UCDAVIS VETERINARY MEDICINE

Poultry Ponderings

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A quarterly newsletter detailing poultry related work, research, and events in California

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Questions or Comments?

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Want to learn more? Visit our YouTube channel at:

UC Davis Vet Med Poultry University

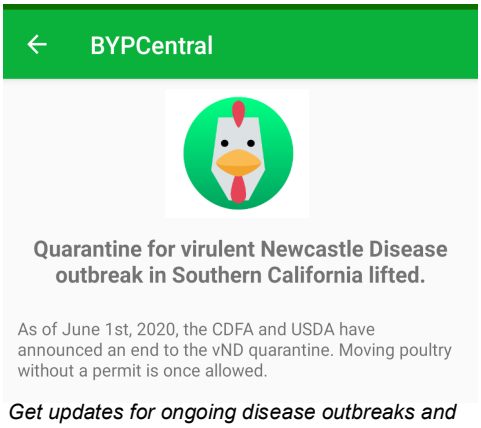
Raising Backyard Poultry? There's an App for That

Backyard chicken owners can now get UC research-based information about raising poultry from their smartphone Backyard Poultry Central app. Push notifications can be sent out alerting users to disease outbreaks and quarantines.

Why an App?

The number of mobile users today is greater than the number of desktop users. Academic and regulatory groups such as UC Cooperative Extension, USDA and CDFA have websites, but they currently do not have any mobile app to communicate with backyard poultry stakeholders. Apps have several inherent advantages over websites with respect to working off-line and user engagement (i.e. users spend more time on apps). They are also considered more effective at communicating (i.e. mobile app or push notifications) and eliciting interactions with various stakeholders.

Screenshot featuring home page in app.



Get updates for ongoing disease outbreaks and access to additional information.

The home screen of the app displays welcome text in English and Spanish. The app features a scrolling list of videos and a dashboard with links to documents. It currently has several videos and pdfs. New material will be rolled out at least every 2 weeks.

A video series called "The Sitch" hosted by Dr. Pitesky is posted every two weeks. "The Sitch" will cover backyard poultry topics in a fun and practical manner. The 'rules' will be:

- No videos longer than 3 minutes
- At least one chicken pun
- No fancy words

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Raising Backyard Poultry? There's an App for That Cont.

It is currently available only for Android devices. Based on the success of the app an IOS version may be developed.

"BYP Central" is designed to distribute information to backyard poultry owners during outbreaks such as the recent vND outbreak. It's basically a place where UC Cooperative Extension can post informational videos, flyers, etc. and issue alerts for outbreaks to backyard owners.

If you'd like to download the app search "Backyard Poultry Central" on the Google Play Store or using the below QR code.

Please direct questions, comments and suggestions to Joseph Gendreau *(*software developer), jdgendreau@ucdavis.edu, and/or Maurice Pitesky, mepitesky@ucdavis.edu.

— *Joseph Gendreau & Maurice Pitesky*

The ABC's of Marek's Disease Prevention in Backyard Chickens

Marek's Disease virus (MDV) has been identified as the number one cause of mortality in backyard chickens in California. This disease remains a major challenge for backyard chicken farmers because of the highly contagious nature of the virus and its ability to survive for long periods in the backyard environment. The following are key considerations in preventing and reducing the spread of MDV in backyard operations:

- **Are my chicks vaccinated?:** It is crucial that day old chicks are vaccinated against MDV. Backyard farmers should ensure that chicks are sourced from a reputable hatchery or feed store that vaccinates against MDV. If uncertain, ask the suppliers. If the chicks are not vaccinated, backyard farmers can visit the website "Private Vets Who Treat BY Poultry" for further guidance or can vaccinate the birds themselves by following these instructions.

- **It's in the feathers and dander:** MDV is strongly associated with feather debris and dander present in contaminated coops which can remain infectious for many months. It is critical that your coops are thoroughly cleaning and disinfected removing all feathers debris, dust and litter material before introducing new chicks.

- **Control insects:** Because insects can act as reservoirs of infections, insect control and prevention programs are recommended. These programs go hand in hand with good husbandry and biosecurity practices.

Marek's Disease is largely preventable but not treatable once your birds are infected. Taking the above steps will go along way toward protecting your backyard chickens from a major killer of backyard chickens.

