Summary of Studies Supporting USDA Product Licensure

Establishment Name	Merial, Inc.
USDA Vet Biologics Establishment Number	298
Product Code	16N1.R0
True Name	Marek's Disease-Newcastle Disease Vaccine, Serotype 3, Live Marek's Disease Vector
Tradename(s)/Distributor (if different from manufacturer)	Newxxitek HVT+ND - No distributor specified
Date of Compilation Summary	December 22, 2016

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	Marek's Disease Virus Serotype 3
Study Purpose	Demonstrate efficacy against Marek's disease
Product Administration	1 dose (0.05 mL) by *in ovo* route
Study Animals	Day-old chicks divided into 3 groups Group 1 vaccinated with Code 16N1.R0 and challenged Group 2 sham vaccinated and challenged (control) Group 3 sham vaccinated non-challenged (control)
Challenge Description	Serotype-1 (SR-1) GA 22 strain given 7 days after vaccination
Interval observed after challenge	The birds were observed daily for clinical signs for 7 weeks.
Results	Vaccinates and controls were evaluated in terms of Marek's disease clinical signs and/or grossly observable lesions per the criteria in 9 CFR 113.330(c)(4) & (5). Birds with clinical signs and/or observable lesions: Group 1: 5/35 Group 2: 29/34 Group 3: 0/34 Requirements of 9 CFR 113.330(c)(4) & (5) were met. Raw data on attached page
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Group/Bird	Paralysis	Locomotive	Emaciation	Depression	Other Clinical Signs
1/1					
1/2				X	
1/3					
1/4					
1/5					
2/1		X			
2/2		X		X	
2/3				X	
2/4				X	
2/5		X			
2/6				X	
2/7				X	
2/8				X	
2/9		X			
2/10					
2/11		X			
2/12				X	
2/13				X	
2/14				X	
2/15			X	X	
2/16				X	
2/17				X	
2/18		X			
2/19				X	
2/20				X	
2/21				X	
2/22				X	
2/23				X	
2/24		X			
2/25				X	
2/26			X	X	
2/27				X	
2/28		X			
2/29		X		X	

Group/Bird	Liver	Spleen	Heart	Muscle	Gonads	Kidneys	Other Gross Lesions	Comments
1/1				X	X	X		
1/2					X	X		
1/3	X							
1/4		X			X			
1/5	X	X			X	X		
2/1				X				
2/2	X	X	X					
2/3						X		
2/4		X			X			
2/5						X		
2/6						X		
2/7		X		X	X			
2/8	X	X						
2/9				X				
2/10					X	X		
2/11	X	X		X	X	X		
2/12	X	X	X					
2/13		X	X					
2/14		X						
2/15						X		
2/16				X	X	X		
2/17	X	X				X		
2/18		X		X	X	X		
2/19		X	X					
2/20	X	X	X					
2/21	X	X						
2/22	X	X				X		
2/23	X	X			X			
2/24		X	X	X	X	X		
2/25		X	X					
2/26						X		
2/27	X	X	X			X		
2/28						X		
2/29				X		X		

Study Type	Efficacy
Pertaining to	Marek's Disease Virus Serotye 3
Study Purpose	Demonstrate efficacy against Marek's disease
Product Administration	1 dose (0.2 mL) by subcutaneous route
Study Animals	Day-old chicks divided into 3 groups Group 1 vaccinated with Code 16N1.R0 and challenged Group 2 sham vaccinated and challenged (control) Group 3 sham vaccinated non-challenged (control)
Challenge Description	Serotype-1 (SR-1) GA 22 strain given 7 days after vaccination
Interval observed after challenge	The birds were observed daily for clinical signs for 7 weeks.
Results	Vaccinates and controls were evaluated in terms of Marek's disease clinical signs and/or grossly observable lesions per the criteria in 9 CFR 113.330(c)(4) & (5). Birds with clinical signs and/or observable lesions: Group 1: 5/35 Group 2: 29/35 Group 3: 0/35 Requirements of 9 CFR 113.330(c)(4) & (5) were met. Raw data on attached page
USDA Approval Date	December 23, 2013

Group/Bird	Paralysis	Locomotive	Emaciation	Depression	Other Clinical Signs
1/1					
1/2					
1/3					
1/4					
1/5					
2/1					
2/2					
2/3					
2/4					
2/5			X		
2/6		X			
2/7	X				
2/8					
2/9		X			
2/10			X		
2/11					
2/12					
2/13					
2/14					
2/15					
2/16		X	X	X	
2/17					
2/18				X	
2/19			X		
2/20					
2/21			X		
2/22				X	
2/23			X	X	
2/24			X		
2/25					
2/26			X		
2/27		X			
2/28			X		
2/29				X	

