Summary of Studies Supporting USDA Product Licensure

Establishment Name	Intervet Inc.
USDA Vet Biologics Establishment Number	165A
Product Code	15P5.R0
True Name	Canine Influenza Vaccine, H3, RNA Particle
Tradename(s) / Distributor or Subsidiary (if different from manufacturer)	Merck Animal Health
Date of Compilation Summary	May 29, 2024

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	Canine Influenza Virus (CIV) H3N2
Study Purpose	Efficacy against CIV H3N2 in dogs
Product Administration	Two doses administered subcutaneously, 3 weeks apart
Study Animals	8-week-old dogs; seronegative to CIV H3N2; 20 vaccinates and 20 placebo-vaccinated controls
Challenge Description	All dogs were challenged with virulent CIV H3N2, 3 weeks after the second vaccination.
Interval observed after challenge	Lungs were scored 10 days following challenge.
Results	The percent of lung mass that was abnormal (consolidated) was calculated for every dog.
USDA Approval Date	October 10, 2023

Table 1. Five-Number Summary for Lung Consolidation Score

Treatment Group	N	Min	Q1	Median	Q3	Max
Vaccinates	19	0	0	0	0.2	1.0
Controls	20	0	2.3	7.2	10.7	22.6

Table 2. Lung Consolidation Scores, Ranked by Group

Vaccinates	Controls
0.0	0.0
0.0	0.0
0.0	0.2
0.0	0.6
0.0	0.6
0.0	2.9
0.0	3.5
0.0	4.0
0.0	4.5
0.0	7.1
0.0	7.2
0.0	7.7
0.0	8.5
0.0	9.9
0.3	10.7
0.5	10.9
0.5	11.3
1.0	11.4
1.0	16.9
*	22.6

*Dog removed from study prior to challenge

Raw data shown on attached page.

Table 1. Post-Challenge Lung Lesion Scores

Raw Scores									
Treatment Group	**Dog ID**	**R. Cranial**	**R. Middle**	**R. Caudal**	**Access**	**L. Cr-Cr**	**L. Cr-Cau**	**L. Caudal**	
Vaccinates	VSH3	0	0	0	0	0	0	0	
	VWG3	0	0	0	0	0	0	0	
	VXG3	0	0	0	0	0	0	0	
	WRH3	0	0	0	0	0	0	0	
	WSH3	0	0	0	0	0	0	0	
	WTG3	0	0	0	0	0	0	0	
	WYH3	0	0	0	0	0	0	0	
	WZG3	0	1	1	2	0	0	2	
	XRH3	0	0	0	0	0	0	0	
	XTG3	0	0	0	0	1	2	3	
	XEH3	1	0	0	0	0	2	0	
	XGG3	0	0	0	0	0	0	0	
	WCH3	0	0	0	0	0	0	2	
	WFG3	0	0	0	0	0	0	0	
	YFH3	0	0	0	0	0	0	0	
	YHH3	0	0	0	0	0	0	0	
	YIG3	0	0	0	0	0	0	0	
	VEH3	0	0	0	0	0	0	0	
	VHG3	3	0	0	0	0	0	0	

Weighted Scores									
Treatment Group	**Dog ID**	**R. Cranial**	**R. Middle**	**R. Caudal**	**Access**	**L. Cr-Cr**	**L. Cr-Cau**	**L. Caudal**	**Total Score**
Vaccinates	VSH3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	VWG3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	VXG3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	WRH3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	WSH3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	WTG3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	WYH3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	WZG3	0.0	0.10	0.25	0.18	0.0	0.0	0.52	**1.0**
	XRH3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	XTG3	0.0	0.0	0.0	0.0	0.09	0.12	0.78	**1.0**
	XEH3	0.15	0.0	0.0	0.0	0.0	0.12	0.0	**0.3**
	XGG3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	WCH3	0.0	0.0	0.0	0.0	0.0	0.0	0.52	**0.5**
	WFG3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	YFH3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	YHH3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	YIG3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	VEH3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	VHG3	0.46	0.0	0.0	0.0	0.0	0.0	0.0	**0.5**