— *Shayne Ramsubeik,*

sramsubeik@ucdavis.edu

Post-Fire Egg Safety Webinar: Food Safety and Urban Fires

The past three years have brought unprecedented wildfire activity in the state of California. What makes these wildfires unique isn't simply their massive scale, but that many involve urban areas as opposed to the traditional rural or woodland wildfire. In the Pitesky Lab, we have received numerous questions as to safety of backyard poultry products in the face of these urban wildfires – essentially, are eggs from backyard poultry that have been exposed to ash and smoke from urban wildfire safe to eat? To help answer that and related questions, the results of research from our lab and collaborating groups within UC Agriculture and Natural Resources regarding the safety of backyard food production (poultry and produce) was presented in a two hour webinar last month, which can be found on YouTube.

Suzy Grady from Petaluma Bounty, set the context for the webinar by detailing the massive destruction that wildfire has brought to the North Bay since 2015. But she is careful to note that each wildfire event is unique, and "…with each fire, there are different considerations. We are sharing this information in hopes that you can build off of our experience and lessons learned" – a theme that would be repeated multiple times during the webinar.

Clare O'Brien, a PhD Student in the Pharmacology and Toxicology Graduate Group, discussed the nature of the chemicals to be concerned about in smoke and ash, such as heavy metals, industrial chemicals like PCBs and fire retardants (PBDEs – it was noted later in the webinar that these are not the same as the red powder dropped from airplanes for fire suppression activities, which are largely harmless). These compounds

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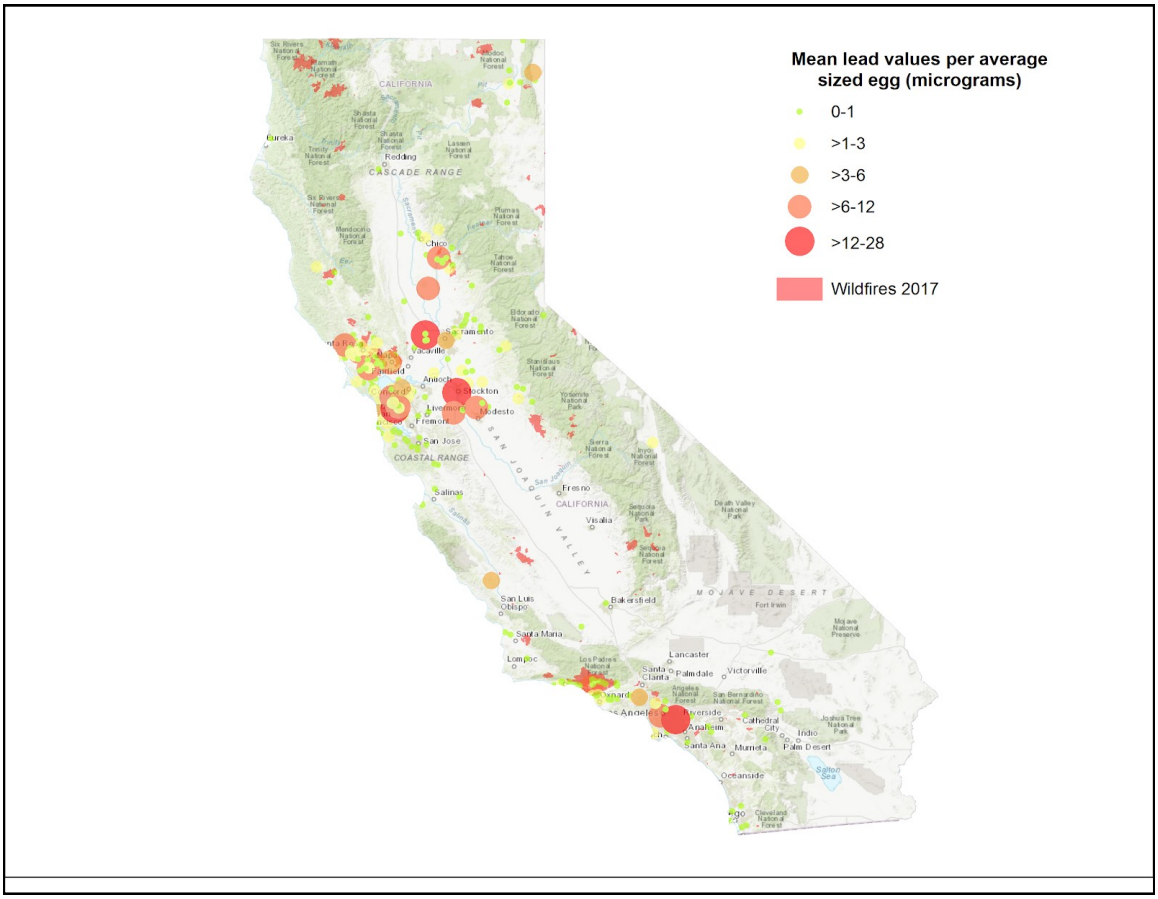

