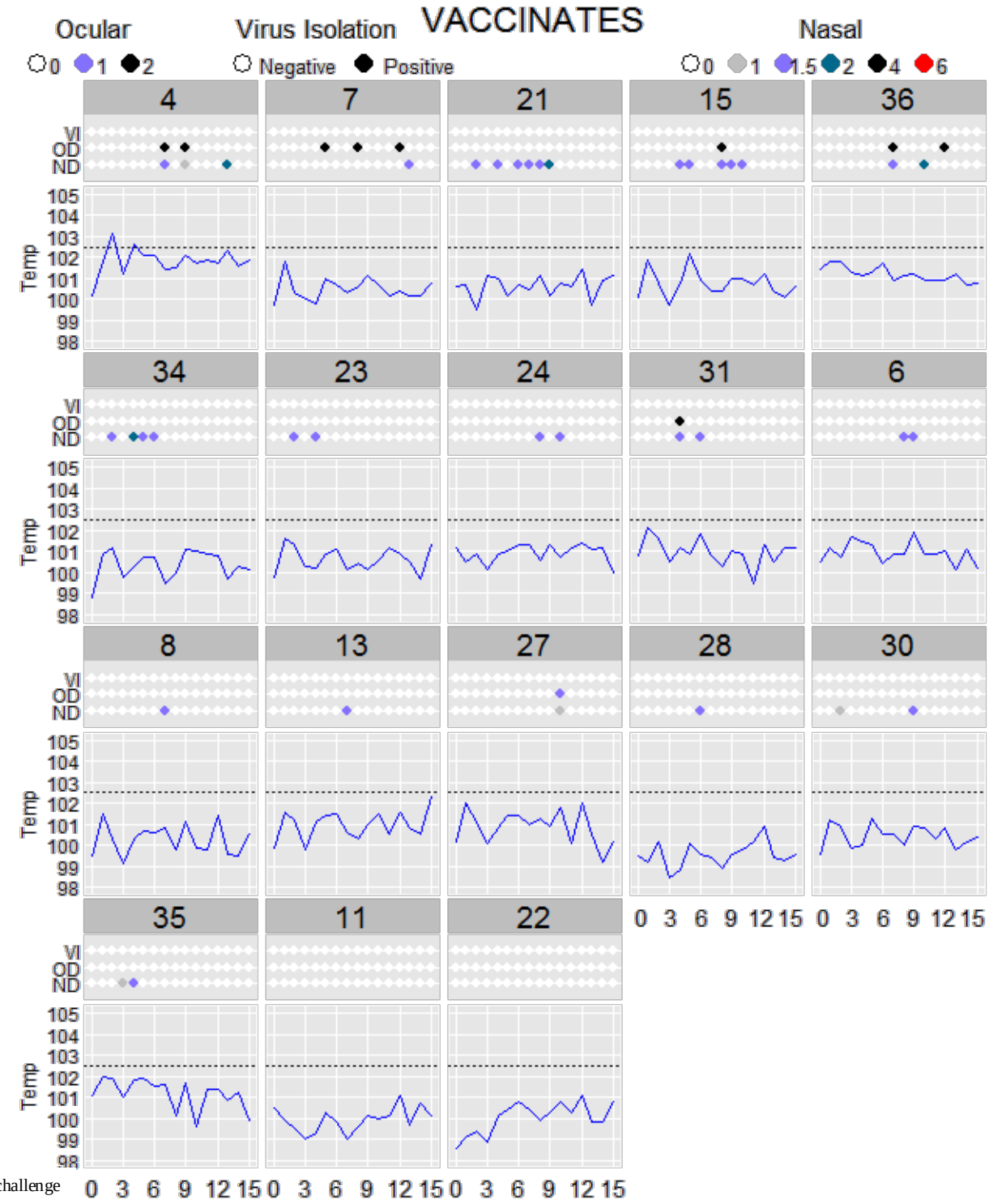
| | |
|---|---|
| **Study Type** | Efficacy |
| **Pertaining to** | Equine influenza virus |
| **Study Purpose** | Demonstration of 6-month duration of immunity against respiratory disease caused by equine influenza |
| **Product Administration** | Two doses, administered intramuscularly, 21 days apart. Vaccinates received test product, and controls received adjuvanted diluent. |
| **Study Animals** | 30 horses (20 vaccinates, 10 controls), 5-6 months of age |
| **Challenge Description** | Influenza A/eq/Ohio/2003 administered 184 days post-final vaccination |
| **Interval observed after challenge** | Horses were observed daily for 10 days post-challenge |
| **Results** | **See tables at the end of document for data.**<br><br>**Clinical Signs:**<br>An animal was considered positive (affected by challenge) if the animal exhibited:<br>• Fever (temperature >102.5ºF), OR<br>• Nasal discharge (moderate serous discharge or mucopurulent discharge), OR<br>• Ocular discharge<br><br>A total of 9/10 (90%) controls were positive as compared to only 9/20 (45%) vaccinates.<br><br>There were no adverse reactions to vaccine administration at any timepoint. |
| **USDA Approval Date** | September 7, 2010 |

