



Summary of Studies Supporting USDA Product Licensure

Establishment Name	Boehringer Ingelheim Animal Health USA Inc.
USDA Vet Biologics Establishment Number	124
Product Code	49K5.R1
True Name	Porcine Circovirus Vaccine, Type 2, Killed Baculovirus Vector, Mycoplasma Hyopneumoniae Bacterin
Tradename(s) / Distributor or Subsidiary (if different from manufacturer)	FLEXcombo - Boehringer Ingelheim Vetmedica GmbH FLEXcombo - No distributor specified
Date of Compilation Summary	December 02, 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	Porcine Circovirus Vaccine, Type 2, Killed Baculovirus Vector												
Study Purpose	Demonstration of efficacy												
Product Administration	Single intramuscular administration of vaccine. ORF2 gene of strain PCV2a.												
Study Animals	Caesarian-derived, colostrum deprived pigs vaccinated at 23-25 days of age and randomly divided into 24 vaccinates and 24 controls												
Challenge Description	All pigs were challenged 14 days following vaccination with Porcine Circovirus, Type 2a challenge virus.												
Interval observed after challenge	Lymphoid tissues were examined 25 days after challenge.												
Results	<p>Summary of Lymphoid Tissue Efficacy Results</p> <table border="1"> <thead> <tr> <th>Group & Treatment</th> <th>Lymphoid Depletion +/total (%)</th> <th>Lymphoid Inflammation +/total (%)</th> <th>Lymphoid IHC +/total (%)</th> </tr> </thead> <tbody> <tr> <td>PCV2 Vaccine</td> <td>3/24 (12.5%)</td> <td>3/24 (12.5%)</td> <td>3/24 (12.5%)</td> </tr> <tr> <td>Control Article</td> <td>17/24 (70.8%)</td> <td>18/24 (75%)</td> <td>19/24 (79.2%)</td> </tr> </tbody> </table> <p>Raw Data Tables of Positive Lymphoid Tissue by Parameter and Tissue</p> <p>IHC = Immunohistochemistry MLN = Mesenteric Lymph Node ILN = Iliac Lymph Node TBLN = Tracheobronchial Lymph Node</p> <p>Lymphoid Depletion Criteria: Negative (-) = No lymphoid depletion present Positive (+) = Lymphoid depletion to some degree present</p> <p>Lymphoid Inflammation Criteria: Negative (-) = No lymphoid inflammation present Positive (+) = Lymphoid inflammation to some degree present</p> <p>Lymphoid IHC Criteria: Negative (-) = Zero lymphoid cells with PCV2 antigen Positive (+) = PCV2 antigen detected in lymphoid cells</p> <p>Raw data is presented on the following pages.</p>	Group & Treatment	Lymphoid Depletion +/total (%)	Lymphoid Inflammation +/total (%)	Lymphoid IHC +/total (%)	PCV2 Vaccine	3/24 (12.5%)	3/24 (12.5%)	3/24 (12.5%)	Control Article	17/24 (70.8%)	18/24 (75%)	19/24 (79.2%)
Group & Treatment	Lymphoid Depletion +/total (%)	Lymphoid Inflammation +/total (%)	Lymphoid IHC +/total (%)										
PCV2 Vaccine	3/24 (12.5%)	3/24 (12.5%)	3/24 (12.5%)										
Control Article	17/24 (70.8%)	18/24 (75%)	19/24 (79.2%)										

USDA Approval Date	June 28, 2007

Vaccinated pigs:

Pig ID	Lymphoid Depletion				Lymphoid Inflammation				Lymphoid IHC			
	Tonsil	MLN	ILN	TBLN	Tonsil	MLN	ILN	TBLN	Tonsil	MLN	ILN	TBLN
5	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-	-	-
36	-	-	-	-	-	-	-	-	-	-	-	-
37	-	-	-	+	-	-	+	+	-	-	-	+
38	-	-	-	-	-	-	-	-	-	-	-	-
42	-	-	-	-	-	-	-	-	-	-	-	-
43	-	-	-	-	-	-	-	-	-	-	-	-
46	-	-	-	-	-	-	-	-	-	-	-	-
47	-	-	-	-	-	-	-	-	-	-	-	-
50	-	-	+	-	+	+	+	+	+	-	+	-
85	-	-	-	-	-	-	-	-	-	-	-	-
87	-	-	-	-	-	-	-	-	-	-	-	-
88	-	-	-	-	-	-	-	-	-	-	-	-
89	-	-	-	-	-	-	-	-	-	-	-	-
90	-	-	-	-	-	-	-	-	-	-	-	-
91	-	-	-	-	-	-	-	-	-	-	-	-
92	-	+	+	+	+	+	+	+	+	-	-	+
94	-	-	-	-	-	-	-	-	-	-	-	-

