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vIBDV in California 2008-2014: What we think we know and where we're heading

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Poultry Institute, 2014 Program: Puyallup, WA
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Questions?



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Who am I ??

Work Experience


- UC Extension, UC Davis School of Vet Med
- California Department of Food and Agriculture
- California Council of Science and Technology (Science Fellow-California State Senate)
- Small Animal Veterinarian
- Lawrence Livermore National Lab (Chemical And Biological National Security Program)



Areas of Interest

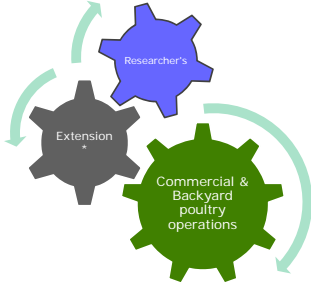
- Application of classical & Spatial Epidemiology in disease surveillance
- Interface of science & policy
- 'Sustainable' Food animal production
- 'Next Gen' food safety

Real Life



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What is Cooperative Extension?



Mission Statement:
Statewide network of researchers and educators focused on the creation and application of knowledge in agriculture

- 200 locally based CE advisors and specialists
- 57 local offices
- 130 campus based CE specialists
- 9 research and extension centers
- 700 academic researchers

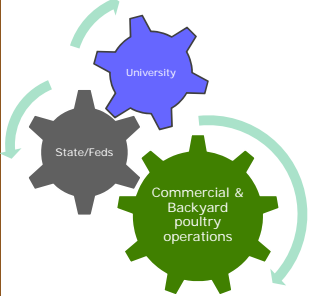
<http://ucanr.edu/>



* Extension Specialists, Researchers and Farm Advisors

UC DAVIS VETERINARY MEDICINE **cdfa UC CE**

Acknowledgements




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Industry:
Cutter Assoc. International
CA Poultry producers
PEPA



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Questions

How did vIBDV get to California?

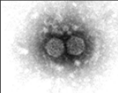
How does it spread?

How can we mitigate the spread vIBDV?

vvIBDV

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- Non-enveloped
- Virus is highly resistant to heat and chemicals and can persist in the environment for months and possibly longer
- Predilection for lymphoid tissue, particularly the bursa
- Genome has 2 segments of ds RNA



vvIBDV

- Acute clinical disease and high (up to 60%) mortality
- Layers affected more than broilers
- Clinical disease typically observed in chickens between 3-8 weeks of age

vvIBDV

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Transmission

- Fecal – oral
- Virus not egg transmitted
- Infected chickens excrete virus up to 2 weeks after infection
- Mealworms, mosquitos, rodents and wild birds have all been implicated as reservoirs.

Sensitivity

- Inactivated at pH 12
- Inactivated by 0.5% chloramine in 10 minutes
- Invert soaps
- Iodine and formalin based disinfectants may be effective

Vaccination

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Breeder Vaccination

- Moderate level of protection in chicks

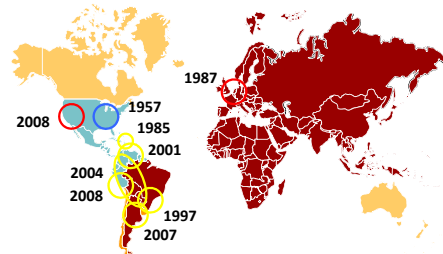
Progeny Vaccination

- Provide active immunity when the maternal immunity wanes


Vaccination worse than disease???