| Treatment | Clinical Sign | Days Post-challenge | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Controls** | | | | | | | | | | | | |
| 1 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | | + | + | + | + | | |
| | Ocular discharge | | | | | | + | | | + | | + |
| 2 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | + | | | + | | + | + | + | |
| | Ocular discharge | | | | | | + | + | | | + | + |
| 3 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | | | + | | + | | |
| | Ocular discharge | | | + | | | + | | | + | | + |
| 4 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | | | | | | | |
| | Ocular discharge | | | | | | + | + | + | | | + |
| 5 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | + | + | + | + | + | + | |
| | Ocular discharge | | | | | | | | | | | |
| 6 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | + | | | + | | + | + |
| | Ocular discharge | | | | | | | | | | | + |
| 7 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | + | | | + | | + | | | + |
| | Ocular discharge | | | + | | | | + | | | | |
| 8 | Fever | | | | | | | | + | | | |
| | Nasal discharge | | | | | | + | + | + | | | + |
| | Ocular discharge | | | + | + | | + | + | | | | + |
| 9 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | | | | | | | |
| | Ocular discharge | | | | | | | | | | | |
| 10 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | | + | + | + | + | + | |
| | Ocular discharge | | | | | + | + | | + | + | + | |

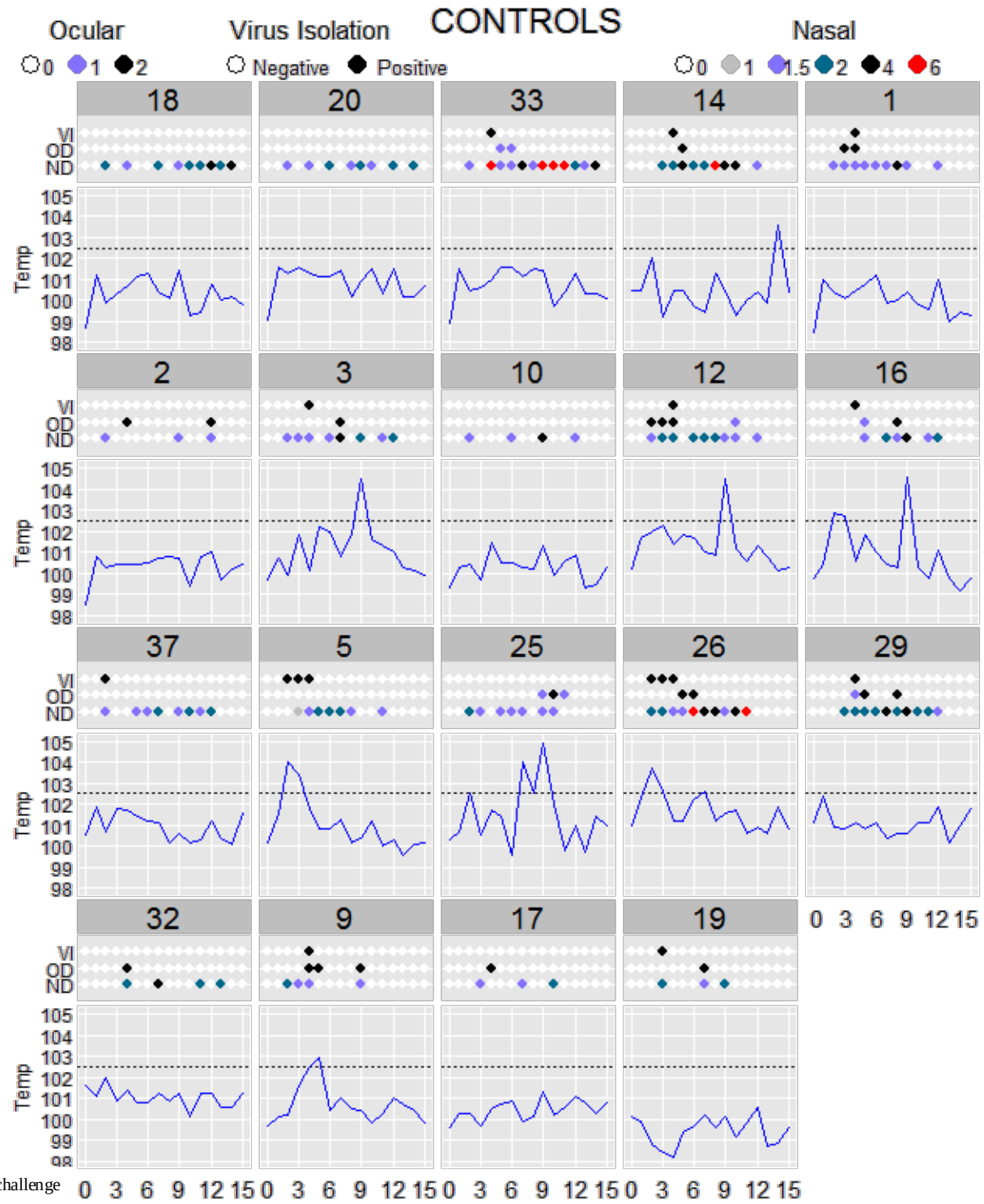
| Treatment | Clinical Sign | Days Post-challenge | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Vaccinates** | | | | | | | | | | | | |
| 1 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | | | | | | | |
| | Ocular discharge | | | | | | | | | | | |
| 2 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | | | | | | | |
| | Ocular discharge | | | | | | | | | | | |
| 3 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | | | | | | | |
| | Ocular discharge | | | | | | + | | | + | + | |
| 4 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | | | | + | | | |
| | Ocular discharge | | | | | | | | | | | |
