Vet Med Cooperative Extension

Winter 2020

# Connection

## Inside this issue




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# Bovine anaplasmosis

Anaplasmosis, caused by the Rickettsia *Anaplasma marginale,* is a vector-borne disease of ruminants affecting beef cattle on range. It is a complex disease with different modes of transmission and a life cycle that involves both ruminants and multiple species of ticks. It can be found in most tropical and subtropical regions on earth with few exceptions, such as Hawaii. Ranchers in California have been managing this disease historically by controlled exposure of cattle to the pathogen. Interestingly, young cattle less than a year old don't show signs of disease when they get infected. It is thought that this age group is better at replenishing the red blood cells that *A. marginale* parasitizes and that get eliminated from the bloodstream by the spleen. Once infected, an animal typically becomes a carrier for life, but will also become immune to further bouts of disease. Ranchers try and take advantage of the biology and physiology involved in *A. marginale* by deliberately exposing young animals to ticks transmitting the disease and inducing immunity in this manner. A further mode of transmission is by mechanical transfer of small amounts of blood from one animal to another. This can happen via a biting insect such as a stable or horse fly or by a hypodermic needle used on multiple animals during vaccination of a group of cattle. Ear taggers or tattooers can also transmit *A. marginale* between animals. Nevertheless, there are many unknowns when applying the method of controlled exposure:

- The tick burden in any given year depends on weather patterns
- The types of strains circulating in a given area can have an influence on how severe the disease is they are able to cause
- The density of wildlife reservoirs such as deer or other wild ruminants affects transmission of *A. marginale* to ticks and cattle.

The topic was recently discussed during the Cattle health meeting at the California Cattlemen's Association in Reno, Nevada by Dr. Gabriele Maier, CE specialist for beef cattle herd health and production, with a special focus on vaccines.

Historically, several vaccines were available to protect cattle from anaplasmosis. In California, a modified live vaccine, Anavac® was on the market, which

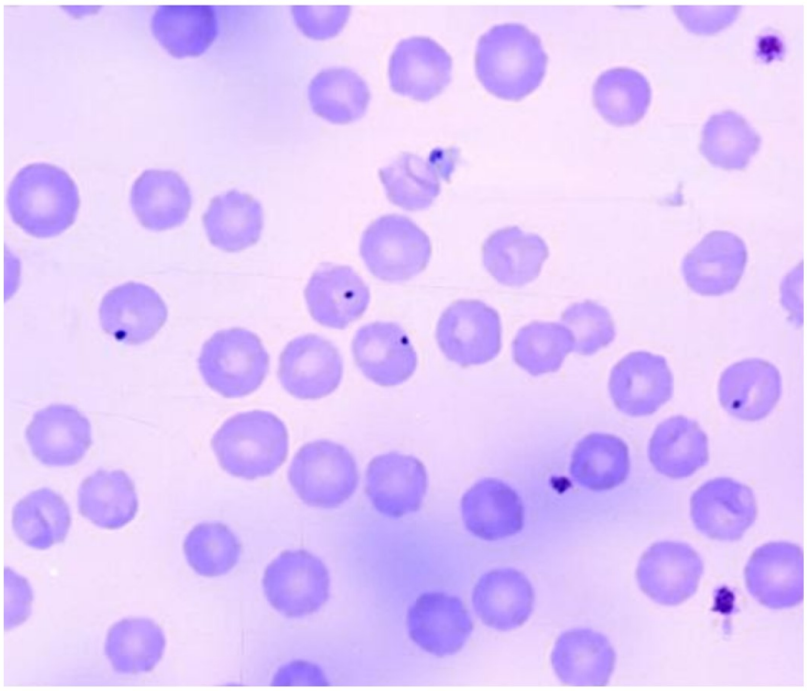

Image source: Department of Agriculture and Fisheries, Queensland, Australia

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# Bovine anaplasmosis cont.


