Summary of Studies Supporting USDA Product Licensure

Establishment Name	Epitopix, LLC
USDA Vet Biologics Establishment Number	365
Product Code	264E.01
True Name	Escherichia Coli Bacterial Extract
Tradename(s) / Distributor or Subsidiary (if different from manufacturer)	
Date of Compilation Summary	July 11, 2018

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.

<table>
<tr><td>Study Type</td><td>Efficacy</td></tr>
<tr><td>Pertaining to</td><td>Escherichia coli O157 (E. coli O157)</td></tr>
<tr><td>Study Purpose</td><td>To demonstrate efficacy against fecal shedding of E. coli O157 in cattle.</td></tr>
<tr><td>Product Administration</td><td>Three doses administered at 3-4 week intervals by subcutaneous route.</td></tr>
<tr><td>Study Animals</td><td>Commercial yearling feedlot cattle were enrolled. Each of 5 feedyards included 20 pens in 10 matched pairs, with one pen randomized to vaccine and the other to placebo. The pens housed a total of 8,584 head of cattle, 4,298 vaccinates, and 4,286 placebo controls.</td></tr>
<tr><td>Challenge Description</td><td>The challenge was through natural exposure of E. coli O157 in the environment.</td></tr>
<tr><td>Interval observed after challenge</td><td>Cattle were observed daily. Thirty fecal samples were collected from each pen on day 0 and at the end of the observation period (95-126 days after the first vaccination).</td></tr>
<tr><td>Results</td><td>Number of matched pen pairs with the higher prevalence of E. coli O157 positive fecal specimens.

<table>
<tr><th>Feedyard</th><th>N</th><th>Vaccine Higher</th><th>Placebo Higher</th><th>Equal Prevalence</th></tr>
<tr><td>0708-1</td><td>10</td><td>0</td><td>6</td><td>4</td></tr>
<tr><td>1008-2</td><td>10</td><td>2</td><td>8</td><td>0</td></tr>
<tr><td>1008-3</td><td>10</td><td>1</td><td>4</td><td>5</td></tr>
<tr><td>1008-4</td><td>10</td><td>3</td><td>5</td><td>2</td></tr>
<tr><td>1008-5</td><td>10</td><td>3</td><td>6</td><td>1</td></tr>
<tr><td>Total</td><td>50</td><td>9</td><td>29</td><td>12</td></tr>
</table>

Raw data on fecal sample testing are shown on the next page</td></tr>
<tr><td>USDA Approval Date</td><td>November 4, 2011</td></tr>
</table>

Table. Number of *E. coli* O157 positive samples out of 30 tested from each pen at enrollment and the end of the observation period.

			Enrollment Samples		Final Samples	
Study	Feedyard	Pair	Vaccinates	Placebo	Vaccinates	Placebo
0708	1	1	5	3	0	0
0708	1	2	1	0	1	7
0708	1	3	1	7	0	4
0708	1	4	6	2	0	0
0708	1	5	4	4	0	0
0708	1	6	0	0	0	5
0708	1	7	3	2	1	1
0708	1	8	0	0	2	4
0708	1	9	4	0	0	1
0708	1	10	3	1	1	10
1008	2	11	7	5	5	7
1008	2	12	2	4	9	6
1008	2	13	22	19	3	7
1008	2	14	5	0	8	1
1008	2	15	3	1	5	9
1008	2	16	0	0	13	16
1008	2	17	0	1	0	10
1008	2	18	0	1	11	16
1008	2	19	1	0	7	14
1008	2	20	1	1	4	18
1008	3	21	0	0	0	0
1008	3	22	0	1	0	0
1008	3	23	0	1	0	0
1008	3	24	2	1	0	0
1008	3	25	0	0	15	0
1008	3	26	0	0	0	7
1008	3	27	0	0	1	2
1008	3	28	0	0	0	0
1008	3	29	2	2	1	6
1008	3	30	0	0	0	2
1008	4	31	0	0	1	0
1008	4	32	0	0	0	0
1008	4	33	1	3	0	3
1008	4	34	3	1	0	0
1008	4	35	0	1	1	5
1008	4	36	1	2	6	3
1008	4	37	0	1	0	5
1008	4	38	0	0	4	0
1008	4	39	2	1	0	4

