



# POULTRY PONDERINGS



A QUARTERLY NEWSLETTER SUMMARIZING POULTRY RELATED WORK AT UC

## Using Weather Radar and Landsat Imagery to Track Waterfowl in the Central Valley of California to Improve Avian Influenza Surveillance

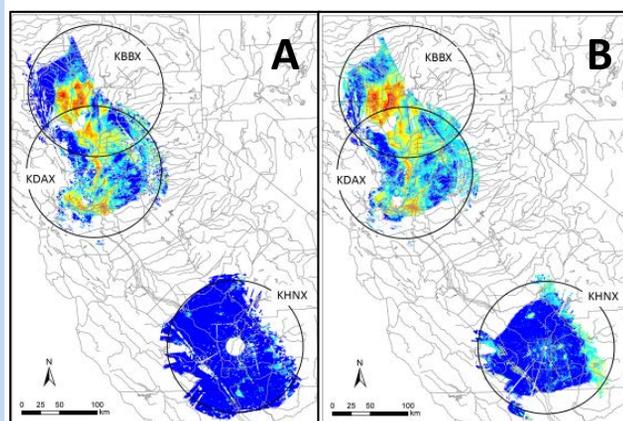
Maurice Pitesky\*, Todd Kelman\*, Elliott Matchett<sup>^</sup>, Myrna Cadena\* , Jaclyn Smolinsky<sup>+</sup> and Jeff Buler<sup>+</sup>

\* UC Davis School of Veterinary Medicine-Cooperative Extension, <sup>^</sup> USGS, <sup>+</sup> University of Delaware

Millions of waterfowl migrate into the Central Valley of California every winter. While the Central Valley offers an important habitat for over-winter waterfowl, they are known to be the primary reservoir of avian influenza. In 2014- 2015, the U.S. experienced its worst bird flu outbreak in history, resulting in more than 48 million birds dying in 15 states, including California. Therefore, understanding the spatial location of waterfowl relative to domestic poultry is an essential component of AI surveillance. Current methods for waterfowl surveillance and testing of waterfowl for avian influenza (AI) are primarily based on USGS fly-overs and “convenience” sampling of waterfowl at hunter-kill stations. In order to improve the spatial and temporal resolution of waterfowl surveillance in the Central Valley we are exploring various remote sensing technologies including Next Generation Radar (NEXRAD) and Landsat imagery.

### How It Works

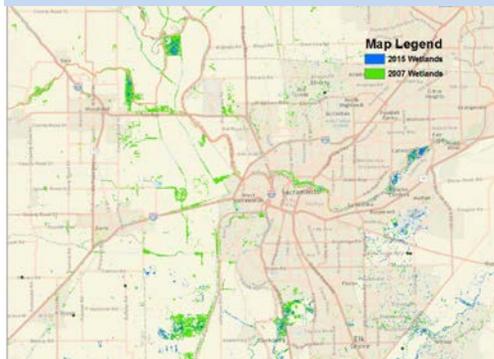
NEXRAD, or next-generation radar, is a network of 160 high-resolution Doppler weather radars operated by the National Weather Service. Instead of monitoring rain drops, the data can be processed to track waterfowl as they leave in concert from their roosting locations. Jeff Buler at the University of Delaware has pioneered this approach and UC Davis is working with his laboratory to learn the technique and apply it to waterfowl surveillance focused on protecting domestic poultry. By tracking mass bird movements remotely in near real-time, we hope to gain novel strategic insights with respect to (cont. on next pg)



NEXRAD radar maps from three radar stations in the Central Valley of California during the wet winter of 2005-06 (A) and the dry winter of 2014-15 (B). Red and blue denote high and low density feeding flights respectively.

surveillance and prevention of avian influenza transmission to domestic poultry.

Waterfowl utilize natural and man-made wetlands such as rice fields as habitat for roosting and feeding. Therefore, in addition to NEXRAD we are also using satellite imagery (i.e. landsat) to map potential habitat that waterfowl may use in order to better understand variability of habitat with respect to water presence in dry and wet years.