Control Pigs

Pig ID	Lymphoid Depletion				Lymphoid Inflammation				Lymphoid IHC			
	Tonsil	MLN	ILN	TBLN	Tonsil	MLN	ILN	TBLN	Tonsil	MLN	ILN	TBLN
1	-	-	-	-	-	-	-	-	+	-	-	-
2	-	-	+	-	-	+	+	+	-	+	+	+
4	+	+	+	+	+	+	+	+	+	+	+	+
7	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	+	-	-	-	+	+	-	-	+	-
11	-	-	-	-	-	-	-	-	-	-	-	-
13	+	+	+	+	+	+	+	+	+	+	+	+
15	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-
19	-	+	+	+	+	+	+	+	-	+	+	+
22	-	-	-	-	-	-	-	-	-	-	-	-
25	-	+	+	+	+	+	+	+	+	+	+	+
26	-	-	-	+	+	-	+	+	-	-	-	+
28	-	-	+	+	-	+	+	+	-	+	+	+
32	+	+	+	+	+	+	+	+	+	+	+	+
33	+	+	+	+	+	+	+	+	-	+	+	+
34	+	+	+	+	+	+	+	+	+	+	+	+
35	-	-	+	+	+	-	+	+	-	-	-	+
39	-	+	+	+	+	+	+	+	+	+	+	+
41	+	+	+	+	+	+	+	+	+	+	+	+
44	-	-	+	+	+	+	+	+	+	-	+	+
45	+	+	+	+	+	+	+	+	+	+	+	+
48	-	-	+	-	-	-	+	+	-	-	+	-
86	-	-	-	-	-	+	-	-	-	-	+	-

Study Type	Efficacy												
Pertaining to	Porcine Circovirus Vaccine, Type 2, Killed Baculovirus Vector												
Study Purpose	Demonstration of 4 months duration of immunity												
Product Administration	Single intramuscular administration of vaccine. ORF2 gene of strain PCV2a.												
Study Animals	Caesarian-derived colostrum deprived pigs vaccinated at 19 – 23 days of age and randomly divided into 24 vaccinates and 24 controls												
Challenge Description	All pigs were challenged 122 days (4months) following vaccination with Porcine Circovirus, Type 2a challenge virus.												
Interval observed after challenge	Lymphoid tissues were examined 25 days after challenge.												
Results	<p>Summary of Efficacy Results</p> <table border="1"> <thead> <tr> <th>Group & Treatment</th> <th>Lymphoid Depletion +/total (%)</th> <th>Lymphoid Inflammation +/total (%)</th> <th>Lymphoid IHC +/total (%)</th> </tr> </thead> <tbody> <tr> <td>Group # 1 – PCV2 Vaccine</td> <td>0/24 (0%)</td> <td>0/24 (0%)</td> <td>0/24 (0%)</td> </tr> <tr> <td>Group # 2 - Control Group</td> <td>13/24 (54.2%)</td> <td>20/24 (83.3%)</td> <td>20/24 (83.3%)</td> </tr> </tbody> </table> <p>Observations of Lymphoid Tissue by Parameter and Tissue: IHC = Immunohistochemistry MLN = Mesenteric Lymph Node ILN = Iliac Lymph Node TBLN = Tracheobronchial Lymph Node</p> <p>Lymphoid Depletion Criteria: Negative (-) = Normal, no lymphoid depletion present Positive (+) = Mild, moderate or severe depletion</p> <p>Lymphoid Inflammation Criteria: Negative (-) = Normal, no lymphoid inflammation Positive (+) = Mild, moderate or severe histiocytic to granulomatous inflammation</p> <p>Lymphoid IHC Criteria: Negative (-) = Zero lymphoid cells observed with PCV2 antigen staining Positive (+) = Lymphoid follicles have cells with PCV2 antigen staining</p> <p>Raw data is presented on the following pages.</p>	Group & Treatment	Lymphoid Depletion +/total (%)	Lymphoid Inflammation +/total (%)	Lymphoid IHC +/total (%)	Group # 1 – PCV2 Vaccine	0/24 (0%)	0/24 (0%)	0/24 (0%)	Group # 2 - Control Group	13/24 (54.2%)	20/24 (83.3%)	20/24 (83.3%)
Group & Treatment	Lymphoid Depletion +/total (%)	Lymphoid Inflammation +/total (%)	Lymphoid IHC +/total (%)										
Group # 1 – PCV2 Vaccine	0/24 (0%)	0/24 (0%)	0/24 (0%)										
Group # 2 - Control Group	13/24 (54.2%)	20/24 (83.3%)	20/24 (83.3%)										