Representation of lead concentrations in average sized eggs across California, based on a 2018 study through the Pitesky lab.

Post-Fire Egg Safety Webinar: Food Safety and Urban Fires Cont.

can cause a variety health issues including cancer and endocrine system disruption (the endocrine system comprises the hormone signaling systems in your body and includes organs like the thyroid, the adrenal glands, and ovaries). O'Brien was careful to note that assessing risk from these substances is not straightforward, as there are considerations far beyond the toxicity of a given chemical (what dose is required for a given substance to be toxic) – it requires assessment of how long a chemical persists in the body, how long a period of time a given individual is exposed, and what vulnerability factors are at play (e.g. being very young or very old, dealing with other major health issues like diabetes, or having limited access to health care).

Julia Van Soelen Kim, a North Bay Food Systems Advisor with UC Cooperative Extension, detailed the results of a study that her and her colleagues undertook to assess the safety of leafy greens after urban wildfire. Fortunately, the outcomes thus far have been positive: "There was very low concern about chemicals on produce." She notes that even under a very conservative estimate of toxic exposure after urban wildfire, the benefit of eating leafy greens far outweighs the risk. While this is indeed good news, she cautioned against generalizing the results of the study, reiterating that each fire event is unique and that the limited size of their study leaves room for further investigation. Good food safety practices, such as washing hands before and after harvesting and washing produce before consuming are absolutely warranted.

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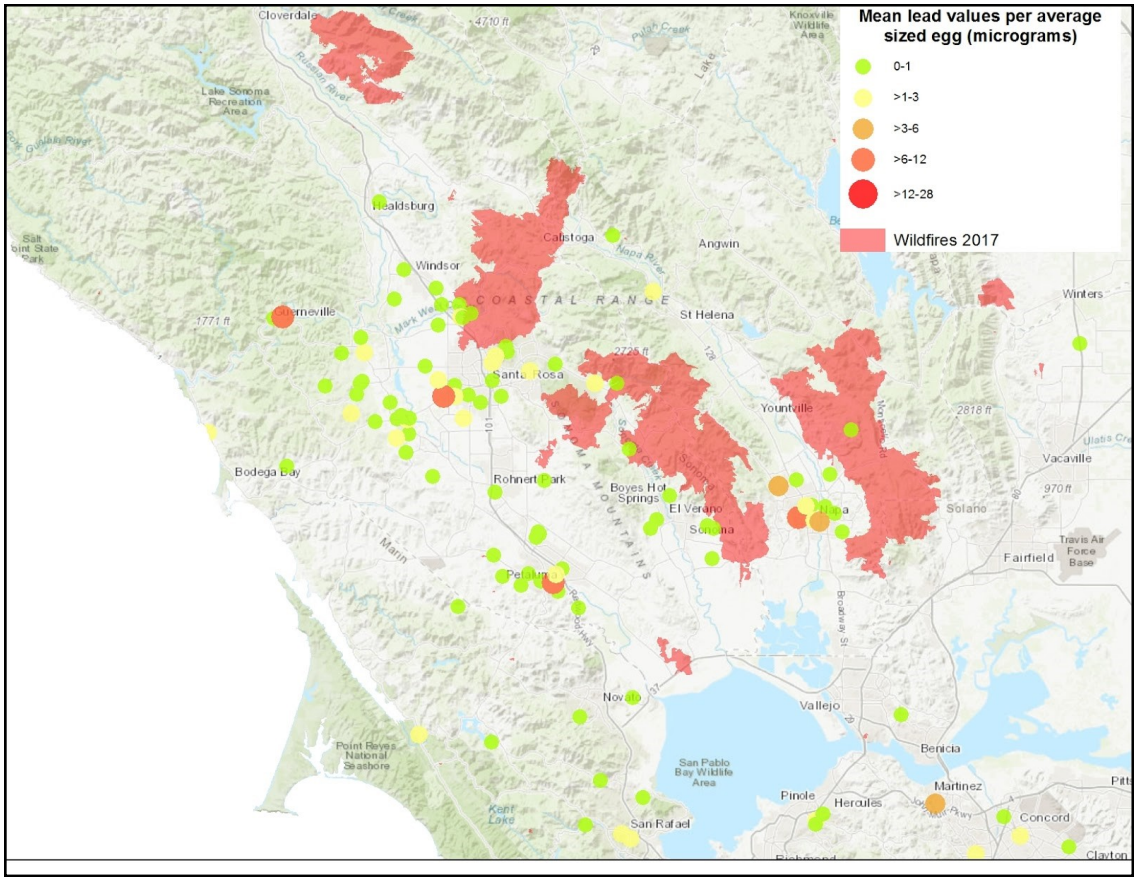