We anticipate hosting monthly to bi-monthly interactive information on waterfowl movements in the Central Valley on the UCCE poultry website during winter starting the winter of 2018 with the goal of helping commercial and backyard flocks assess risk to their flocks. Further statistical modeling will also be incorporated into the user friendly web-based tool. This work was funded by UC Agriculture and Natural Resources and is a collaboration between the UC Davis School of Veterinary Medicine, Jeff Buler at the University of Delaware, the U.S. Geological Survey, the California Department of Food and Agriculture, the California Poultry Federation, the Pacific Egg and Poultry Association and Point Blue, an organization that focuses on conservation science.

Landsat imagery of the Central Valley of California during the wet winter of 2005-06 (A) and the dry winter of 2014-15 (B). Results shows variability between the 2 years which may affect waterfowl habitat selection and changes in risk to poultry

## Backyard Chickens and Lead?

Arya Sobhakumari,

California Animal Health and Food Safety Laboratory (CAHFS), Davis

Backyard chickens are exposed to variety of heavy metals including lead. One of the major concerns with lead exposed birds is the potential for lead reaching humans through egg consumption. Ingestion of lead is particularly hazardous for children and pregnant women. According to the Centre for Disease Control (CDC), any amount of lead is unsafe for children and can result in neurodevelopmental morbidities such as altered motor functions, cognition, reduced IQ and antisocial behavior. Though legislation has been passed to reduce lead in the environment, various sources of lead still exist in old chipped paint, lead shots, etc which are potential major lead sources for backyard chickens.

The potential public health concerns associated with lead exposure prompted us to systematically screen all backyard chickens submitted to CAHFS over a year time frame. Specifically, 1,476 backyard chicken livers were tested for lead toxicity. Preliminary findings show that 3% (45) of the 1,476 backyard chicken livers were found to have detectable lead. Many of these birds were lead positive despite not having any clinical signs or indications of lead exposure which is a cause for concern from a public health perspective. The owners of positive birds were contacted to obtain further details such as the premise and egg consumption habits of the family members. *(cont. on next page)*

Owners were encouraged to submit eggs and environmental samples to test for lead as well as to check the blood lead levels of their family. Follow up testing of eggs from the lead contaminated flocks showed that some eggs had lead as high as 13 micrograms which is more than twice the FDA recommendation for maximum daily lead intake for children (6 micrograms). There are still many unknowns regarding this issue like how lead concentrations in the liver correlates with lead concentration in eggs from the same hens and the duration of lead excretion which is assumed to be lengthy. Therefore, particular attention should be paid to the environment in which the birds are raised. Our results indicates a potential health problem and demands further investigation so that appropriate measures can be taken to prevent lead exposure.

## **Project to Fund Black Solider Fly Larvae as a Source of Methionine for Organic Layers and Broilers**

Deb Niemeier\*, Jean VanderGheynst\* and Maurice Pitesky^

\*UC Davis School of Civil and Environmental Engineering, ^ UC Davis School of Veterinary Medicine-Cooperative Extension

The current organic standards, which were developed by the National Organic Standards Program of the USDA, only allow up to 2 pounds of synthetic methionine per ton of feed for laying hens and broilers. Without enough methionine in organic commercial poultry diets, hens are prone to suboptimal egg production, egg size, decreased growth and diminished immunity.

The Methionine Task Force (MTF) was formed by the organic poultry industry to help support relevant research and address regulatory issues. The MTF recently allocated \$40,000 of seed money to UC Davis to evaluate methionine levels in black soldier fly larvae (BSFL) at different stages in their larval life cycle. The idea is to identify the dietary effect of BSFL on organic poultry and to identify optimal conditions for feeding larvae as a protein supplement to organic broilers and layers.

The work will continue initial work supported by a 2015 UC Davis Innovation Development Award which supported the development of a prototype bioreactor (Poultry Ponderings, Edition #8). The bioreactor uses ensiled organic waste material as a substrate for larval production. In the first stage of the MTF supported project, we will be examining the best BSFL growth conditions for delivering methionine supplements. During the second stage of the project, BSFL will be fed to commonly used organic commercial broiler and layer flocks in controlled experiments at the UC Davis Pastured Poultry Farm. We will be measuring dietary methionine levels, various flock based health factors and organoleptic properties of the meat and eggs via controlled surveys.