USDA Approval Date	April 17, 2007
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Pig ID	Lymphoid Depletion				Lymphoid Inflammation				Lymphoid IHC			
	Tonsil	MLN	ILN	TBLN	Tonsil	MLN	ILM	TBLN	Tonsil	MLN	ILN	TBLN
Group 1: PCV2 Vaccine												
5	-	-	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-
37	-	-	-	-	-	-	-	-	-	-	-	-
38	-	-	-	-	-	-	-	-	-	-	-	-
39	-	-	-	-	-	-	-	-	-	-	-	-
44	-	-	-	-	-	-	-	-	-	-	-	-
49	-	-	-	-	-	-	-	-	-	-	-	-
56	-	-	-	-	-	-	-	-	-	-	-	-
57	-	-	-	-	-	-	-	-	-	-	-	-
59	-	-	-	-	-	-	-	-	-	-	-	-
66	-	-	-	-	-	-	-	-	-	-	-	-
68	-	-	-	-	-	-	-	-	-	-	-	-
71	-	-	-	-	-	-	-	-	-	-	-	-
80	-	-	-	-	-	-	-	-	-	-	-	-
83	-	-	-	-	-	-	-	-	-	-	-	-
89	-	-	-	-	-	-	-	-	-	-	-	-
99	-	-	-	-	-	-	-	-	-	-	-	-
109	-	-	-	-	-	-	-	-	-	-	-	-
113	-	-	-	-	-	-	-	-	-	-	-	-
114	-	-	-	-	-	-	-	-	-	-	-	-
119	-	-	-	-	-	-	-	-	-	-	-	-

Pig ID	Lymphoid Depletion				Lymphoid Inflammation				Lymphoid IHC			
	Tonsil	MLN	ILN	TBLN	Tonsil	MLN	ILN	TBLN	Tonsil	MLN	ILN	TBLN
Group 2: Control Group												
1	+	-	+	+	+	+	+	+	+	+	+	+
7	+	-	+	+	+	+	+	+	+	+	+	+
9	-	-	+	-	+	+	+	-	+	-	+	-
13	-	-	-	-	+	-	+	-	-	-	+	-
28	-	-	-	+	+	-	+	+	-	-	-	+
29	-	-	-	-	+	-	-	-	+	-	-	-

31	-	+	+	+	+	+	+	+	+	+	+	+	+
35	+	+	-	+	+	+	+	+	+	+	+	+	+
40	+	-	+	+	+	+	+	+	+	+	+	+	+
41	-	-	-	-	+	+	+	+	+	-	+	+	+
46	-	-	-	-	-	-	-	-	-	-	-	-	-
51	+	-	-	-	+	+	-	+	+	+	+	+	+
60	-	-	+	-	+	+	+	-	+	+	+	+	-
69	-	-	+	-	+	+	+	-	+	+	+	+	-
74	-	-	-	+	+	+	-	+	+	-	-	-	+
75	-	-	-	-	-	-	-	-	-	-	-	-	-
92	+	-	-	-	+	-	+	+	+	-	-	-	+
93	-	-	-	-	+	-	-	+	+	-	-	-	-
98	-	-	-	-	-	-	-	-	-	-	-	-	-
100	-	-	-	-	+	-	-	-	+	-	-	-	-
104	-	+	-	-	+	+	+	-	+	+	+	+	-
110	-	-	-	-	+	-	-	-	+	-	-	-	-
116	-	-	-	-	+	-	-	-	+	-	-	-	-
117	-	-	-	-	-	-	-	-	-	-	-	-	-