Global distribution of vvIBDV

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1957, 1985, 1987, 2001, 2004, 2008, 1997, 2007



Subtypes of vvIBDV in California

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Segment A	Segment B	Name
very virulent	very virulent	vvIBDV/vvIBDV
very virulent	Serotype 2	vvIBDV/serotype 2
very virulent	Standard sequence	vvIBDV/standard
Standard sequence	Very virulent	Standard/vvIBDV

IBDV in California (2008-2013)

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Case #	Date	Commercial/BY	Production Class	IBDV Subtype	Distance from Index case (miles)	Approximate age (weeks)	IBD Vaccine status	Reported mortality
1	Dec. 08*	Commercial	Layer	vvIBDV/vvIBDV	---	10	Vac	5%-30%
2	Dec. 2008	Commercial	Layer	vvIBDV/vvIBDV	2.5	Unknown	Unknown	~50%
3	May 09*	Commercial	Brooding facility	vvIBDV/serotype 2	2.5	5 & 7	Vac	~15%
4	May 2009	Commercial	Broiler	vvIBDV/vvIBDV	2	3	Vac	~1%
5	Aug. 2009	Commercial	Broiler	vvIBDV/vvIBDV	4	4	Vac	~1%
6	Oct 09*	BY	Layer	vvIBDV/serotype 2	32	28	Unknown	Unknown
7	Jan. 2010	Commercial	Broiler	vvIBDV/vvIBDV	14	3.5	Vac	~1%
8	Jan. 2010	BY	Layer	vvIBDV/vvIBDV	5.5	10-11	Unknown	~15%
9	June 2010	BY	Layer	vvIBDV?	1	10-12	Unknown	Unknown
10	Sept. 2010	BY	Unknown	vvIBDV/vvIBDV	141	14	Unknown	Unknown
11	Oct. 10*	Commercial	Brooder	vvIBDV/standard	1	1-10	Vac	~
12	Dec. 2010	Commercial	Brooding facility	vvIBDV?	1	5 & 7	Vac	~5%
13-25	Jan. 2011 and present	Commercial	Broiler	vvIBDV/vvIBDV	*	~4-8 younger	Vac	~1%
24	Aug. 2011	BY	Layer	vvIBDV/serotype 2	19	4	Not vaccinated	Unknown
25	Sept. 2011	BY	Layer	vvIBDV?	19	Unknown	Not vaccinated	Unknown

- o 54% are commercial vs. BY facilities
- o 54% are layer or brooder vs. broiler or unknown operations
- o 54% are vvIBDV/vvIBDV, 23% are vvIBDV/serotype 2, and 8% are vvIBDV/standard,

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vvIBDV in Washington State

- Spring 2014
- Layer Flock
- Same subtype as in SoCal (vvIBDV/standard)

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vvIBDV Subtypes in California

Segment A	Segment B	Name
very virulent	very virulent	vvIBDV/vvIBDV
very virulent	Standard 2	vvIBDV/standard 2
very virulent	Standard sequence	vvIBDV/standard
Standard sequence	Very virulent	Standard/vvIBDV

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Questions

How did vvIBDV get to California?

How does it spread?

How can we mitigate the spread vvIBDV?

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How to it get here?