| 5 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | | | | | | | |
| | Ocular discharge | | | | | | | | | | | |
| 6 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | | | | | | | |
| | Ocular discharge | | | | | | | | | | | |
| 7 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | | | | | | | |
| | Ocular discharge | | | | | | | | | | | |
| 8 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | | | | | | | |
| | Ocular discharge | | | | | | | | | | | |
| 9 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | | | | | | | |
| | Ocular discharge | | | | | | | | | | | |
| 10 | Fever | | | | | | + | | | | | |
| | Nasal discharge | | | | | | | + | + | | | |
| | Ocular discharge | | | | | | | | | + | | + |
| 11 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | | + | | | + | + | + |
| | Ocular discharge | | | | | | | | | | | |
| 12 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | | | | | + | | |
| | Ocular discharge | | | | | | | | | | | |

| Treatment | Clinical Sign | Days Post-challenge | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Vaccinates** | | | | | | | | | | | | |
| 13 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | + | | | | | | + |
| | Ocular discharge | | | | | | | | | | | |
| 14 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | | | | | | | |
| | Ocular discharge | | | | | | | | | | | |
| 15 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | | | | | | | |
| | Ocular discharge | | | | | | + | | + | | | |
| 16 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | | | + | | | | |
| | Ocular discharge | | | | | | | | | | | |
| 17 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | | | | | | | |
| | Ocular discharge | | | | | | | | | | | |
| 18 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | | | | | | | |
| | Ocular discharge | | | | | | | | | | | |
| 19 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | | | + | | + | | |
| | Ocular discharge | | | | | | | | | | | |
| 20 | Fever | | | | | | | | | | | |
| | Nasal discharge | | | | | | | | | | | |
| | Ocular discharge | | | | | | | | | | | |