Study Type	Efficacy																					
Pertaining to	Porcine Circovirus Vaccine, Type 2, Killed Baculovirus Vector																					
Study Purpose	Efficacy of Porcine Circovirus Vaccine, Type 2																					
Product Administration	Administration of one dose intramuscularly. Product tested contained ORF2 gene of strain PCV2a.																					
Study Animals	3 week old caesarian derived, colostrum deprived pigs, divided into 24 vaccinates and 24 controls																					
Challenge Description	Challenged with Porcine Circovirus Type 2a at 31 days after vaccination																					
Interval observed after challenge	Pigs were observed daily for 25 days. At 25 days, tissues were assessed for lymphoid depletion, lymphoid and lung inflammation and immunohistochemistry (IHC)																					
Results	<p>Summary of Results:</p> <p>Tissues were assessed for lymphoid depletion, lymphoid and lung inflammation, and immunohistochemistry (IHC) for both lymphoid and lung tissue.</p> <p>An animal was considered positive for lymphoid depletion, lymphoid inflammation, or lymphoid IHC if depletion, inflammation, or PCV2 antigen, respectively, were present in tonsil tissue, mesenteric lymph node (MLN) tissue, iliac lymph node (ILN) tissue, or tracheobronchial lymphoid (TBLN) tissue.</p> <p>An animal was considered positive for lung inflammation if microscopic lung inflammation was present and Lung IHC positive if PCV2 antigen was detected in lung cells.</p> <table border="1"> <thead> <tr> <th>Tissues</th> <th>Vaccinates</th> <th>Controls</th> </tr> </thead> <tbody> <tr> <td>Lymphoid depletion (LyD)</td> <td>0/24</td> <td>20/24</td> </tr> <tr> <td>Lymphoid inflammation (Lyl)</td> <td>1/24</td> <td>21/24</td> </tr> <tr> <td>Lung Inflammation</td> <td>3/24</td> <td>18/24</td> </tr> <tr> <td>Lymphoid IHC</td> <td>2/24</td> <td>22/24</td> </tr> <tr> <td>Lung IHC</td> <td>0/24</td> <td>14/24</td> </tr> <tr> <td>Any pig: (LyD or Lyl)</td> <td>2/24</td> <td>22/24</td> </tr> </tbody> </table> <p>See tables on the following pages for data.</p>	Tissues	Vaccinates	Controls	Lymphoid depletion (LyD)	0/24	20/24	Lymphoid inflammation (Lyl)	1/24	21/24	Lung Inflammation	3/24	18/24	Lymphoid IHC	2/24	22/24	Lung IHC	0/24	14/24	Any pig: (LyD or Lyl)	2/24	22/24
Tissues	Vaccinates	Controls																				
Lymphoid depletion (LyD)	0/24	20/24																				
Lymphoid inflammation (Lyl)	1/24	21/24																				
Lung Inflammation	3/24	18/24																				
Lymphoid IHC	2/24	22/24																				
Lung IHC	0/24	14/24																				
Any pig: (LyD or Lyl)	2/24	22/24																				
USDA Approval Date	June 5, 2008																					

Individual Lymphoid Depletion

Group	Animal ID	Tonsil	MLN	ILN	TBLN
Vaccinates (24)	22	-	-	-	-
	23	-	-	-	-
	26	-	-	-	-
	29	-	-	-	-
	31	-	-	-	-
	32	-	-	-	-
	34	-	-	-	-
	39	-	-	-	-
	43	-	-	-	-
	44	-	-	-	-
	45	-	-	-	-
	47	-	-	-	-
	51	-	-	-	-
	53	-	-	-	-
	57	-	-	-	-
	62	-	-	-	-
	67	-	-	-	-
	69	-	-	-	-
	72	-	-	-	-
	74	-	-	-	-
82	-	-	-	-	
87	-	-	-	-	
88	-	-	-	-	
95	-	-	-	-	
Controls (24)	28	+	+	+	+
	30	+	+	+	+
	36	*	+	+	+
	38	-	-	-	-
	40	-	-	-	-
	41	+	-	-	+
	42	-	+	+	+
	46	-	-	-	-
	55	+	+	+	+
	56	-	+	-	-
	58	-	-	-	-
	60	-	-	-	+
	61	-	+	-	-
	64	-	+	+	+
	65	+	+	+	+
	71	-	-	-	+
	75	+	+	+	+
	77	+	+	+	+
	78	+	+	+	+
	79	+	+	+	+
80	+	+	+	+	
81	+	+	+	+	
86	-	-	-	+	
94	-	-	-	+	

(+) = positive

(-) = negative

(*)=missing tissue

Individual Lymphoid Inflammation

Group	Animal ID	Tonsil	MLN	ILN	TBLN
Vaccinates (24)	22	-	-	-	-
	23	-	-	-	-
	26	-	-	-	-
	29	-	-	-	-
	31	-	-	-	-
	32	-	-	-	-
	34	-	-	-	-
	39	-	-	-	-
	43	-	-	-	-
	44	-	-	-	-
	45	-	-	-	-
	47	-	-	-	-
	51	-	-	-	+
	53	-	-	-	-
	57	-	-	-	-
	62	-	-	-	-
	67	-	-	-	-
	69	-	-	-	-
	72	-	-	-	-
	74	-	-	-	-
82	-	-	-	-	
87	-	-	-	-	
88	-	-	-	-	
95	-	-	-	-	
Controls (24)	28	+	+	+	+
	30	+	+	+	+
	36	*	+	+	+
	38	-	-	-	-
	40	-	-	-	-
	41	+	+	+	+
	42	+	+	+	+
	46	+	-	+	-
	55	+	+	+	+
	56	+	+	+	+
	58	-	-	-	-
	60	-	-	+	+
	61	+	+	+	-
	64	+	+	+	+
	65	+	+	+	+
	71	+	-	+	+
	75	+	+	+	+
	77	+	+	+	+
	78	+	+	+	+
	79	+	+	+	+
80	+	+	+	+	
81	+	+	+	+	
86	+	-	+	+	
94	+	-	+	+	