Close up of lead concentrations in eggs, overlayed with 2017 urban fires in California.

Post-Fire Egg Safety Webinar: Food Safety and Urban Fires Cont.

Rob Bennaton, a Bay Area Urban Agriculture Advisor from UC Cooperative Extension in Alameda, discussed the impacts of urban wildfire on soil health and the implications for backyard agriculture. The take-home message was that much is yet to be discovered about both the short and long term implications of wildfire on soil health. He stated that the UC Master Gardener Program can provide support and direction for those residing within the state as to how to properly assess your own soil health after wildfire. Bennaton also noted that both local government agencies and private contractors can assist with post-fire clean-up and testing. Even after cleanup, it is important to consider all exposure pathways when working in and around soil and make use of best practices, including wearing gloves and boots, provide mulch & drip irrigation (to avoid upsplash), and consider importing clean soil and building raised beds.

Finally, Todd Kelman, a veterinarian from the Piteksy Lab in the Veterinary School at UC Davis, discussed the safety of eggs from backyard poultry after wildfire events. He discussed that previous studies had identified heavy metals (such as lead) in eggs of backyard poultry (not as a function of wildfire but from other exposures), and that ash from urban wildfire had been shown to contain high levels of heavy metals. "Given what chickens do all day – peck at the ground for hours on end, that makes for a pretty good hypothesis – that urban wildfire could pose a risk for the production of eggs and poultry that contain heavy metals and other substances." A study was performed by the Pitesky lab to assess exactly that hypothesis, the results of which have been detailed in previous versions of this newsletter. In short, heavy metals and organic pollutants (like the PCBs and PBDEs mentioned earlier) were measured in eggs of backyard poultry from 344 sites around California. The primary intoxicant discovered was lead – in 8% of premises (27 total), the average egg lead concentration exceeded the FDA recommendation for daily intake by a child (3 micrograms).

While the study did not reveal any relationship between proximity to wildfire and egg lead concentration, Kelman noted that diligence is still absolutely warranted: "So, is it safe to eat eggs from your backyard poultry? Because of individual variability in risk, we can't give you a definitive answer to that question. But we do highly recommend that you assess your risk and reduce the risk of contamination." He noted that you can assess your risk by sending eggs into the California Animal Health and Food Safety Laboratory System for heavy metal testing, which at this time runs about $60. Best practices for risk reduction include using a chicken feeder that prevents spillage onto the ground, confining chickens to known (tested) areas of the yard, and keeping them on raised beds. He noted that knowing what's in your water supply and in your plumbing (pipes and fixtures before 1986 can contain elevated levels of lead) is also extremely important.

Additional resources were shared at the end of the talk. The slides with the full list of resources can be found here, and once again the entire talk is available on YouTube. Poultry specific information can always be found on the UC Cooperative Extension Poultry website, on our UC Davis Vet Med Poultry University YouTube page, and through our new Android app!