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Questions

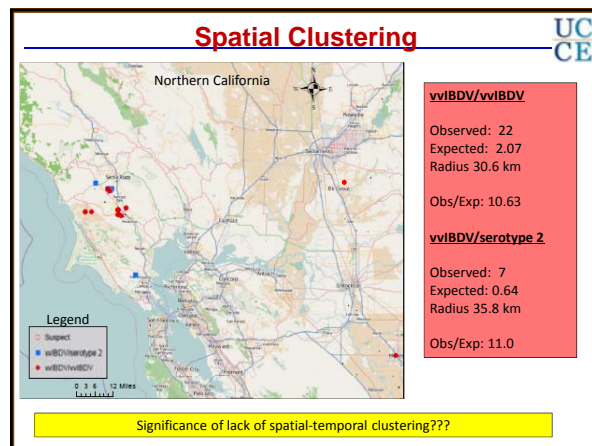
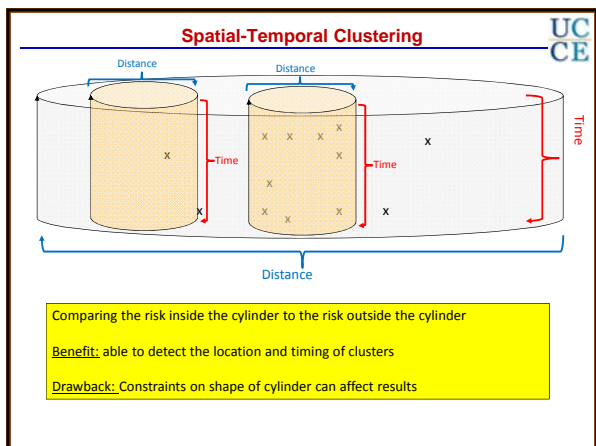
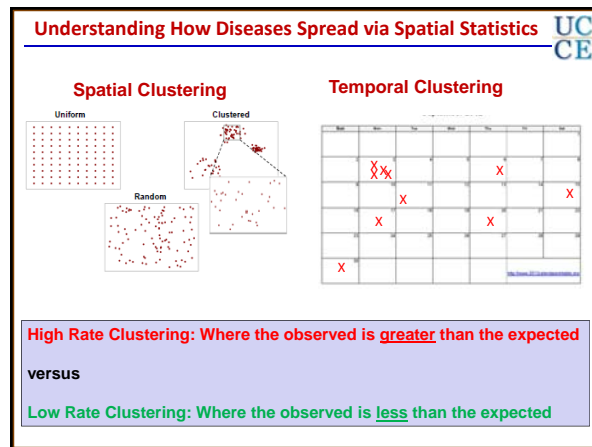
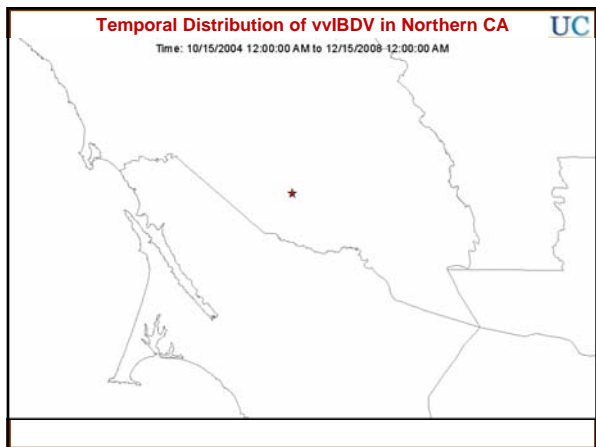
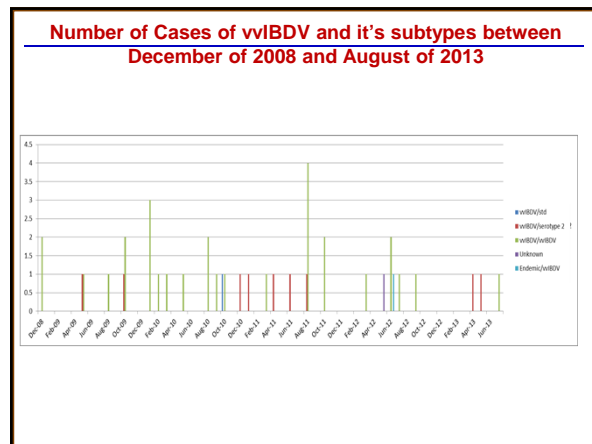
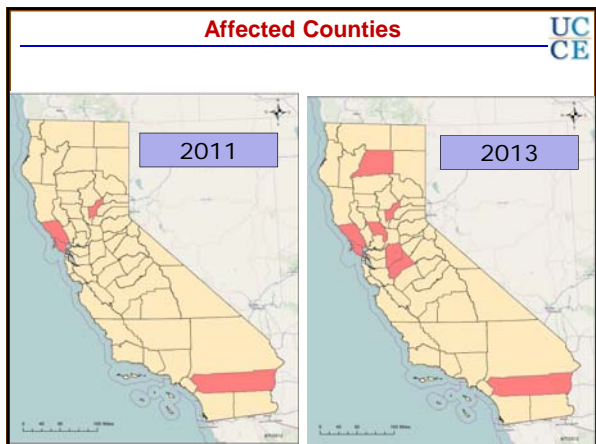
How did vvIBDV get to California?