(+) = positive
 (-) = negative
 (*) = missing tissue

Individual Lymphoid IHC Results

Group	Animal ID	Tonsil	MLN	ILN	TBLN
Vaccinates (24)	22	-	-	-	-
	23	-	-	-	-
	26	-	-	-	-
	29	-	-	-	-
	31	-	-	-	-
	32	-	-	-	-
	34	-	-	-	-
	39	+	+	-	-
	43	-	-	-	-
	44	-	-	-	-
	45	-	-	-	-
	47	-	-	-	-
	51	-	-	-	+
	53	-	-	-	-
	57	-	-	-	-
	62	-	-	-	-
	67	-	-	-	-
	69	-	-	-	-
	72	-	-	-	-
	74	-	-	-	-
82	-	-	-	-	
87	-	-	-	-	
88	-	-	-	-	
95	-	-	-	-	
Controls (24)	28	+	+	+	+
	30	+	+	+	+
	36	*	+	+	+
	38	-	-	-	-
	40	-	+	-	-
	41	+	+	+	+
	42	+	+	+	+
	46	+	-	+	-
	55	+	+	+	+
	56	+	+	+	-
	58	-	-	-	-
	60	-	-	-	+
	61	+	+	+	-
	64	+	+	+	+
	65	+	+	+	+
	71	+	-	+	+
	75	+	+	+	+
	77	+	+	+	+
78	+	+	+	+	
79	+	+	+	+	
80	+	+	+	+	
81	+	+	+	+	
86	+	-	+	+	
94	+	-	+	+	

(+) = positive

(-) = negative

(*)=missing tissue

Individual Lung Inflammation Results

Group	Animal ID	Lung Inflammation Result
Vaccinates (24)	22	-
	23	-
	26	-
	29	-
	31	-
	32	-
	34	-
	39	+
	43	-
	44	-
	45	-
	47	-
	51	+
	53	+
	57	-
	62	-
	67	-
	69	-
	72	-
	74	-
82	-	
87	-	
88	-	
95	-	
Controls (24)	28	+
	30	+
	36	+
	38	-
	40	-
	41	+
	42	+
	46	-
	55	+
	56	+
	58	-
	60	+
	61	-
	64	+
	65	+
	71	+
	75	+
	77	+
	78	+
	79	+
80	+	
81	+	
86	-	
94	+	

(+) = positive

(-) = negative

Individual Lung IHC Results

Group	Animal ID	Lung IHC Result
Vaccinates (24)	22	-
	23	-
	26	-
	29	-
	31	-
	32	-
	34	-
	39	-
	43	-
	44	-
	45	-
	47	-
	51	-
	53	-
	57	-
	62	-
	67	-
	69	-
	72	-
	74	-
82	-	
87	-	
88	-	
95	-	
Controls (24)	28	+
	30	+
	36	+
	38	-
	40	-
	41	+
	42	+
	46	+
	55	+
	56	-
	58	-
	60	+
	61	-
	64	-
	65	+
	71	-
	75	+
	77	+
	78	+
	79	+
80	-	
81	+	
86	-	
94	-	

(+) = positive

(-) = negative

Study Type	Efficacy																		
Pertaining to	<i>Mycoplasma Hyponeumoniae</i>																		
Study Purpose	Efficacy of Mycoplasma Hyopneumoniae Bacterin																		
Product Administration	Administration of one dose intramuscularly																		
Study Animals	Pigs 3 weeks of age, divided into 19 vaccinates and 20 controls																		
Challenge Description	Challenged with <i>Mycoplasma hyopneumoniae</i> 33 days post vaccination																		
Interval observed after challenge	Pigs were observed for 28 days. Lungs were examined for lung lesions consistent with <i>Mycoplasma hyopneumoniae</i> at 28 days post challenge.																		
Results	<p>Summary of Results:</p> <p>Lung lesions were evaluated visually and by palpation for each pig to determine the percent pathology for each lung lobe. The following is a summary of statistics for Total Lung Lesion scores (%) results:</p> <table border="1"> <thead> <tr> <th>Treatment</th> <th>Min</th> <th>Q1</th> <th>Median</th> <th>Q3</th> <th>Max</th> </tr> </thead> <tbody> <tr> <td>Vaccinates</td> <td>0</td> <td>0</td> <td>2</td> <td>6</td> <td>16</td> </tr> <tr> <td>Controls</td> <td>0</td> <td>7</td> <td>12</td> <td>17</td> <td>50</td> </tr> </tbody> </table> <p>See tables on the following pages for data.</p>	Treatment	Min	Q1	Median	Q3	Max	Vaccinates	0	0	2	6	16	Controls	0	7	12	17	50
Treatment	Min	Q1	Median	Q3	Max														
Vaccinates	0	0	2	6	16														
Controls	0	7	12	17	50														
USDA Approval Date	June 11, 2008																		