Group/Bird	Liver	Spleen	Heart	Muscle	Gonads	Kidneys	Other Gross Lesions	Comments
1/1	X					X		
1/2				X				
1/3		X		X				
1/4	X	X			X	X		
1/5				X	X			
2/1	X	X	X			X		
2/2		X				X		
2/3		X			X	X		
2/4	X	X	X		X	X	X	Skin
2/5	X	X			X	X		
2/6	X	X			X	X		
2/7	X	X		X	X		X	other = nerve and skin
2/8		X			X			
2/9	X	X				X	X	Skin positive, and GI/proventriculus
2/10	X	X						
2/11	X			X			X	GI
2/12	X					X		
2/13		X			X	X		
2/14		X			X			
2/15	X							Spleen enlarged
2/16	X	X				X		
2/17		X						
2/18						X	X	Skin positive
2/19	X	X			X	X		
2/20	X	X				X		
2/21	X	X						
2/22	X							
2/23	X	X		X	X		X	other = skin
2/24	X	X	X			X		
2/25	X						X	GI tract
2/26	X				X	X		
2/27								
2/28	X	X		X		X	X	Skin positive
2/29	X					X	X	Skin, wattles positive, also swollen head

Study Type	Efficacy
Pertaining to	Newcastle disease virus
Study Purpose	Demonstrate efficacy against Newcastle disease
Product Administration	1 dose (0.05 mL) by *in ovo* route
Study Animals	Day-old chicks divided into 2 groups Group 1 vaccinated with Code 16N1.R0 and challenged Group 2 sham vaccinated and challenged (control)
Challenge Description	NDV Texas GB given 28 days after vaccination
Interval observed after challenge	Birds observed daily for clinical signs for 14 days post challenge
Results	Vaccinates and controls were evaluated in terms of Newcastle disease clinical signs per the criteria in 9 CFR 113.329(c)(4). Birds with clinical signs: Group 1: 0/30 Group 2: 29/29 Requirements of 9 CFR 113.329(c)(4) were met. Raw data on attached page
USDA Approval Date	August 23, 2012

Group/Bird	Respiratory Distress	Paralysis	Torticollis	Other Clinical Signs	Muscular Tremors	Opisthotonos	Death
2/1							X
2/2							X
2/3							X
2/4		X			X		
2/5		X			X		
2/6		X			X		
2/7		X			X		
2/8		X			X		
2/9		X			X		
2/10		X			X		
2/11							X
2/12							X
2/13							X
2/14		X			X		
2/15		X			X		
2/16		X			X		
2/17		X			X		
2/18		X			X		
2/19		X			X		
2/20							X
2/21							X
2/22							X
2/23							X
2/24		X			X		
2/25		X			X		
2/26		X			X		
2/27		X			X		
2/28		X			X		
2/29		X			X		

Study Type	Efficacy
Pertaining to	Newcastle disease virus
Study Purpose	Demonstrate efficacy against Newcastle disease
Product Administration	1 dose (0.2 mL) by Subcutaneous route
Study Animals	Day-old chicks divided into 2 groups Group 1 vaccinated with Code 16N1.R0 and challenged Group 2 sham vaccinated and challenged (control)
Challenge Description	NDV Texas GB given 28 days after vaccination
Interval observed after challenge	Birds observed daily for clinical signs for 14 days post challenge
Results	Vaccinates and controls were evaluated in terms of Newcastle disease clinical signs per the criteria in 9 CFR 113.329(c)(4). Birds with clinical signs: Group 1: 1/29 Group 2: 30/30 Requirements of 9 CFR 113.329(c)(4) were met. Raw data on attached page
USDA Approval Date	August 21, 2012

Group/Bird	NDV clinical signs Results
1/1	X
2/1	X
2/2	X
2/3	X
2/4	X
2/5	X
2/6	X
2/7	X
2/8	X
2/9	X
2/10	X
2/11	X
2/12	X
2/13	X
2/14	X
2/15	X
2/16	X
2/17	X
2/18	X
2/19	X
2/20	X
2/21	X
2/22	X
2/23	X
2/24	X
2/25	X
2/26	X
2/27	X
2/28	X
2/29	X
2/30	X

Study Type	Safety
Pertaining to	ALL
Study Purpose	Demonstrate safety of product under typical use conditions
Product Administration	1 dose by either the (0.05 mL) in ovo or (0.2 mL) subcutaneous (SQ) route
Study Animals	Poultry, 18 day-old embryos or day-old chicks 125,506 were vaccinated by in ovo route, 41,900 were vaccinated by subcutaneous route and 136,459 kept as controls. Animals were observed daily for mortality through 21 days after vaccination.
Challenge Description	Not applicable
Interval observed after challenge	Not applicable
Results	

Location	Treatment	Total Placed	21 Day Mortality	% Mortality	% Hatch-ability	% Condemnation
1	SQ	9,100	135	1.5	N/A	0.18
1	*In ovo*	9,100	126	1.4	86.9	0.06
1	Control	16,400	223	1.4	87.4	0.09
2	SQ	20,100	307	1.5	N/A	N/A
2	*In ovo*	20,000	325	1.6	87.8	
2	Control	20,000	439	2.2	85.6	N/A
3	SQ	12,700	107	0.8	N/A	N/A
3	*In ovo*	12,700	145	1.1	90.2	
3	Control	16,900	312	1.8	86.7	N/A
4	*In ovo*	55,900	1447	2.6	84.6	0.20
4	Control	55,400	1015	1.8	87.6	0.10
5	*In ovo*	27,806	423	1.5	89.4	0.21
5	Control	27,759	422	1.5	88.7	0.10

N/A is not applicable

No adverse reactions attributable to the vaccine were recorded.

USDA Approval Date	June 15, 2016 and November 10, 2016