Summary of Studies Supporting USDA Product Licensure

Establishment Name	Intervet Inc.
USDA Vet Biologics Establishment Number	165A
Product Code	16J1.R1
True Name	Fowl Laryngotracheitis-Marek's Disease Vaccine, Serotype 3, Live Marek's Disease Vector
Tradename(s) / Distributor or Subsidiary (if different from manufacturer)	Innofusion-ILT - No distributor specified Innovax-ILT - Intervet South Africa (Pty) Ltd. Innovax-ILT - Merck Sharp & Dohme Saude Animal Ltda. Innovax-ILT - No distributor specified Merck Animal Health
Date of Compilation Summary	November 17, 2021

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	Infectious Laryngotracheitis Virus
Study Purpose	To demonstrate effectiveness against Infectious Laryngotracheitis (ILT)
Product Administration	*In ovo*
Study Animals	Chickens
Challenge Description	
Interval observed after challenge	
Results	Study data were evaluated by USDA-APHIS prior to product licensure and met regulatory standards for acceptance at the time of submission. No data are published because this study was submitted to USDA-APHIS prior to January 1, 2007, and APHIS only requires publication of data submitted after that date.
USDA Approval Date	October 2, 2006

Study Type	Efficacy
Pertaining to	Infectious Laryngotracheitis Virus
Study Purpose	To demonstrate effectiveness against Infectious Laryngotracheitis (ILT)
Product Administration	Subcutaneous
Study Animals	Chickens
Challenge Description	
Interval observed after challenge	
Results	Study data were evaluated by USDA-APHIS prior to product licensure and met regulatory standards for acceptance at the time of submission. No data are published because this study was submitted to USDA-APHIS prior to January 1, 2007, and APHIS only requires publication of data submitted after that date.
USDA Approval Date	October 2, 2006

Study Type	Efficacy
Pertaining to	Infectious Laryngotracheitis Virus
Study Purpose	To demonstrate efficacy against infectious laryngotracheitis virus 10 weeks after vaccination
Product Administration	One dose administered *in ovo* at 18 days of embryonation.
Study Animals	Specific-pathogen-free chickens divided into groups: Vaccinates: 30 chickens Positive Controls (10 weeks old at challenge): 10 chickens Positive Controls (4 weeks old at challenge): 10 chickens
Challenge Description	Challenged with ILT virus 10 weeks post-vaccination.
Interval observed after challenge	Observed for clinical signs for 10 days post-challenge.
Results	Summary of results: Birds positive for Infectious Laryngotracheitis Disease (see raw data table below for positivity criteria): Vaccinates: 1/30 (3%) 10-week-old Controls: 7/9* (78%) 4-week-Old Controls: 10/10 (100%) *One chicken died two days following challenge and the death was determined not related to the challenge. Requirements per 9 CFR 113.328 were met. The 4-week-old controls group validated the virulence of challenge. Raw data attached
USDA Approval Date	December 14, 2007