*Gabriele Maier presenting on Bovine anaplasmosis*

could only be administered to cattle less than 12 months of age, in order to avoid clinical disease. This vaccine was licensed by the secretary of food and agriculture in California, but subsequent state legislation required all biologics to be licensed through the United States Department of Food and Agriculture and no such license was pursued for Anavac®. A killed vaccine named Anaplaz® was discontinued by the manufacturer due to company restructuring. The only vaccine available today in the United States is a killed vaccine marketed by University Products LLC headed by Dr. Gene Luther, a professor emeritus at Louisiana State University. The efficacy of the available vaccine has, however, not been documented through controlled studies. Efforts are under way to develop a new vaccine by several researchers at Kansas State University. Developing new vaccines is challenging due to the fact that we suspect to have a multitude of strains in many locations of the US as a result of intensive cattle transportation across state lines. A new vaccine will have to provide cross-protection to all circulating strains. In addition, *A. marginale* has ways to evade the immune system of its host, that add to the difficulties in designing an effective vaccine. Many challenges lie ahead on the way to managing this disease in cattle on range and it will require the work of many dedicated researchers, veterinarians, and producers to provide the desired tools for the cattle industry.

**Gabriele Maier**
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***Trivia:*** **Who invented the term "zoonosis"?**

***Answer*** **from last issue:**
**What name and number comes next?: Marie Curie (1903), Maria Goeppert Mayer (1963), Donna Strickland (2018).**

# California Dairy Research Foundation Awards Robotic Milking Research

Producing high quality milk is a labor consuming activity: cows need to be brought to the parlor, their udders need to be cleaned, the milking machine needs to be manually attached to them, and finally they are taken back to their pens to receive their fresh food and rest between milkings. Then the cycle repeats twice or three times daily, with no Sunday or holiday breaks. Milking cows is the most labor consuming activity in a dairy farm. However, dairy farmers are enjoying the advantages of this fast changing, technology driven world: they now have robots to milk their cows.

Robot milking technology was first adopted in Europe by small dairy farmers to improve their life-style. In the US, these technologies are gaining momentum. With milking robots, the cows decide when they need to be milked. They are trained to visit the milking robots where they receive the most palatable part of their ration, and they seem to like it. Each unit of the new generation of robots can milk up to 70 cows daily and collect detailed information of each animal such as milk quality and components, udder health information, eating behavior, among others. Farmers have more time to dedicate to management and decision making, and better information to do so. Such great technology has also its downside: each unit may cost up to $150,000 or more if a new barn needs to be built, which can reach high sums for large dairies such as the ones in California. In addition to the high cost of each unit, milking robots require more specialized and better management skills, and each farmer needs to take into consideration their own production system characteristics and management challenges before transitioning to milk robots.


*Example of a new milking robot unit.*

To help large dairies making more informed decisions about the economic feasibility of investing in milking robots, Drs. Fernanda Ferreira and Daniela Bruno have recently approved a $150,000 research grant with the California Dairy Research Foundation to investigate the risk factors associated with economic success of implementing milking robots in large dairies. Dr. Ferreira is a CE specialist whose work is focused on herd health and management economics, and together with Dr. Bruno, dairy advisor for Fresno, Madera and Kings counties,

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# California Dairy Research Foundation Awards Robotic Milking Research cont.

they have raised many research questions that they aim to answer with the recently approved project.

One of such questions is related to the choice of milking robots by large dairies as their milking system compared to other available alternatives such as rotary and even traditional parlors. “The investments for large dairies can be quite high, especially if the whole herd is intended to be milked by robots. An average dairy in California has about 1,800 milking cows, which means that they would need at least 25 units for the whole herd. If we multiply this by a unit cost of about $120,000, we can see that the investment is pretty high”, says Dr. Ferreira. Dr. Bruno adds: “there are scenarios in which the investment is worth, especially considering high labor costs and low labor availability. This is the new reality dairy farmers are facing across the US”.

Despite the high cost, research has shown advantages of milking robots related to animal welfare, milk quality, consistency of milking procedures, among others. Drs. Ferreira and Bruno want to investigate if it is still true for milking robots in large dairies, and how farmers need to adapt, and maybe change, to guarantee the success of the investment. They are planning to host a meeting where farmers and manufactures of these machines will discuss their experiences and challenges. “This grant is giving us and the California dairy community the chance to learn about the challenges and opportunities these technologies are bringing. We hope to help farmers to make better informed decisions on their investments”, concludes Dr. Ferreira.