For more information on the MTF including membership opportunities please contact David Will at [david@chinovalleyranchers.com](mailto:david@chinovalleyranchers.com) or David Bruce at [david.bruce@organicvalley.coop](mailto:david.bruce@organicvalley.coop)

## Infectious Laryngotracheitis (ILT) in Chickens

H. L. Shivaprasad. California Animal Health and Food Safety Laboratory System, Tulare Branch. University of California, Davis

Infectious laryngotracheitis (ILT) is an acute and highly contagious respiratory viral disease primarily of chickens and it is caused by Gallid Herpesvirus 1. Viruses vary greatly in their pathogenicity from low to highly pathogenic. The disease occurs in chickens of all ages but it is most common in broiler chickens more than three weeks of age or in mature chickens. The disease is characterized by lacrimation, respiratory signs such as gurgling, coughing, dyspnea, open mouth breathing and rarely with expectoration of blood. Depending on the pathogenicity of the viral strain, morbidity can be as low as 5 to 10 % (called silent ILT) or high as 50 % to 70 % and mortality can range from negligible to 10 % to 20 %. The disease can persist in a flock for 2 to 4 weeks. ILT is transmitted horizontally through contaminated environment including air, dust, feathers, sick chickens, personnel, fomites such as shared equipment, clothes, shoes, feed trucks and trucks carrying live and dead haul. A few recovered and vaccinated chickens can become carriers and also be a source of infection. For example the modified-live vaccine strains and in particular the chicken-embryo-origin (CEO) strains used for vaccination in layers, can be a source of outbreaks in broiler chickens.



Figure 1. Lachrymation with exudate around the swollen eyelids in a broiler chicken suffering from ILT.



Figure 2. Fibrinonecrotic exudate in the larynx of one and diffuse hemorrhage in the trachea of another chicken with ILT infection.

Gross and microscopic lesions of ILT include mild to severe necrohemorrhagic or fibrinous conjunctivitis, laryngitis, tracheitis, sinusitis and bronchitis with syncytia cell formations. Prompt diagnosis of ILT can be made by histopathology, Fluorescent Antibody (FA) and PCR tests. ILT can be controlled successfully by depopulation of the affected flock, cleaning and disinfection of the premises, increased down time and by the implementation of biosecurity measures and vaccination. Although ILT was the first poultry pathogen controlled by vaccination, ILT still represents one of the most significant poultry diseases from a global industry perspective.

## Avian Influenza Biosecurity Study

Beatriz Martinez-Lopez and Sharmin Chowdhury  
Center for Animal Disease Modeling and Surveillance  
UC Davis School of Veterinary Medicine

**Background of the study:** The recent and numerous (>240) outbreaks of highly pathogenic avian influenza (HPAI) that has affected commercial turkey, poultry operations and backyard flocks of more than 20 US states during 2014-2015 highlights the urgent need to develop and implement solutions to protect US poultry industry against HPAI. The capture and analysis of key information about biosecurity and management practices on poultry operations and backyard flocks will allow the personalized and more accurate, estimation of the risk of AIV exposure on the participant farms as well as on the US poultry industry as a whole. The identification of the high risk areas and time periods for HPAI outbreaks is critical for the implementation of timely and targeted surveillance and biosecurity measures, providing a much more cost-effective way to prevent future outbreaks in the US.

This survey was designed by researchers of the Center for Animal Disease Modeling and Surveillance (CADMS, <http://www.vetmed.ucdavis.edu/cadms/>) at University of California, Davis under the Agriculture and Food Research Initiative Competitive Grant no. 2015-09118 from the USDA National Institute of Food and Agriculture.

The main goal is to evaluate and inform producers about their specific biosecurity level in relation to the risk of introduction/spread of avian influenza (both low pathogenic or highly pathogenic avian influenza) into their premises. Moreover, data collected in this survey will be de-identified and summarized to provide valuable information of the overall biosecurity level for avian influenza in different production systems in the US, which would be a very useful background information for the poultry industry.