Individual Bird Challenge Data

Bird ID	Treatment Group	Date:										Clinical Result	Necropsy Result
		8/17/07	8/18/07	8/19/07	8/20/07	8/21/07	8/22/07	8/23/07	8/24/07	8/25/06	8/26/07	(+ or -)	(+ or -)
2558	Vaccinate											-	
2560	Vaccinate											-	
2561	Vaccinate											-	
2569	Vaccinate											-	
2572	Vaccinate											-	
2582	Vaccinate											-	
2588	Vaccinate											-	
2594	Vaccinate											-	
2599	Vaccinate											-	
2553	Vaccinate											-	
2563	Vaccinate											-	
2568	Vaccinate											-	
2586	Vaccinate											-	
2590	Vaccinate											-	
2592	Vaccinate											-	
2595	Vaccinate											-	
2552	Vaccinate											-	
2555	Vaccinate											-	
2566	Vaccinate											-	
2574	Vaccinate											-	
2575	Vaccinate											-	
2587	Vaccinate											-	
2597	Vaccinate											-	
2601	Vaccinate											-	
2559	Vaccinate											-	
2562	Vaccinate											-	
2571	Vaccinate											-	
2576	Vaccinate											-	
2580	Vaccinate											-	
2589	Vaccinate				**G**	**D**						+	+
2668*	Placebo		**D**										-
2661	Placebo					**G**	**GA**					+	
2674	Placebo			**G**	**G**	**D**						+	+
2676	Placebo					**D**							+
2666	Placebo											-	
2667	Placebo			**G**	**G**	**AG**	**AG**	**D**				+	+
2673	Placebo											-	
2663	Placebo			**G**	**G**	**G**						+	
2672	Placebo				**G**	**G**						+	
2682	Placebo			**G**	**G**	**G**						+	
4260	Control			**GA**	**GA**	**A**						+	
4264	Control			**A**	**GA**	**AG**	**A**					+	+
4265	Control			**A**	**A**	**D**						+	
4266	Control			**GA**	**GA**	**GAO**						+	
4269	Control			**GA**	**GA**	**A**						+	
4270	Control			**GA**	**GA**	**A**						+	
4271	Control			**G**	**G/D**							+	+
4272	Control			**A**	**A**	**GA**	**D**					+	+
4276	Control			**GA**	**GA**	**OAG**						+	
4284	Control			**A**	**GA**	**GA**						+	

Clinical Signs: (D) Dead; (G) Gasping; (L) Acute Labored Breathing; (B) Expectoration of Blood; (O) Acute Ocular Discharge/Swelling and/or Sinus Swelling; (A) General Appearance, Huddled with Ruffled Feathers, Depression, and/or emaciation

NOTE: If general appearance is only clinical sign, bird is considered positive if it remains morbid throughout remainder of observation and morbidity cannot be attributed to other causes.

Clinical Findings: Birds exhibiting a clinical sign for 2 or more days are considered positive (+)

* Bird 2668 was not included in the final challenge results as mortality was not related to challenge.

<table>
<tr><td>Study Type</td><td>Efficacy</td></tr>
<tr><td>Pertaining to</td><td>Infectious Laryngotracheitis Virus</td></tr>
<tr><td>Study Purpose</td><td>To demonstrate efficacy against infectious laryngotracheitis virus 60 weeks after vaccination</td></tr>
<tr><td>Product Administration</td><td>One dose administered subcutaneously to one day of age chickens</td></tr>
<tr><td>Study Animals</td><td>Vaccinates at 60 weeks of age: 30
Positive controls at 60 weeks of age: 9
Positive controls at 4 weeks of age: 10</td></tr>
<tr><td>Challenge Description</td><td>Challenged with ILT virus 60 weeks post-vaccination.</td></tr>
<tr><td>Interval observed after challenge</td><td>Observed for clinical signs for 10 days post-challenge.</td></tr>
<tr><td>Results</td><td>Summary of results:
<table>
<tr><td rowspan="3">ILT VIRUS CHALLENGE</td><td colspan="6">Treatment Group</td></tr>
<tr><td colspan="2">Vaccinates</td><td colspan="2">60 Week Old Positive Controls</td><td colspan="2">4 Week Old Positive Controls*</td></tr>
<tr><td>Number positive/total</td><td>Percent Protection</td><td>Number positive/ total</td><td>Percent Protection</td><td>Number Positive/ total</td><td>Percent Protection</td></tr>
<tr><td>60 weeks</td><td>1/17**</td><td>94</td><td>7/9</td><td>22</td><td>10/10</td><td>0</td></tr>
</table>
*4-week-old chickens challenged at the same time as 60-week-old vaccinates and controls to validate virulence of challenge.
**23 mortalities between 30 and 60 weeks of age which were determined not vaccine-related.

Requirements per 9 CFR 113.328 were met.