Individual Lung Lesion Scores in Vaccinates (19):	
Pig ID	Total Lung Score*
516	0.00
517	0.10
522	0.40
529	0.20
535	1.40
538	5.50
547	0.00
551	2.70
555	14.25
571	4.60
712	9.95
714	1.10
716	0.20
717	1.50
719	8.50
735	16.00
736	6.05
864	0.20
866	1.50

Individual Lung Lesion Scores in Controls (20):	
Pig ID	Total Lung Score*
519	8.00
525	4.95
526	11.95
534	0.00
540	17.00
546	2.00
549	50.25
554	20.00
556	9.25
562	25.50
563	12.45
576	10.50
709	6.25
711	13.20
715	17.25
724	5.00
723	29.50
732	NA**
734	17.50
876	10.50

***Total Lung Score** = Sum of scores for all lung lobes

**Animal died on Study day 33. No necropsy was performed.

Study Type	Efficacy																		
Pertaining to	<i>Mycoplasma Hyponeumoniae</i>																		
Study Purpose	To demonstrate efficacy of the <i>Mycoplasma Hyponeumoniae</i> component of the combination package product																		
Product Administration	Administration of one dose intramuscularly																		
Study Animals	40 pigs, 24-25 days old divided into 20 vaccinates and 20 controls																		
Challenge Description	Challenged with virulent <i>Mycoplasma Hyponeumoniae</i> 35 days after vaccination																		
Interval observed after challenge	Pigs were observed for 28 days after challenge, and then tissues were examined for lung lesions																		
Results	<p>Summary of Results:</p> <p>Lungs were examined and scored for percent lung pathology.</p> <table border="1"> <thead> <tr> <th>Group</th> <th>Minimum</th> <th>25th percentile</th> <th>Median</th> <th>75th percentile</th> <th>Maximum</th> </tr> </thead> <tbody> <tr> <td>Vaccinates</td> <td><1</td> <td>1</td> <td>4</td> <td>11</td> <td>35</td> </tr> <tr> <td>Controls</td> <td><1</td> <td>7</td> <td>15</td> <td>20</td> <td>30</td> </tr> </tbody> </table> <p>See tables on the following pages for data.</p>	Group	Minimum	25 th percentile	Median	75 th percentile	Maximum	Vaccinates	<1	1	4	11	35	Controls	<1	7	15	20	30
Group	Minimum	25 th percentile	Median	75 th percentile	Maximum														
Vaccinates	<1	1	4	11	35														
Controls	<1	7	15	20	30														
USDA Approval Date	August 10, 2006																		

Individual Pig Lung Lesion Scores (%) in Vaccinates

ID#	R. Apical	R. Cardiac	R. Diaphragmatic	L. Apical	L. Cardiac	L. Diaphragmatic	Intermediate	Total
184	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.4
187	0.0	0.5	0.25	0.0	1.0	0.25	0.1	2.1
188	0.0	1.0	0.25	0.0	2.0	0.0	0.0	3.25
189	0.0	5.0	0.25	0.0	2.0	0.5	0.5	8.25
193	4.0	7.0	2.5	4.0	7.0	1.25	9.0	34.75
194	0.0	0.1	0.25	0.0	0.2	0.25	0.0	0.8
195	0.5	2.0	1.25	0.1	4.0	0.0	5.0	12.85
200	0.1	0.2	0.0	0.0	0.1	0.0	0.0	0.4
201	1.0	3.0	0.5	0.0	3.0	0.5	8.0	16.0
202	0.5	3.0	0.0	0.0	2.0	0.0	0.0	5.5
217	0.5	3.0	0.5	0.0	3.0	0.0	3.0	10.0
218
219	0.0	3.0	1.25	0.0	2.0	0.5	0.2	6.95
220	0.0	3.0	1.25	0.0	2.0	0.5	0.2	14.95
222	0.2	2.0	0.25	0.0	1.0	0.25	0.5	4.2
223	0.1	0.5	0.0	0.0	0.0	0.0	1.0	1.6
224	0.1	0.2	0.5	0.1	1.0	0.25	1.0	3.15
226	0.0	0.2	0.0	0.0	1.0	0.0	0.0	1.2
227	0.5	5.0	0.0	1.0	7.0	0.0	0.0	13.5
228	0.0	0.2	0.0	0.0	1.0	0.0	0.0	1.2