**Fernanda Ferreira and Daniela Bruno**
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**dfbruno@ucanr.edu**

# Feature: Laura Patterson

Although most of America's swine production occurs inside confinement systems with high levels of biosecurity, the United States is experiencing a resurgence of outdoor-raised pig operations, due to growing consumer demand for sustainably-produced, local foods. There is a lack of research evaluating this re-emerging livestock production system and how it may involve risk factors that affect the transmission of foodborne pathogens in the food supply. For instance, one challenge in raising pigs outdoors is the increasing risk of domestic pigs interfacing with wildlife, like feral pigs. While still considered a niche market, outdoor-raised pig operations are broadly distributed in California, providing an opportunity for the widespread transmission of diseases between wildlife, livestock and humans.

PhD candidate Laura Patterson is an epidemiology graduate student in Dr. Alda Pires' Urban Agriculture and Food Safety laboratory and is also a member of Dr. Beatriz Martinez's Center for Animal Disease Modeling and Surveillance (CADMS) at University of California, Davis.

Laura was one of three new researchers awarded a $250 prize for best poster at the 2019 GeoVet conference held October 8-10, 2019 in Davis, California USA. GeoVet is an international conference that focuses on spatial epidemiology and spatial statistics applied toward improving animal and public health. Her poster "Preliminary spatial study to identify the distribution of feral pigs and outdoor-raised pigs in California" represented preliminary research conducted for her dissertation, which quantified the spatial overlap between wildlife and livestock in California as possible disease transmission zones. Laura also presented at the 2019 Conference of Research Workers in Animal Diseases (CRWAD) annual conference in Chicago, IL USA Nov 2-5, 2019. Her talk was titled "Spatial overlap of feral and outdoor-raised pigs in California: potential disease transmission in the wildlife-livestock interface".

*Laura Patterson receiving award at the 2019 GeoVet conference.*

The overarching goal of these projects examine the risk of emerging or re-emerging zoonotic diseases that could negatively impact the economic sustainability of California agriculture, as well as spread diseases to humans. Additionally, the results of these projects will provide outreach and educational materials for outdoor-based pig owners.

To learn more about these research projects, visit these links: https://aghealth.ucdavis.edu/news/transformations-within-yolo-county-agriculture

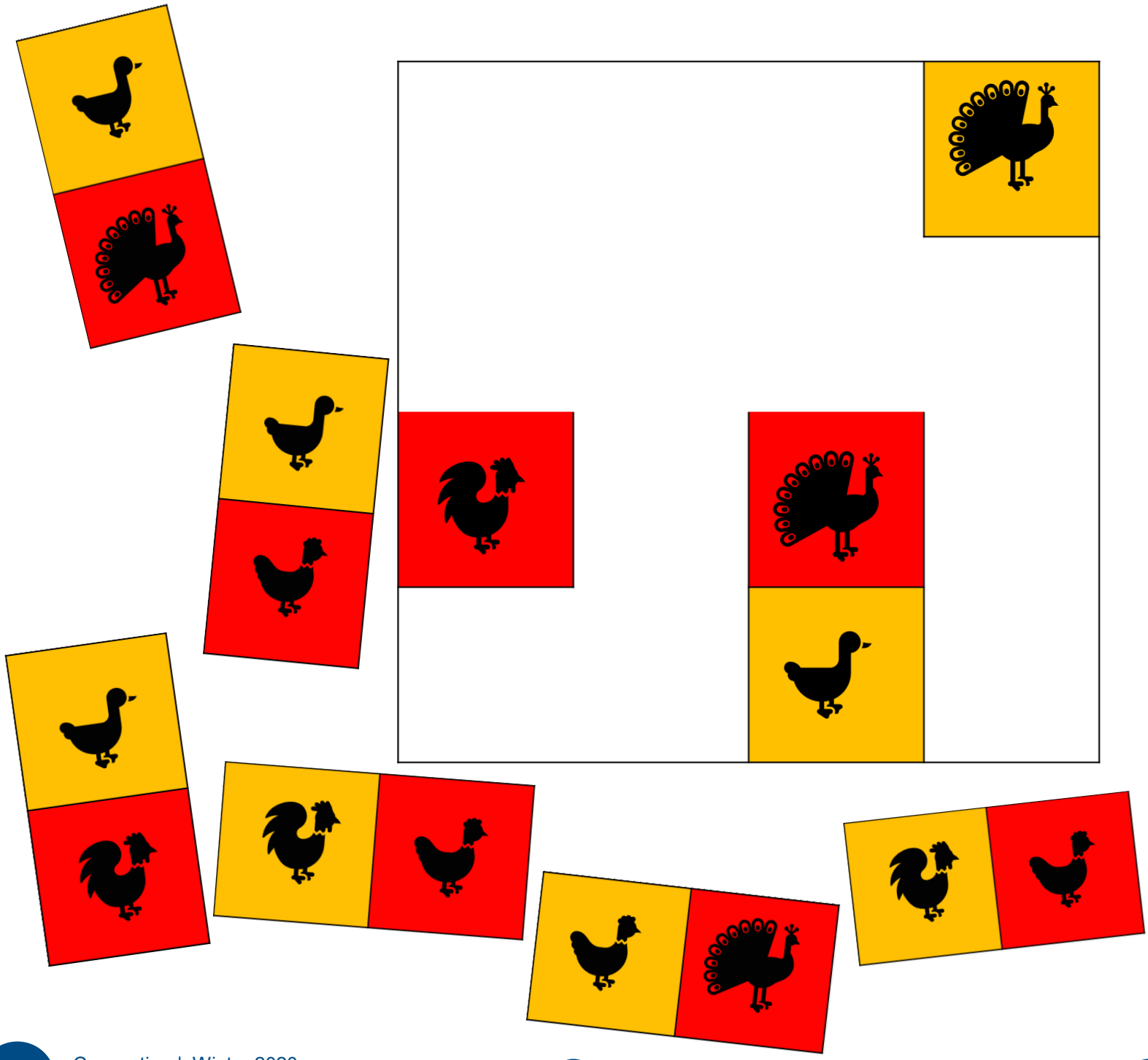
Dr. Alda Pires small farm and urban agriculture website: https://ucanr.edu/sites/Small_Farms_/