**How does it work?** Participation is completely voluntary. The survey questions target both *external risk factors* (factors responsible for introduction of avian influenza virus when not present) and *internal risk factors* (factors responsible for spreading avian influenza when already present). After completion of the survey each poultry flock will get a biosecurity score based on their survey responses (i.e., self-assessment) and a list of customized recommendations to improve their biosecurity score and make more informed decisions. **Good info in = good biosecurity score out! Please take the time to complete the survey accurately to obtain accurate results.** All survey data will be treated with the maximum confidentiality: producers will have full access to their own biosecurity scores and customized recommendations but only de-identified summaries will be made publicly available for the poultry industry/general public in the form of reports and peer-reviewed publications. Results will also inform the development of biosecurity education programs for farmers, backyard producers and poultry veterinarians. (*cont. on next pg*).

## **Why should you participate?**

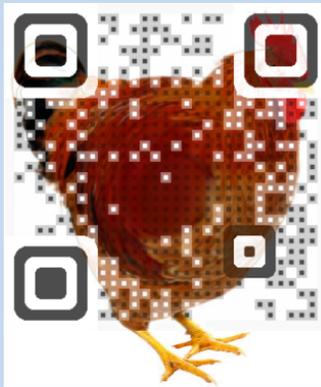
- ✓ Results of this survey will help poultry producers and poultry veterinarians to know the biosecurity level on their farms in real-time (i.e., after survey completion) and based on the actual measures implemented.
- ✓ Poultry producers will obtain a list of customized recommendations adapted to their production system to better prevent and control not only avian influenza but many other poultry diseases into their flocks.
- ✓ Poultry producers will obtain a list of customized recommendations adapted to their production system to better prevent and control not only avian influenza but many other poultry diseases into their flocks.
- ✓ It will guide poultry producers with medium and low biosecurity scores to identify and prioritize interventions and improve their biosecurity status.
- ✓ It will provide the US poultry industry a better understanding of the practices and biosecurity status across different production systems to inform decisions and improve the resilience, sustainability and profitability of the poultry sector.

## **Where can I find the survey?:**

<http://www.surveymoz.com/s3/3232118/Biosecurity-Avian-Survey-copy-without-rec>

Your participation is essential!! The survey will take about 15-20 minutes of your time. Please if you have more than one farm, fill out the survey individually for each farm.

You can visit the survey using this QR code:



## **How to contact us?**

If you have any questions or comments you may contact us at:

- Prof. Beatriz Martinez Lopez, email: [beamartinezlopez@ucdavis.edu](mailto:beamartinezlopez@ucdavis.edu), phone: (530)752-7675.
- Prof. Sharmin Chowdhury, email: [shach@ucdavis.edu](mailto:shach@ucdavis.edu), phone: (530)752-1301.

Thank you for your participation and commitment to poultry farming!

## Research Opportunity for Mixed Crop-Livestock Farms

Alda Pires\* and Michele Jay-Russell^

UC Davis School of Veterinary Medicine-Cooperative Extension, Western Center of Food Safety and Security, UC Davis

We are seeking volunteers for a study accessing the dynamics of foodborne pathogens (i.e., *Campylobacter* spp.) in integrated mixed crop-livestock systems involving multiple livestock species. The use of livestock to graze vegetable, fruit or nut production fields has increased in recent years in California. The results of this project will develop scale-sized management practice recommendations to reduce foodborne pathogen risk for **mixed crop-livestock farms** producing fresh produce or nuts.

University of California Davis and Agriculture Natural Resources researchers will visit enrolled farms 4 times. We will collect feces, water, and produce samples. All samples will be tested for foodborne pathogens (*Campylobacter* spp.). Farmers will be asked to complete a short survey. The study is **voluntary** and all locations and names will be kept **confidential**.

Volunteer criteria:

Farm in Yolo, Solano, Sacramento, Sonoma, or Marin county

**Integrate livestock grazing** and crop production or integrate livestock grazing in orchards (fruit or nuts)

Small\* to medium-sized farms

Raise poultry and at least one of these livestock species: cattle, swine or small ruminants

For more information or to enroll, please contact Dr. Alda Pires (Urban Agriculture & Food Safety Specialist in Cooperative Extension): Phone: 530-754-9855, Email: [apires@ucdavis.edu](mailto:apires@ucdavis.edu) or Dr. Michele Jay-Russell (Research Microbiologist & Program Manager): Phone: 530-219-4628, Email: [mjay@ucdavis.edu](mailto:mjay@ucdavis.edu). More information about the study can be found in the [Small Farm & Urban Agriculture](#) website.