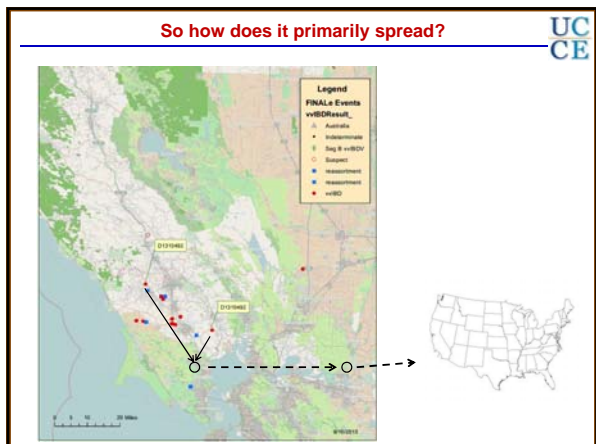
How does it spread?

How can we mitigate the spread vvIBDV?

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Following vvIBDV (How does it spread?)





If you are really, really interested in the epidemiology of vvlBDV...

AVIAN DISEASES 57:76-82, 2013

Historical, Spatial, Temporal, and Time-Space Epidemiology of Very Virulent Infectious Bursal Disease in California: A Retrospective Study 2008–2011

Maurice Pitesky,^{AH} Kristina Catalano,^B Beat Crowley,^C Michael Poulos,^A Greg Ramon,^D Dave Willoughby,^A Peter Woolcock,^E Greg Carter,^F Mark Brand,^A Johnny Tam,^A Daral Jackson,^F Larry Allen,^A Rich Breimeyer,^C Annette Jones,^A Kenneth Forsythe,^G C. Gabriel Santos-Cat,^C and Bruce Charlton^C

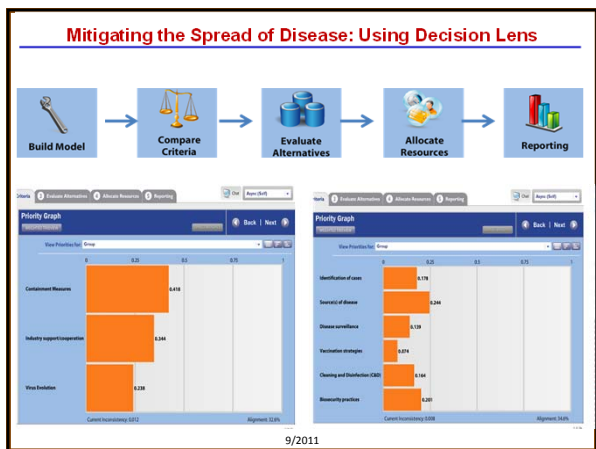
Questions

How did vvlBDV get to California?

How does it spread?

How can we mitigate the spread vvlBDV?

- ### Recommendations
- Outreach with
 - BY specialty breeders
 - NO trading of poultry with bursas
 - Hatcheries
 - Vaccine (HVT-VP2)
 - Feed stores
 - Small commercial
 - BY producers
 - National surveillance in strategic states
 - *Antemortem testing
 - Vaccine studies
 - Wildlife testing
- Mitigation vs. Elimination of vvlBDV???**