Dr. Beatriz-Martinez CADMS website: https://cadms.vetmed.ucdavis.edu/

**Alda Pires and Laura Patterson**

# Dr. Cluck's Puzzle

**Help Dr. Cluck solve this puzzle! These birds need to be organized in the pasture based on bird type and color. Each row and column must contain 2 squares of each color (2 red, 2 yellow) and 1 of each bird type.**



# Guest Article: The Food Safety and Inspection Service Leads in One Health

With the unanimous passing of Senate Resolution 462, January is now recognized as One Health Awareness Month in the United States. The purpose of this month is to raise awareness of organizations that advance human, animal, and environmental health through multi-disciplinary, multi-sectorial collaboration. Touting the critical contributions these organizations have on society is another important aim.

The Food Safety and Inspection Service (FSIS) plays a quiet, yet steadfast role in One Health. As the regulatory public health agency within the U.S. Department of Agriculture (USDA), FSIS is responsible for protecting public health by verifying that establishments are producing meat, poultry, and processed egg products that are safe, wholesome, and accurately labeled. People typically think of food inspectors when they think of FSIS, and for good reason: FSIS inspection personnel conduct their work in almost 6,500 slaughter and processing establishments and 125 ports of entry nationwide. The regulations they enforce help ensure the nation's food supply can be consumed with confidence.

However, a lesser known aspect of FSIS is the role that the Agency plays in the well-being of food animals. Here are just some of the ways FSIS promotes animal health:

- FSIS policies help to drive pathogen reduction in slaughter and processing establishments. The suppliers to these establishments—livestock producers—in turn, are challenged to address pathogens through herd and flock management. The resulting husbandry practices, biosecurity protocols, and pathogen preventive measures applied on-farm all serve to keep animals cleaner, safer, and healthier.

- FSIS prohibits animals with condemnable diseases from entering the food supply. This gives producers a strong incentive to prevent illness in their livestock through the provision of veterinary care and other health-promoting services.

- FSIS' enforcement of humane handling regulations protects animals. FSIS prohibits the use of abusive techniques in the movement and restraint of animals at slaughter establishments, and the slaughter process itself is highly regulated to minimize unnecessary pain and suffering. In addition, animals that show severe injuries are subject to FSIS condemnation either in part or in whole. Thus, it is in industry's best interest to transport, unload, and hold animals safely and humanely.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# Guest Article: The Food Safety and Inspection Service Leads in One Health cont.