| | |
|---|---|
| **Study Type** | Efficacy |
| **Pertaining to** | Equine influenza virus |
| **Study Purpose** | Demonstration of efficacy against respiratory disease and shedding caused by equine influenza |
| **Product Administration** | Two doses, administered intramuscularly, 21 days apart. |
| **Study Animals** | 37 horses (18 vaccinates, 19 controls), approximately 9-10 months of age |
| **Challenge Description** | Influenza A/eq/Ohio/2003 administered 3 weeks post-final vaccination |
| **Interval observed after challenge** | Horses were observed, and nasal swabs were collected, daily for 15 days post-challenge. |
| **Results** | **See tables at the end of document for data.**<br><br>**Clinical Signs:**<br>An animal was considered positive (affected by challenge) if the animal exhibited the following at any post-challenge observation point:<br>• Fever (temperature $\geq$102.5°F), OR<br>• Ocular discharge, OR<br>• Nasal discharge (very slight mucopurulent discharge, or worse)<br><br>**Duration** of disease was calculated from the date the animal was first observed to be positive to the date of last positive observation for that animal. Based on this calculation, the median duration of disease for the controls was determined to be 11 days as compared to 3 days for the vaccinates.<br><br>**Nasal shedding** of influenza virus was evaluated through nasal swab virus isolation results. An animal was considered positive if virus was isolated from nasal swabs on one or more occasions following challenge.<br><br>0/18 vaccinates shed virus and 12/19 controls shed virus.<br><br>There were no adverse reactions to vaccine administration at any timepoint. |
| **USDA Approval Date** | April 8, 2013 |




**Ocular Discharge**: 0=none; 1=mild to moderate; 2=severe
**Nasal Discharge**: 0=none; 1=slight clear serous, as may be observed in both normal and diseased horses; 1.5=very slight mucopurulent discharge, one or both nostrils; 2=moderate clear serous discharge, easily seen in one or both nostrils; 3=Abundant clear serous discharge typically seen only in diseased horses; 4=moderately mucopurulent, in large quantities in both nostrils; 5=heavy mucopurulent discharge in large amounts in both nostrils

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| | |
|---|---|
| **Study Type** | Efficacy |
| **Pertaining to** | Equine influenza |
| **Study Purpose** | Demonstration of efficacy against respiratory disease caused by equine influenza A2 strain Richmond 07 |
| **Product Administration** | Two doses, administered intramuscularly, 21 days apart |
| **Study Animals** | 20 horses (20 vaccinates), 12 months of age |
| **Challenge Description** | Not applicable |
| **Interval observed after challenge** | Not applicable |
| **Results** | This product class allows the manufacturer to update micro-organisms in this vaccine under expedited procedures to respond to emerging needs. Abbreviated data to support influenza strain updates to the product composition were evaluated by USDA-APHIS and found to be acceptable based on regulations and policies at the time of approval. Full vaccination-challenge studies may not have been required for these updates. |
| **USDA Approval Date** | February 2, 2012 |

| | |
|---|---|
| **Study Type** | Efficacy |
| **Pertaining to** | Equine influenza |
| **Study Purpose** | Demonstration of efficacy against respiratory disease caused by equine influenza A2 strain Kentucky 95 |
| **Product Administration** | Two doses, administered intramuscularly, 21 days apart |
| **Study Animals** | 20 horses (20 vaccinates), 12 months of age |
| **Challenge Description** | Not applicable |
| **Interval observed after challenge** | Not applicable |
| **Results** | This product class allows the manufacturer to update micro-organisms in this vaccine under expedited procedures to respond to emerging needs. Abbreviated data to support influenza strain updates to the product composition were evaluated by USDA-APHIS and found to be acceptable based on regulations and policies at the time of approval. Full vaccination-challenge studies may not have been required for these updates. |
| **USDA Approval Date** | February 2, 2012 |