Raw data attached and positivity criteria attached.</td></tr>
<tr><td>USDA Approval Date</td><td>April 28, 2009</td></tr>
</table>

Individual Bird Clinical Observations Data
Post-Challenge
(60 Week Old Vaccinates)

Day	1	2	3	4	5	6	7	8	9	10	Result (+ or -)
Bird ID#											
4025											-
3853											-
3857											-
3586											-
3756											-
3619											-
3849											-
4086											-
4163											-
4178											-
3873											-
3648											-
3977						G	G			G	+
3818											-
4102											-
3778											-
3995											-

Clinical Signs: (D) Dead; (G) Gasping; (L) acute labored breathing; (B) Expectoration of blood; (O) Acute ocular discharge/swelling and/or sinus swelling; (A) General appearance; huddled with ruffled feathers, depression, and/or emaciation; (N) Normal

NOTE: If general appearance is only clinical sign, bird is considered positive if it remains morbid throughout remainder of observation period and morbidity cannot be attributed to other causes.

[1]Clinical Findings: Birds exhibiting a clinical sign for 2 or more days are considered positive (+)

Individual Bird Clinical Observations Data
Post-Challenge
(60 Week Old Positive Controls)

Day	1	2	3	4	5	6	7	8	9	10	Result (+ or -)
Bird ID#											
4085					D						+
4074			G		G						+
4190											-
3822					G						+
4200		D									+
3943			G		G	G					+
3550			G	G							+
3786			L								-
3609			L	G	L	G					+

Clinical Signs: (D) Dead; (G) Gasping; (L) acute labored breathing; (B) Expectoration of blood; (O) Acute ocular discharge/swelling and/or sinus swelling; (A) General appearance; huddled with ruffled feathers, depression, and/or emaciation; (N) Normal

NOTE: If general appearance is only clinical sign, bird is considered positive if it remains morbid throughout remainder of observation period and morbidity cannot be attributed to other causes.

[1]Clinical Findings: Birds exhibiting a clinical sign for 2 or more days are considered positive (+)

Individual Bird Clinical Observations Data
Post-Challenge
(4 Week Old Positive Controls)

Day	1	2	3	4	5	6	7	8	9	10	Result (+ or -)
Bird ID#											
4296			A	A,L	A,L	D					+
4297			A	A	A	N	N	N	N	N	+
4298			A,G	A,L	A,L	D					+
4299			A	A,G	D						+
4300			A	A,G	A,G	D					+
4301			A	A,G	A,G	A,G	G	G	G	G	+
4302			A	A,G	A	A,G	N	N	N	N	+
4303			A	A,G	A,L	A,G	N	L	N	N	+
4304			A	A,G	A,G	A,G	G	D			+
4305			A	A,G	A,G	A,G	D				+

Clinical Signs: (D) Dead; (G) Gasping; (L) acute labored breathing; (B) Expectoration of blood; (O) Acute ocular discharge/swelling and/or sinus swelling; (A) General appearance; huddled with ruffled feathers, depression, and/or emaciation; (N) Normal

NOTE: If general appearance is only clinical sign, bird is considered positive if it remains morbid throughout remainder of observation period and morbidity cannot be attributed to other causes.

[1]Clinical Findings: Birds exhibiting a clinical sign for 2 or more days are considered positive (+)

Study Type	Efficacy
Pertaining to	Marek's Disease Virus
Study Purpose	To demonstrate effectiveness against Marek's Disease Virus (MDV)
Product Administration	Subcutaneous
Study Animals	Chickens
Challenge Description	
Interval observed after challenge	
Results	Study data were evaluated by USDA-APHIS prior to product licensure and met regulatory standards for acceptance at the time of submission. No data are published because this study was submitted to USDA-APHIS prior to January 1, 2007, and APHIS only requires publication of data submitted after that date.
USDA Approval Date	October 13, 2004

Study Type	Efficacy
Pertaining to	Marek's Disease Virus
Study Purpose	To demonstrate effectiveness against Marek's Disease Virus (MDV)
Product Administration	*In ovo*
Study Animals	Chickens
Challenge Description	
Interval observed after challenge	
Results	Study data were evaluated by USDA-APHIS prior to product licensure and met regulatory standards for acceptance at the time of submission. No data are published because this study was submitted to USDA-APHIS prior to January 1, 2007, and APHIS only requires publication of data submitted after that date.
USDA Approval Date	October 13, 2004