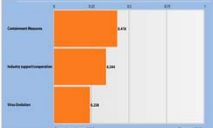
DL Process

Alternative	1 vs F3/U	1 vs F5 vs U	diff indiv wts	everyone same wt
Determination of RF for Re-emergence/introduction at facilities	1	1	1	1
Development of lab dx test to screen for segment B of genome	2	2	1	2
Surveillance of other potential (nonavian) reservoirs (rodents, mealworms, etc.)	3	3	4	3
Wild bird surveillance geographically linked to affected facilities	4	5	5	4
Evaluation of vvlBD strains using SPF birds	4	3	3	6
Voluntary surveillance at/around affected commercial facilities	4	5	5	11
Development of lab protocols to track changes in genome	7	5	5	5
Voluntary surveillance at commercial facilities (Central Valley, other nonaffected areas)	8	5	8	6
Development of environmental test	9	10	9	6
Development of BMP disease control program	10	9	9	6
Voluntary surveillance/outreach to BYF owners near affected premises	10	10	11	6
Voluntary surveillance/outreach to BYF owners throughout State	12	12	12	11
Sentinel Surveillance using BY birds	13	14	14	14
Evaluation of C&D methods	14	13	13	13
Development of case definition	15	14	15	15
Evaluation of vaccination strategies for parent/production flocks	16	16	16	16
Id. of recommended IBD vaccination strategies	17	16	17	17

Do we still agree???

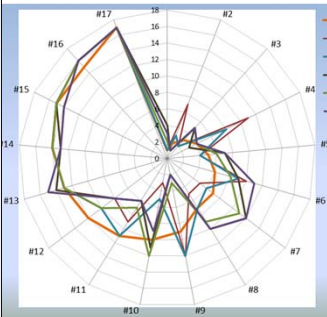
Creating a 'stress test'

One of the major advantages of DL based AHP models is the ability to change the model when the facts on the ground have changed.



Scenario A: Containment weight doubled
Scenario B: Containment weight increased 50%
Scenario C: Virus Evolution weight doubled
Scenario D: Virus evolution weight increased 50%
Scenario E: Containment weight and virus evolution increased 20%

DL Stress test



Alternative	Details
1	Determination of risk factors for re-emergence or re-introduction at affected facilities
2	Development of laboratory diagnostic test to screen for segment B of the vvIBD genome
3	Surveillance of other potential reservoirs (meathooks, rodents, beetles)
4	Evaluation of vvIBD strains using Specific Pathogen-Free (SPF) birds
5	Surveillance of wild bird populations geographically linked to affected commercial poultry facilities
6	Voluntary surveillance of commercial facilities in the Central Valley and other parts of the State not known to have vvIBD
7	Development of Best Management Practices (BMP) disease control program
8	Voluntary surveillance at and around known affected commercial facilities
9	Development of laboratory protocols that enable the tracking of changes in the vvIBD genome
10	Development of environmental test
11	Voluntary surveillance and outreach to backyard owners in proximity to affected premises
12	Voluntary surveillance and outreach to backyard owners throughout the State
13	Evaluation methods for cleaning and disinfection (C&D) of vvIBD
14	Sentinel surveillance using backyard birds
15	Development of case definition for vvIBD
16	Evaluation of IBD vaccine strategies for parent and production flock
17	Identification of recommended IBD vaccination strategies

Stress Test Results

Alternative	Original	A	B	C	D	E
1	1	1	1	4	2	3
2	2	7	3	1	1	1
3	3	2	2	5	5	5
4	4	11	8	3	4	4
5	5	4	4	7	6	7
6	6	10	9	9	8	11
7	7	5	6	12	11	12
8	8	5	7	10	9	10
9	9	12	12	2	3	2
10	10	3	5	11	12	9
11	11	9	11	6	7	6
12	12	8	10	8	10	8
13	13	15	13	14	13	15
14	14	13	14	13	14	13
15	15	14	15	15	15	14
16	16	16	16	16	16	16
17	17	17	17	17	17	17
Containment weight	0.377	0.749	0.565	0.241	0.31	0.452
Industry Support weight	0.361	0.145	0.252	0.234	0.297	0.1
Virus evolution weight	0.262	0.106	0.183	0.524	0.392	0.448

Article Accepted with Revisions to the Journal of Preventative Veterinary Medicine

A COOPERATIVE APPROACH TO ANIMAL DISEASE RESPONSE ACTIVITIES: ANALYTICAL HIERARCHY PROCESS (AHP) AND vvIBD IN CALIFORNIA POULTRY

EMI K. SAITO³, SUPIE SHEA³, ANNETTE JONES⁵, GREGORY RAMOS⁵, & MAURICE PITESKY^{6*}

Questions?