. = no data

Individual Pig Lung Lesion Scores (%) in Controls

ID#	R. Apical	R. Cardiac	R. Diaphragmatic	L. Apical	L. Cardiac	L. Diaphragmatic	Intermediate	Total
181	2.0	6.0	2.5	0.5	5.0	2.5	7.0	25.5
182	0.0	1.0	0.0	0.2	0.5	0.0	5.0	6.7
183	0.1	0.5	0.5	0.1	2.0	0.5	0.2	3.9
185	0.5	4.0	1.25	0.5	5.0	2.5	6.0	19.75
186	0.1	1.0	0.25	0.0	6.0	0.25	0.5	8.1
191	0.0	0.1	0.0	0.0	0.5	0.0	0.0	0.6
192	1.0	7.0	1.25	0.2	7.0	0.0	4.0	20.45
196
198	0.0	1.0	1.25	0.1	7.0	0.25	8.0	17.6
204	0.2	2.0	0.25	0.2	2.0	0.0	1.0	5.65
205	0.2	3.0	0.0	0.1	1.0	0.0	3.0	7.3
207	0.2	5.0	0.5	0.2	5.0	0.5	3.0	14.4
211	1.0	5.0	1.25	1.0	6.0	0.5	4.0	18.75
212	0.2	6.0	1.25	0.1	5.0	0.25	7.0	19.8
215	1.0	3.0	1.25	0.1	4.0	0.5	5.0	14.85
225	0.1	1.0	0.25	0.0	2.0	0.5	0.1	3.95
230	0.2	4.0	0.5	0.1	3.0	0.25	2.0	10.05
231	0.0	3.0	0.5	3.0	6.0	1.25	1.0	14.75
232	1.0	8.0	1.25	1.0	8.0	1.25	9.0	29.5
233	2.0	6.0	1.25	2.0	7.0	0.25	3.0	21.5

. = no data

Study Type	Efficacy
Pertaining to	<i>Mycoplasma Hyopneumoniae</i>
Study Purpose	Demonstration of a 26 week Duration of Immunity
Product Administration	Administration of one dose intramuscularly
Study Animals	Pigs approximately 3 weeks of age, divided into 20 vaccinates and 20 controls
Challenge Description	Challenged with <i>Mycoplasma hyopneumoniae</i> 184 days post vaccination
Interval observed after challenge	Pigs were observed for 33 days post-challenge for clinical signs of <i>Mycoplasma hyopneumoniae</i> infection and then tissues were examined for lung lesions consistent with <i>Mycoplasma hyopneumoniae</i> infection.
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	August 7, 2006

Study Type	Safety																																																																																																													
Pertaining to	All fractions																																																																																																													
Study Purpose	To demonstrate safety of the product under field conditions																																																																																																													
Product Administration	Administration of one dose intramuscularly																																																																																																													
Study Animals	1349 pigs, 18-25 days of age, at three different geographical locations divided into 672 vaccinates and 677 controls																																																																																																													
Challenge Description	Not Applicable																																																																																																													
Interval observed after challenge	Animals were observed for at least 2 hours after vaccination and then daily for 14 days after vaccination																																																																																																													
Results	<p>Results Summary:</p> <p>No injection site reactions were observed.</p> <p>The number of pigs by site with specific clinical observations post-vaccination are presented in the following table:</p> <table border="1"> <thead> <tr> <th rowspan="2">Clinical Observation</th> <th colspan="2">Site 1</th> <th colspan="2">Site 2</th> <th colspan="2">Site 3</th> </tr> <tr> <th>Vac.</th> <th>Cont.</th> <th>Vac.</th> <th>Cont.</th> <th>Vac.</th> <th>Cont.</th> </tr> </thead> <tbody> <tr> <td>Cough</td> <td>1</td> <td>1</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Gaunt</td> <td>4</td> <td>1</td> <td>0</td> <td>0</td> <td>2</td> <td>0</td> </tr> <tr> <td>Lacking vigor / growth</td> <td>1</td> <td>2</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Red anus</td> <td>0</td> <td>1</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Red ears</td> <td>1</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Swollen joint/foot /leg</td> <td>0</td> <td>1</td> <td>2</td> <td>0</td> <td>2</td> <td>2</td> </tr> <tr> <td>Inflamed umbilicus</td> <td>3</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Greasy pig disease</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>8</td> <td>14</td> </tr> <tr> <td>Pneumonia</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>3</td> <td>0</td> </tr> <tr> <td>Scours</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>18</td> <td>15</td> </tr> <tr> <td><i>Streptococcus</i> infection</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>1</td> <td>0</td> </tr> <tr> <td>Lame</td> <td>0</td> <td>0</td> <td>1</td> <td>0</td> <td>2</td> <td>5</td> </tr> </tbody> </table> <p>Additional observations were affirmed by licensee to be due to causes other than vaccination. Vac. is vaccinate; Cont. is control.</p> <p>The total number of animals exhibiting clinical signs for at least one day at all three sites are as follows:</p> <table border="1"> <thead> <tr> <th></th> <th>Clinical Signs Present</th> <th>Clinical Signs Absent</th> <th>Percent with Clinical Signs</th> </tr> </thead> <tbody> <tr> <td>Vaccinates</td> <td>48</td> <td>624</td> <td>7%</td> </tr> <tr> <td>Controls</td> <td>43</td> <td>634</td> <td>6%</td> </tr> </tbody> </table>	Clinical Observation	Site 1		Site 2		Site 3		Vac.	Cont.	Vac.	Cont.	Vac.	Cont.	Cough	1	1	0	0	0	0	Gaunt	4	1	0	0	2	0	Lacking vigor / growth	1	2	0	0	0	0	Red anus	0	1	0	0	0	0	Red ears	1	0	0	0	0	0	Swollen joint/foot /leg	0	1	2	0	2	2	Inflamed umbilicus	3	0	0	0	0	0	Greasy pig disease	0	0	0	0	8	14	Pneumonia	0	0	0	0	3	0	Scours	0	0	0	0	18	15	<i>Streptococcus</i> infection	0	0	0	0	1	0	Lame	0	0	1	0	2	5		Clinical Signs Present	Clinical Signs Absent	Percent with Clinical Signs	Vaccinates	48	624	7%	Controls	43	634	6%
Clinical Observation	Site 1		Site 2		Site 3																																																																																																									
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Controls	43	634	6%																																																																																																											
USDA Approval Date	June 18, 2009																																																																																																													