			Enrollment Samples		Final Samples	
Study	Feedyard	Pair	Vaccinates	Placebo	Vaccinates	Placebo
1008	4	40	14	17	1	8
1008	5	41	1	1	3	3
1008	5	42	3	3	6	7
1008	5	43	0	1	2	11
1008	5	44	0	0	11	8
1008	5	45	0	0	5	6
1008	5	46	0	2	8	2
1008	5	47	2	0	4	8
1008	5	48	0	0	8	1
1008	5	49	0	0	3	4
1008	5	50	2	4	0	1

Study Type	Safety
Pertaining to	ALL
Study Purpose	To demonstrate safety of the product under field conditions.
Product Administration	Three doses administered at 3-4 week intervals by subcutaneous route.
Study Animals	655 head of commercial feedlot cattle between 4 and 10 months of age were housed at three separate commercial feedyards in three geographically distinct regions. At least 1/3 of the aimals vaccinated in each region were the minimum age recommended for product administration. Region 1 included 246 cattle. Region 2 included 211 cattle. Region 3 included 198 cattle.
Challenge Description	Not applicable
Interval observed after challenge	On day of vaccination cattle were observed for local and systemic reactions and then palpated weekly to monitor any local swelling until resolution.

Results

Tables show the numer of cattle with injection site reactions following the first dose of vaccine

Region 1

	Weeks Post Vaccination						
	0	1	2	4	5	6	7
No palpable swelling	244	76	113	229	237	242	238
< 1.5 cm	1	0	6	0	2	2	0
1.5 - 5.0 cm	1	168	125	16	6	1	7
> 5 cm	0	1	1	0	0	0	0
Total Animals palpated	246	245	245	245	245	245	245

Region 2

	Weeks Post Vaccination						
	0	1	2	3	4	5	6
No palpable swelling	211	26	39	92	131	170	196
< 1.5 cm	0	11	25	21	24	33	6
1.5 - 5.0 cm	0	130	144	94	54	6	7
> 5 cm	0	43	2	3	1	1	1
Total Animals palpated	211	210	210	210	210	210	210

Region 3

	Weeks Post Vaccination				
	0	1	3	4	6
No palpable swelling	198	68	165	177	194
< 1.5 cm	0	33	26	12	0
1.5 - 5.0 cm	0	97	6	6	2
> 5 cm	0	0	0	1	0
Total Animals palpated	198	198	197	196	196

Tables show the numer of cattle with injection site reactions following the second dose of vaccine

Region 1

	Weeks Post Vaccination						
	0	1	2	3	4	5	6
No palpable swelling	244	98	166	228	240	244	245
< 1.5 cm	0	1	18	2	2	1	0
1.5 - 5.0 cm	1	145	61	15	3	0	0
> 5 cm	0	1	0	0	0	0	0
Total Animals palpated	245	245	245	245	245	245	245

Region 2

	Weeks Post Vaccination					
	0	1	2	3	4	5
No palpable swelling	210	111	190	201	208	209
< 1.5 cm	0	28	3	6	0	0
1.5 - 5.0 cm	0	69	17	3	1	0
> 5 cm	0	2	0	0	0	0
Total Animals palpated	210	210	210	210	209	209

Region 3

	Weeks Post Vaccination				
	0	1	3	4	9
No palpable swelling	193	48	155	170	60
< 1.5 cm	2	17	16	7	0
1.5 - 5.0 cm	1	128	17	12	0
> 5 cm	1	3	8	5	0
Total Animals palpated	197	196	196	194	60

Tables show the numer of cattle with injection site reactions following the third dose of vaccine

Region 1

	Weeks Post Vaccination			
	0	1	2	3
No palpable swelling	238	127	189	240
< 1.5 cm	0	0	0	0
1.5 - 5.0 cm	7	118	56	5
> 5 cm	0	0	0	0
Total Animals palpated	245	245	245	245

Region 2

	Weeks Post Vaccination				
	0	1	2	3	9
No palpable swelling	196	50	172	33	4
< 1.5 cm	6	1	5	0	0
1.5 - 5.0 cm	7	150	32	4	0
> 5 cm	1	8	0	0	0
Total Animals palpated	210	209	209	37	4

Region 3

	Weeks Post Vaccination		
	0	1	6
No palpable swelling	194	155	60
< 1.5 cm	0	25	0
1.5 - 5.0 cm	2	13	0
> 5 cm	0	1	0
Total Animals palpated	196	194	60

No systemic reactions or deaths were attributed to the vaccine at any study site. Transient swelling at the injection site is commonly observed.

USDA Approval Date	January 26, 2009