— *Todd Kelman, tjkelman@ucdavis.edu*

Community Corner

Q & A: *This issue we asked one of our female researchers about her current and past projects, how she felt her work has contributed to the community, and her thoughts on diversity in the current research field.*

Myrna Cadena: Myrna is a 2nd year PhD student in the Animal Biology graduate group, currently using computational social science techniques to better understand disease transmission among backyard poultry flocks.

What are some things you've accomplished so far that you think have contributed to the community?
"Well I think that my favorite project was the demo coop because we used to give eggs each week to the Yolo Food Bank. And it was always such a rewarding feeling to meet with the Yolo Food Bank. The volunteers come and pick up the food and stuff and it was just always nice to talk to them. They were so nice and it was just very rewarding to hear from them that they really liked our eggs; that they were very clean and processed well. It was just great to give back that way….you know with research it can take a while or you don't really know how you affect the community. But that one was very clear and it was a lot of fun."

What would you say your long term goals are with this work?
"I hope to work as a poultry farm advisor, preferably in Southern CA where there's a lot of poultry in Spanish speaking communities. That's where I hope to be. But I'm also just interested in a position in outreach and research in general. So it doesn't have to be through a poultry advisor position, but I think that's what I would feel comfortable with. Because I'm also doing a certification, it's new actually, in extension outreach and science communication that I think has helped me feel more confident in taking that route."

You mentioned Spanish speaking as a main community you would like to work with, is there a reason?
"Yeah, I think historically it's been an underserved community and especially now with the [recent] virulent Newcastle Disease outbreak. I think we saw that [outreach is] needed and I think I can help out with that part of the community. I feel like they've been underserved but also there just hasn't been that many people to begin with, that can connect with that community." Myrna mentioned how she's seen improvements in expanding resource availability and the creation of new programs that work with impacted communities.

As a woman in STEM what has your experience been like so far in your early career- any challenges or anything you would care to discuss?
"It was hard to see myself as a graduate student because I didn't see many professors that were women, so it was hard to see what we could do. But I've had really great mentors, so I think that has helped a lot. Because without them I wouldn't have thought that I could do it. Having them believe in me was really important."

Heavy Metals and California Fires

In 2018, UC Davis conducted a backyard chicken egg study due to concerns regarding environmental contaminants in eggs from California. This study coincided with several large fire events that occurred in late 2017 in Northern and Southern California and, in order to address emerging concerns surrounding semi-urban wildfires and food safety, a subset of eggs were analyzed for several classes of persistent organic pollutants. 130 eggs collected within 100 miles of the Thomas fire and North Bay (Tubbs, Atlas, Nuns, and Pocket) fires were tested for polycyclic aromatic hydrocarbons (PAHs), polybrominated diphenyl ethers (PBDEs), and polychlorinated biphenyls (PCBs) by gas chromatography coupled to mass spectrometry (GC-MS). These chemicals were chosen because they may be produced or released during urban fire events and have the ability to negatively impact human health. Note that all eggs submitted from a single premise were pooled prior to sample analysis as this more accurately represents the average daily exposure from eating eggs from a given premise than measurements derived from a single egg.

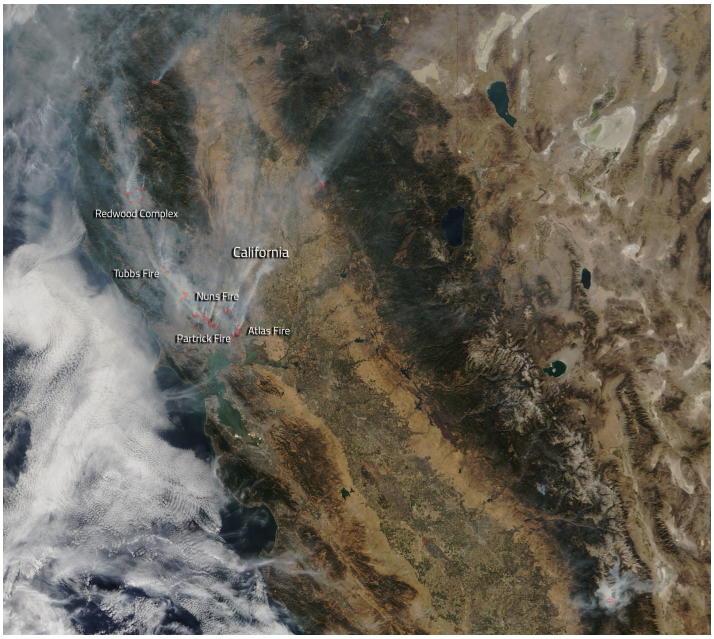

Image of smoke from California fires, 2017.