Study Type	Safety																																				
Pertaining to	All																																				
Study Purpose	To demonstrate safety under field conditions																																				
Product Administration	Single intramuscular administration																																				
Study Animals	1355 pigs at 10 - 30 days of age, (≥ 200 pigs from each of three different geographical locations were vaccinated, and a similar number at each site were not vaccinated for comparison)																																				
Challenge Description	Not applicable																																				
Interval observed after challenge	Pigs were observed immediately following vaccination and then for 14 days following vaccination. No challenge was conducted.																																				
Results	<p>Observations of Vaccinated Pigs:</p> <table border="1"> <thead> <tr> <th>Clinical Observation ^a</th> <th>MO Site N=244</th> <th>NE Site N=229</th> <th>IN Site N=207</th> </tr> </thead> <tbody> <tr> <td>None ^b</td> <td>241</td> <td>210</td> <td>193</td> </tr> <tr> <td>Poor Condition ^c</td> <td>0</td> <td>15</td> <td>0</td> </tr> <tr> <td>Dead ^d</td> <td>3</td> <td>2</td> <td>3</td> </tr> <tr> <td>Scours</td> <td>0</td> <td>1</td> <td>10</td> </tr> <tr> <td>Lame</td> <td>0</td> <td>1</td> <td>0</td> </tr> <tr> <td>Swollen Joint(s)</td> <td>2</td> <td>0</td> <td>0</td> </tr> <tr> <td>Cough</td> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>Skin Abnormalities ^e</td> <td>0</td> <td>1</td> <td>1</td> </tr> </tbody> </table> <p>^a Pigs may have exhibited more than one clinical observation. ^b For an observation of “None” a pig had to be without clinical observations for the entire 14 days of the study. ^c Observations of “Poor Condition” included: thin starve, small thin, small, gaunt, gaunt weak, and thin. ^d Observation of “Dead” included: Dead, Died, and Euthanized. ^e Observation of “Skin Abnormalities” included: scabbed knees and skin spots</p>	Clinical Observation ^a	MO Site N=244	NE Site N=229	IN Site N=207	None ^b	241	210	193	Poor Condition ^c	0	15	0	Dead ^d	3	2	3	Scours	0	1	10	Lame	0	1	0	Swollen Joint(s)	2	0	0	Cough	0	0	1	Skin Abnormalities ^e	0	1	1
Clinical Observation ^a	MO Site N=244	NE Site N=229	IN Site N=207																																		
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Lame	0	1	0																																		
Swollen Joint(s)	2	0	0																																		
Cough	0	0	1																																		
Skin Abnormalities ^e	0	1	1																																		

	Observations of Control Pigs:			
	Clinical Observation ^a	MO Site N=241	NE Site N=228	IN Site N=206
	None ^b	237	209	195
	Poor Condition ^c	0	13	0
	Dead ^d	4	2	1
	Scours	0	0	9
	Lame ^e	0	3	1
	Swollen Joint(s)	2	0	0
	Hernia ^f	0	2	0
	^a Pigs may have exhibited more than one clinical observation. ^b For an observation of “None” a pig had to be without clinical observations for the entire 14 days of the study. ^c Observations of “Poor Condition” included: thin, gaunt, gaunt/weak, and gaunt-purple ears. ^d Observation of “Dead” included: dead, died, and euthanized. ^e Observation of “Lame” included: lame, sore right front foot, and shoulder ^f Observation of “Hernia” included: hernia and surgery.			
USDA Approval Date	April 5, 2006			