<table>
<tr><td>Study Type</td><td>Safety</td></tr>
<tr><td>Pertaining to</td><td>All fractions</td></tr>
<tr><td>Study Purpose</td><td>To demonstrate safety under field conditions at three different test sites</td></tr>
<tr><td>Product Administration</td><td>2 doses given intramuscularly 21 days apart</td></tr>
<tr><td>Study Animals</td><td>622 horses vaccinated with two doses including:<ul><li>203-two to four month-old foals</li><li>19-five to seven month-old foals</li><li>400-1 year or older horses</li></ul></td></tr>
<tr><td>Challenge Description</td><td>Not Applicable</td></tr>
<tr><td>Interval observed after vaccination</td><td>Horses were observed on Days 0, 1 and 3 following the first vaccination and on Days 1, 3 and 7 following the second vaccination for systemic and local injection site reactions.</td></tr>
<tr><td>Results</td><td>There were no systemic reactions observed at any of the three sites. Local injection site reactions are summarized below.<br><br>North Dakota Site:
<table>
<tr><th>Summary</th><th>Total Number</th><th>Number with 2 doses</th><th colspan="2">Transient Injection Site Swelling</th><th colspan="2">Number Normal</th></tr>
<tr><td>Age</td><td></td><td></td><td>1st dose</td><td>2nd dose</td><td>1st dose</td><td>2nd dose</td></tr>
<tr><td>2-4 mo</td><td>149</td><td>149</td><td>0</td><td>0</td><td>149</td><td>149</td></tr>
<tr><td>5-7 mo</td><td>0</td><td>0</td><td>n/a</td><td>n/a</td><td>n/a</td><td>n/a</td></tr>
<tr><td>8-11 mo</td><td>0</td><td>0</td><td>n/a</td><td>n/a</td><td>n/a</td><td>n/a</td></tr>
<tr><td>1 yr-5yr</td><td>23</td><td>23</td><td>0</td><td>0</td><td>23</td><td>23</td></tr>
<tr><td>6-15 yr</td><td>121</td><td>121</td><td>0</td><td>0</td><td>121</td><td>121</td></tr>
<tr><td>>16 yr</td><td>3</td><td>3</td><td>0</td><td>0</td><td>3</td><td>3</td></tr>
<tr><td>Total</td><td>296</td><td>296</td><td>0</td><td>0</td><td>296</td><td>296</td></tr>
</table>
California Site:
<table>
<tr><th>Summary</th><th>Total Number</th><th>Number with 2 doses</th><th colspan="2">Transient Injection Site Swelling</th><th colspan="2">Number Normal</th></tr>
<tr><td>Age</td><td></td><td></td><td>1st dose</td><td>2nd dose</td><td>1st dose</td><td>2nd dose</td></tr>
<tr><td>2-4 mo</td><td>0</td><td>0</td><td>n/a</td><td>n/a</td><td>n/a</td><td>n/a</td></tr>
<tr><td>5-7 mo</td><td>5</td><td>5</td><td>0</td><td>0</td><td>5</td><td>5</td></tr>
<tr><td>8-11 mo</td><td>0</td><td>0</td><td>n/a</td><td>n/a</td><td>n/a</td><td>n/a</td></tr>
<tr><td>1 yr-5yr</td><td>25</td><td>25</td><td>0</td><td>4</td><td>25</td><td>21</td></tr>
<tr><td>6-15 yr</td><td>15</td><td>15</td><td>0</td><td>3</td><td>15</td><td>12</td></tr>
<tr><td>>16 yr</td><td>6</td><td>6</td><td>0</td><td>1</td><td>6</td><td>5</td></tr>
<tr><td>Total</td><td>51</td><td>51</td><td>0</td><td>8*</td><td>51</td><td>43</td></tr>
</table>
*Postvaccination reactions were minimal. The reported reactions were mild, transient, non-painful injection swellings.</td></tr>
</table>