<table>
<tr><td>Study Type</td><td>Safety</td></tr>
<tr><td>Pertaining to</td><td>ALL</td></tr>
<tr><td>Study Purpose</td><td>To demonstrate safety of product under typical field conditions</td></tr>
<tr><td>Product Administration</td><td>One dose was administered by the subcutaneous route to 1 day old chickens.</td></tr>
<tr><td>Study Animals</td><td>A total of 227,185 vaccinates & 223,329 controls = 450,514 chickens, representing 3 distinct geographical locations.</td></tr>
<tr><td>Challenge Description</td><td>N/A</td></tr>
<tr><td>Interval observed after challenge</td><td>No challenge. Chicks were observed daily for mortality through 6 weeks of age.</td></tr>
<tr><td>Results</td><td>
<table>
<tr><th>Site</th><th>Group</th><th>Total Placed</th><th>% Mortality</th></tr>
<tr><td rowspan="2">1</td><td>Vaccinate</td><td>107,086</td><td>3.3</td></tr>
<tr><td>Control</td><td>103,230</td><td>2.9</td></tr>
<tr><td rowspan="2">2</td><td>Vaccinate</td><td>53,799</td><td>1.6</td></tr>
<tr><td>Control</td><td>53,799</td><td>1.8</td></tr>
<tr><td rowspan="2">3</td><td>Vaccinate</td><td>66,300</td><td>2.0</td></tr>
<tr><td>Control</td><td>66,300</td><td>1.9</td></tr>
</table>

No adverse reactions attributable to vaccination with the test article were reported.
</td></tr>
<tr><td>USDA Approval Date</td><td>May 3, 2007</td></tr>
</table>

<table>
<tr><td>Study Type</td><td>Safety</td></tr>
<tr><td>Pertaining to</td><td>ALL</td></tr>
<tr><td>Study Purpose</td><td>To demonstrate safety of product under typical field conditions</td></tr>
<tr><td>Product Administration</td><td>One dose was administered in ovo to 18-19 day old chicken embryos.</td></tr>
<tr><td>Study Animals</td><td>A total of 2,366,613 chickens, representing 3 distinct geographical locations.</td></tr>
<tr><td>Challenge Description</td><td>N/A</td></tr>
<tr><td>Interval observed after challenge</td><td>Chicks were observed daily for mortality through 14 days post-hatch.</td></tr>
<tr><td>Results</td><td>
<table>
<tr><th>Site</th><th>Group</th><th>Total Placed</th><th>% Hatchability</th><th>% Mortality</th><th>Condemnation Rates</th></tr>
<tr><td rowspan="2">1</td><td>Vaccinate</td><td>681,138</td><td>69.1-92.1</td><td>0.99-3.57</td><td>0.36-1.37</td></tr>
<tr><td>Control</td><td>702,801</td><td>65.5-92.1</td><td>0.93-2.36</td><td>0.65-1.15</td></tr>
<tr><td rowspan="2">2</td><td>Vaccinate</td><td>343,155</td><td>73.0-93.4</td><td>2.61-5.38*</td><td>0.37-0.47*</td></tr>
<tr><td>Control**</td><td>--</td><td>73.7-87.5</td><td>--</td><td>--</td></tr>
<tr><td rowspan="2">3</td><td>Vaccinate</td><td>1,342,320</td><td>72.9-91.3</td><td>4.50-5.17</td><td>0.78-1.12</td></tr>
<tr><td>Control</td><td>1,436,083</td><td>70.3-91.2</td><td>0.79-1.58</td><td>0.79-1.58</td></tr>
</table>
*8 total houses that had test vaccinated birds, however only 2 has all test birds. Percent mortality and condemnation rates were determined based on the 2 houses with test birds only.
** Percent hatchability for Site 2 controls was the “Standard Hatch” value provided by the site.

No adverse reactions attributable to vaccination with the test article were reported.
</td></tr>
<tr><td>USDA Approval Date</td><td>April 13, 2009</td></tr>
</table>