Polycyclic aromatic hydrocarbons:

PAHs are chemicals that are produced during combustion of organic material. Large amounts of PAHs are released into the environment during wildfire, but they are also present in motor vehicle exhaust, smoked and charred foods, and cigarette smoke. We found no detectable levels of PAHs in the backyard chicken eggs or in eggs from the three commercial premises we tested. However, a non-detect result does not mean PAHs are not present in the eggs, rather, PAHs are not at a high enough level to be measured by the instrumentation. When we calculate the amount of PAHs ingested in an 57g egg (the weight of an average large size backyard poultry egg) using the threshold the detection threshold for the PAH benzo(a)pyrene, this amount is well below the safe harbor level of 0.06 ug/day set by California's Office of Environmental Health Hazard Assessment (OEHHA) Proposition 65.

Polybrominated diphenyl ethers:

PBDEs are a class of chemicals used as flame retardants in the United States until the early 2000s. These chemicals were widely used in polyurethane foam, electronic equipment and other household goods and are ubiquitous environmental pollutants routinely measured in air, water, soil, and food products. The mean concentration of PBDEs based on a 57 g egg was 0.163 ug for backyard eggs and 0.004 ug in commercial eggs. No premises exceeded the Chronic Oral Reference Dose (0.002 mg/kg/day) set by the US Environmental Protection Agency (EPA) for an average 70kg person, representing minimal concern for exposure to PBDEs from backyard eggs.

Polychlorinated biphenyls:

PCBs were used in a large number of industrial and commercial applications including dielectric and coolant fluids, plasticizers, and pigments and dyes. Although they were banned

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Heavy Metals and California Fires Cont.

in 1979 in the United States, PCBs do not break down readily in the environment and are still detected in air, water, soil and food products. The mean concentration of PCBs based on a 57 g egg was 0.079 ng for backyard eggs and 0.041 ng in commercial eggs. 57 premises had average PCB for which one egg daily exceeded California OEHHA no significant risk level for cancer (0.09 ug/day). Of the three pooled eggs we tested from commercial facilities, one sample exceeded California OEHHA no significant risk level for cancer.

Overall, there appears to be no correlation between proximity to wildfire and levels of these contaminants in backyard chicken eggs. In the eggs tested in this study, there is little concern regarding human exposure to PAHs and PBDEs, however, in 43% of premises, consumption of one large backyard chicken egg per day would exceed the OEHHA risk level for cancer. It is unclear exactly how backyard chickens are exposed to PCBs; it is possible that these chemicals may be present in soils and chickens are exposed when they scratch and feed. As testing soil for PCBs is difficult and costly, if you are concerned about PCBs in your backyard eggs, it is important to limit exposure of chickens to soil. You can provide your chickens food in a feeder that keeps the food off the ground or confine them to a particular area of the yard, for example, confine them to a raised bed that has fresh soil. Additionally, the UC Davis California Animal Health and Food Safety Laboratory system may be able to test some of your eggs for PCBs for a fee.

— *Claire O'Brien, ceobrien@ucdavis.edu*

Want to learn more about the impact of fires on egg production or soil quality?
Visit these resources!