Table 1. Post-Challenge Lung Lesion Scores - continued

Raw Scores									
Treatment Group	**Dog ID**	**R. Cranial**	**R. Middle**	**R. Caudal**	**Access**	**L. Cr-Cr**	**L. Cr-Cau**	**L. Caudal**	
Controls	VRH3	7	25	3	7	15	25	8	
	VTH3	5	25	6	15	7	8	0	
	VUG3	10	25	15	20	20	0	0	
	VVG3	5	25	1	8	20	5	3	
	WUG3	0	25	0	3	7	5	1	
	WVG3	3	2	0	2	8	10	3	
	XAG3	10	30	5	5	10	5	4	
	XBG3	0	40	0	5	0	1	0	
	XQH3	10	35	15	10	8	5	0	
	XSH3	35	45	15	25	20	40	10	
	XUG3	0	20	25	15	6	20	0	
	XCH3	1	0	0	0	0	0	0	
	XFG3	2	0	0	0	0	0	1	
	WAH3	0	0	0	0	0	0	0	
	WDH3	0	0	10	8	3	0	0	
	YGH3	5	25	8	7	10	3	3	
	YJG3	5	25	15	25	25	25	15	
	YKG3	0	0	0	0	5	2	0	
	VFH3	30	45	0	5	1	0	5	
Weighted Scores									
Treatment Group	**Dog ID**	**R. Cranial**	**R. Middle**	**R. Caudal**	**Access**	**L. Cr-Cr**	**L. Cr-Cau**	**L. Caudal**	**Total Score**
Controls	VRH3	1.06	2.50	0.74	0.63	1.37	1.50	2.07	**9.9**
	VTH3	0.76	2.50	1.49	1.35	0.64	0.48	0.0	**7.2**
	VUG3	1.52	2.50	3.72	1.80	1.82	0.0	0.0	**11.4**
	VVG3	0.76	2.50	0.25	0.72	1.82	0.30	0.78	**7.1**
	WUG3	0.0	2.50	0.0	0.27	0.64	0.30	0.26	**4.0**
	WVG3	0.46	0.20	0.0	0.18	0.73	0.60	0.78	**2.9**
	XAG3	1.52	3.00	1.24	0.45	0.91	0.30	1.04	**8.5**
	XBG3	0.0	4.00	0.0	0.45	0.0	0.06	0.0	**4.5**
	XQH3	1.52	3.50	3.72	0.90	0.73	0.30	0.0	**10.7**
	XSH3	5.32	4.50	3.72	2.25	1.82	2.40	2.59	**22.6**
	XUG3	0.0	2.00	6.20	1.35	0.55	1.20	0.0	**11.3**
	XCH3	0.15	0.0	0.0	0.0	0.0	0.0	0.0	**0.2**
	XFG3	0.30	0.0	0.0	0.0	0.0	0.0	0.26	**0.6**
	WAH3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	WDH3	0.0	0.0	2.48	0.72	0.27	0.0	0.0	**3.5**
	YGH3	0.76	2.50	1.98	0.63	0.91	0.18	0.78	**7.7**
	YJG3	0.76	2.50	3.72	2.25	2.28	1.50	3.89	**16.9**
	YKG3	0.0	0.0	0.0	0.0	0.46	0.12	0.0	**0.6**
	VFH3	4.56	4.50	0.0	0.45	0.09	0.0	1.30	**10.9**

<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 under field conditions</td></tr>
<tr><td>Product Administration</td><td>Two doses administered 3-4 weeks apart by the subcutaneous route</td></tr>
<tr><td>Study Animals</td><td>654 dogs represented five geographic locations.
217 dogs were 8 weeks of age, which is the recommended minimum age; 437 dogs ranged in age from 9 weeks to 15 years.</td></tr>
<tr><td>Challenge Description</td><td>Not applicable</td></tr>
<tr><td>Interval observed after challenge</td><td>Dogs were observed daily for 14 days after each vaccination for any adverse events.</td></tr>
<tr><td>Results</td><td><u>Summary of Adverse Events:</u>
<table>
<tr><th>VeDDRA Code for Adverse Events Related to the Test Vaccine</th><th>Number of Adverse Events in 1,301 doses</th></tr>
<tr><td>Lethargy</td><td>21 (1.6%)</td></tr>
<tr><td>Diarrhea</td><td>4 (0.3%)</td></tr>
<tr><td>Polydipsia</td><td>3 (0.2%)</td></tr>
<tr><td>Anorexia</td><td>1 (0.1%)</td></tr>
<tr><td>Injection Site Oedema</td><td>1 (0.1%)</td></tr>
<tr><td>Anaphylaxis</td><td>1 (0.1%)</td></tr>
<tr><td>Injection site pain</td><td>1 (0.1%)</td></tr>
<tr><td>Total</td><td>32 (2.5%)</td></tr>
</table>
<table>
<tr><th>VeDDRA Code for Adverse Events Not Related to the Test Vaccine</th><th>Number of Adverse Events in 1,301 doses</th></tr>
<tr><td>Diarrhea</td><td>14 (1.1%)</td></tr>
<tr><td>Emesis</td><td>13 (1.0%)</td></tr>
<tr><td>Cough</td><td>12 (0.9%)</td></tr>
<tr><td>Respiratory Tract Disorder NOS</td><td>6 (0.5%)</td></tr>
<tr><td>Lethargy</td><td>5 (0.4%)</td></tr>
<tr><td>Lack of Efficacy* (Parvovirus disease)</td><td>4 (0.3%)</td></tr>
<tr><td>Joint Pain NOS</td><td>3 (0.2%)</td></tr>
<tr><td>Hyperthermia</td><td>3 (0.2%)</td></tr>
<tr><td>Dermatitis and Eczema</td><td>3 (0.2%)</td></tr>
<tr><td>Gastroenteritis</td><td>2 (0.2%)</td></tr>
<tr><td>Sneezing</td><td>2 (0.2%)</td></tr>
<tr><td>Muscle tremor</td><td>2 (0.2%)</td></tr>
<tr><td>Anxiety Disorder NOS</td><td>2 (0.2%)</td></tr>
<tr><td>Anorexia</td><td>1 (0.1%)</td></tr>
<tr><td>Polydipsia</td><td>1 (0.1%)</td></tr>
<tr><td>Hypersalivation</td><td>1 (0.1%)</td></tr>
<tr><td>Nausea</td><td>1 (0.1%)</td></tr>
<tr><td>Injection site hemorrhage</td><td>1 (0.1%)</td></tr>
</table></td></tr>
</table>

	Dermal Mass: 1 (0.1%) Otitis externa: 1 (0.1%) Pneumonia: 1 (0.1%) Ocular discharge: 1 (0.1%) Pruritus: 1 (0.1%) Regurgitation: 1 (0.1%) Digestive Tract Hypermotility: 1 (0.1%) Alopecia: 1 (0.1%) Trauma NOS: 1 (0.1%) **Total: 85 (6.5%)** *Lack of expected effectiveness of the vaccine due to concurrent disease
USDA Approval Date	May 2, 2024