Missouri Site:

| Summary | Total Number | Number with 2 doses | Transient Injection Site Swelling | | Number Normal | |
|---|---|---|---|---|---|---|
| Age | | | 1st dose | 2nd dose | 1st dose | 2nd dose |
| 2-4 mo | 55 | 54 | 0 | 0 | 55 | 54 |
| 5-7 mo | 15 | 14 | 0 | 0 | 15 | 14 |
| 8-11 mo | 0 | 0 | n/a | n/a | n/a | n/a |
| 1 yr-5yr | 134 | 132 | 0 | 0 | 134 | 132 |
| 6-15 yr | 68 | 68 | 0 | 0 | 68 | 68 |
| >16 yr | 7 | 7 | 0 | 0 | 7 | 7 |
| **Total** | **279** | **275** | **0** | **0** | **279** | **275** |

Total Across Three Sites:

| Site | Total Number | Number with 2 doses | Transient Injection Site Swelling | | Number Normal | |
|---|---|---|---|---|---|---|
| | | | 1st dose | 2nd dose | 1st dose | 2nd dose |
| North Dakota | 296 | 296 | 0 | 0 | 296 | 296 |
| California | 51 | 51 | 0 | 8* | 51 | 43 |
| Missouri | 279 | 275 | 0 | 0 | 279 | 275 |
| **Total** | **626** | **622** | **0** | **8*** | **626** | **614** |

*Postvaccination reactions were minimal and described as mild, transient, non-painful swellings after the second vaccination in eight (8) older, heavily vaccinated horses. There were no systemic reactions observed.

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| **USDA Approval Date** | February 14, 2012 |

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|---|---|
| **Study Type** | Safety |
| **Pertaining to** | All fractions |
| **Study Purpose** | To demonstrate safety in pregnant mares under field conditions at two different test sites |
| **Product Administration** | Two intramuscular doses, given 16-28 days apart. 54 pregnant mares were injected with placebo and 325 pregnant mares were vaccinated with test product. |
| **Study Animals** | Three hundred seventy-nine pregnant mares at two locations were included in the study. The mares were confirmed to be pregnant by serum hormonal evaluation on the day of the first vaccination. |
| **Challenge Description** | Not applicable |
| **Interval observed after vaccination** | 1st and 2nd trimester: Mares observed immediately after vaccination and daily for overall health and for abortion. Resulting foals were observed daily for 7 days following birth.<br>3rd trimester: Mares observed immediately after vaccination and daily for overall health and for abortion. Resulting foals were observed daily for 30 days following birth. |
| **Results** | Results shown on next page |

**Results**

**Study 2013-PM-1009**
***North Dakota Site:***

| Group | Vaccinated | Confirmed Pregnant | Foals | Parturition Rate |
|---|---|---|---|---|
| 1st trimester/ product | 143 | 127 | 114 | 90% |
| 1st trimester/ placebo | 59 | 54 | 49 | 91% |
| 2nd trimester/ product | 6 | 6 | 6 | 100% |
| 3rd trimester/ product | 140 | 117 | 117 | 100% |
| **Total – all animals** | **348** | **304** | **286** | **94%** |
| **Total – product only** | **289** | **250** | **237** | **95%** |
| **Total – placebo only** | **59** | **54** | **49** | **91%** |

**Study 2013-PM-1009**
***Misssouri Site:***

| Group | Vaccinated | Confirmed Pregnant | Foals | Parturition Rate |
|---|---|---|---|---|
| 2011 3rd trimester | 5 | 5 | 5 | 100% |
| 2012 1st trimester | 1 | 1 | 1 | 100% |
| 2012 2nd trimester | 53 | 43 | 39 | 91% |
| 2012 3rd trimester | 26 | 26 | 25 | 96% |
| **Total – product** | **85** | **75** | **70** | **93%** |

**Study 2014-PM-1009**
***North Dakota Site:***

| Group | Vaccinated | Confirmed Pregnant | Foaled | Parturition Rate | Foals Survived to End of Observation Period |
|---|---|---|---|---|---|
| 2nd trimester vaccinated | 52 | 52 | 52 | 100% | 51* |
| 3rd trimester vaccinated | 69 | 69 | 67** | 97.1% | 67 |

*Lost foal affirmed by study cooperator to be due to causes other than vaccination.
**One mare died due to causes other than vaccination, as affirmed by study cooperator.
All other foals were normal and healthy

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| **USDA Approval Date** | September 12, 2014 |