- ◊ ***UC Davis Pastured Poultry*** website; Wildfire Resources for more information
  - **Wildfire Resources**
- ◊ ***UCCE Sonoma County*** website**; f**or the Post-Fire Soil Safety webinar slides and video recording
  - **Food Safety after Urban Wildfire**
- ◊ Watch the ***Post-Fire Soil Safety Webinar*** at the link below
  - **YouTube**

Seeking Stakeholders for Avian Influenza Waterfowl Tracker Advisory Group

Recently UC Davis Vet Med Extension, USGS and the University of Delaware received a 4-year USDA grant titled "*Real-time Waterfowl Mapping Web Application: Validating a Critical Tool for a New Era of Avian Influenza Surveillance to Improve Food Security in Commercial Poultry".*

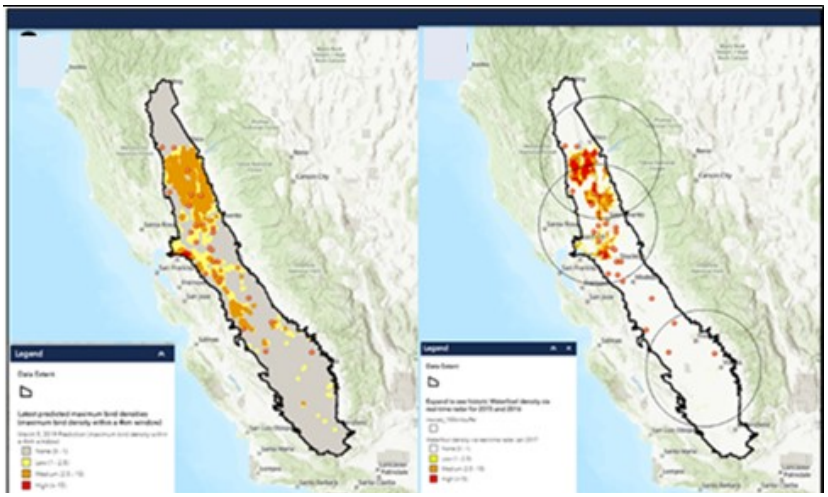
This project builds off of a 3-year UC-ANR project to further develop remote sensing technologies including weather radar, satellite imagery and telemetry of waterfowl to map waterfowl habitat in close proximity to commercial poultry in the Central Valley of California and the Delmarva Peninsula in Delaware (both large poultry growing areas). In addition the project leverages our previous UC-ANR research on detection of avian influenza virus (AIV) in wetlands using ultrafiltration and a novel PCR approach refined in Sam Diaz's lab at UCD that is more able to detect the wide range of AI viruses in the environment vs standard approaches.

You can visit the California Waterfowl Tracker and read the article on detecting avian influenza in California wetlands targeted via remote sensing here .

Our goal is to develop a "real-time" mapping tool that allows stakeholders the ability to better understand their proximity to waterfowl and AIV in the environment. If successful, we hope to expand the system across the U.S.

What we need: We need stakeholders (industry and government) who can meet 1-2x a year to provide feedback on the functionality of the web-tools we are developing. Our goal is to make the tools practical and easy to use as currently, they are not. We will be offering an annual $300 honorarium for up to 3 hours of work (a maximum of two 1.5 hr meetings per year).

— Brian Ladman and Maurice Pitesky



Screenshots from the California Waterfowl Tracker. The figure on he left shows a tool that makes daily predictions on waterfowl location and density between November and March using satellite imagery. The figure on the right shows historic radar data of waterfowl roosting. The tool will be expanded to the Delmarva Peninsula along the Atlantic Coast. We are seeking industry and government stakeholder for an advisory group to make the app more useful to the poultry industry.

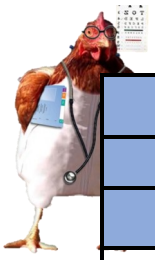
If interested please contact
Brian Ladman
(bladman@udel.edu)

and/or

Maurice Pitesky
(mepitesky@ucdavis.edu).

Dr. Cluck's Summer Puzzle Answers!!

Here are the answers for last quarters puzzle!



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Down:

1. A word for geese and ducks
3. The practice of keeping our animals/plants happy and healthy
4. All of us together create a —
5. "I'm late, I'm late! For a very important date! No time to say 'hello, goodbye,' I'm late, I'm late, I'm late!"
7. In orbit I can tell you what the weather's like
8. A favorite past time for cows and sheep
9. Turkeys and -

Across:

2. Cultivating crops and raising livestock equals —
6. Grown for profit or provisions
10. Another word for longevity and/or feasibility
11. Bacteria or viruses or other microorganisms that can cause harm
12. Domesticated animals raised in an agricultural setting

Dr. Cluck's Puzzle!

Which chick (a,b,c, or d) completes the set?