## Getting Ready to Hatch ...

Western Poultry Disease Conference

March 19-22

Holiday Inn Capitol Plaza  
Sacramento, CA

For more info:

<http://www.cevs.ucdavis.edu/confreg/?confid=852>

## Obituary: Dr. Duncan McMartin UC Davis, Vet Med Extension

*From UC Davis School of Veterinary Medicine  
Dean Dr. Michael Lairmore:*

We recently learned that Dr. Duncan McMartin, of Davis, California and Rannoch, Scotland, passed away peacefully at home on Jan. 14th, 2017, from complications following routine surgery. McMartin was a member of the school's faculty from 1980-1993 in our Vet Extension Unit and in the Department of Population Health and Reproduction. McMartin provided leadership and advanced scientific knowledge of avian health problems. His research focused on *Salmonella* Enteritidis. He later took a leadership role in developing the Veterinary Extension Animal Welfare Program to promote broad dialogue and understanding related to human-animal inter-relationships, and societal concerns related to animal welfare in research, education and animal agriculture.



Youtube video of Duncan playing "Bonnie Lass O'Bon Accord in 2012).

He was a well-respected veterinarian, and an accomplished fiddler player. He began playing the fiddle as a young boy in Scotland, but higher education and his veterinary career took him away for more than four decades. Upon retiring in 1994, he resumed his interest in Celtic fiddle music and joined a group to continue his passion. He was invited to perform at the Spring Faculty Reception in 1997.

There will be no immediate service as his family will be taking him home to Scotland. A celebration of his life will be held in Davis later this year.

Useful Information on Highly Pathogenic Avian Influenza can be found at:  
[http://www.cdffa.ca.gov/ahfss/Animal Health/Avian Influenza.html](http://www.cdffa.ca.gov/ahfss/Animal_Health/Avian_Influenza.html)

**Last quarters trivia:** Black feathered mallards were the original duck used to make Peking Duck. Domesticated white feathered Pekin ducks were not used because they had not been domesticated yet when the dish was developed during the Yuan Dynasty (1271 to 1368).

\*Note: You can get the breakfast version of Peking Duck at participating KFCs in China!

When a hen lays an egg what is the English word (verb) that describes the sharp broken noise?

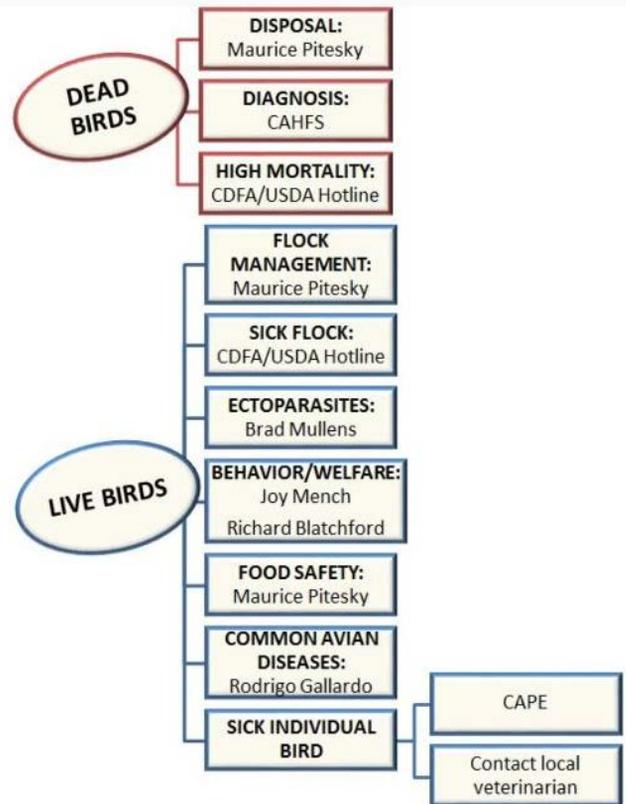


POULTRY  
BUMPER  
STICKER



ADLER

## Remember Who to Call if You Have Poultry Questions



The web address for the this flow chart along with individual contact information is at:

<http://ucanr.edu/sites/poultry/>

Useful Information on Highly Pathogenic Avian Influenza can be found at:

<http://www.cdfa.ca.gov/ahfss/Animal Health/Avian Influenza.html>