- By alerting federal partners to notifiable animal diseases, FSIS helps to control the spread of devastating biological threats. As an example, FSIS inspectors conduct surveillance of diseases such as bovine tuberculosis in support of the National Bovine Tuberculosis Eradication Program.
- FSIS routinely tests for veterinary drugs in meat samples collected at slaughter establishments. When violative residues are detected, FSIS prohibits this meat from entering the food supply. Ultimately, this creates a disincentive for the improper use of veterinary drugs in livestock.

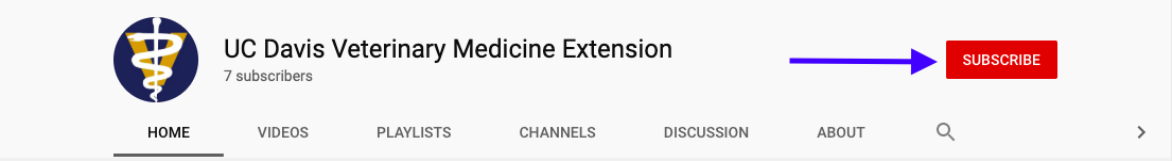
These examples represent just a few of the ways FSIS promotes animal health. It's also worth mentioning that FSIS advances environmental health as well. Just as the agency tests meat and poultry for veterinary drugs, it also tests for pesticides and other environmental contaminants. FSIS' condemnation policy for detected violative residues creates negative consequences for livestock producers who fail to properly use and dispose of pesticides. This ultimately serves to limit the use of these chemicals in the environment while at the same time promoting food safety.

When we think about One Health and what it looks like in practice, we should think about food safety and FSIS. The Agency's mission places it squarely at the interface of animal, human, and environmental health, in a way that few organizations can claim. Moreover, FSIS' commitment to multidisciplinary collaboration is reflected in its professionally diverse workforce. At FSIS, teams comprised of veterinarians, microbiologists, statisticians, food technologists, communicators, and other groups use their collective knowledge to carry out inspection, develop policies, analyze samples, investigate outbreaks, and much more. FSIS is truly One Health in action!

**Kis Robertson Hale**
DVM, MPH, DACVPM
CAPT, US Public Health Service
Chief Public Health Veterinarian
USDA, Food Safety and Inspection Service


*Inspection of poultry during processing.*

# UC Davis Veterinary Medicine Cooperative Extension is on YouTube!



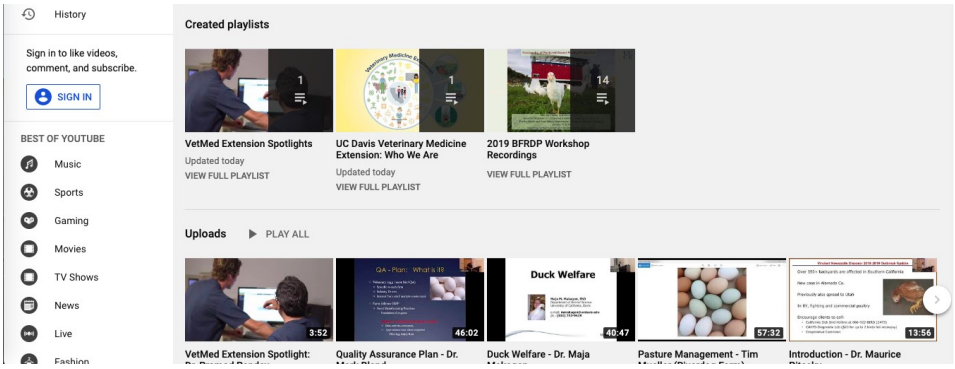

Did you know UC Davis Veterinary Medicine Cooperative Extension has a YouTube Channel? We are always looking for new ways to increase outreach efforts, and our newest addition takes advantage of the popular video sharing platform.

***What is it?***

YouTube is a free web platform where users can upload videos for the public to see. It is a great place for discovering new ideas and spreading information! As a viewer, you can share videos you find useful with other people and use the "Comments" section to connect with others and engage in discussions.

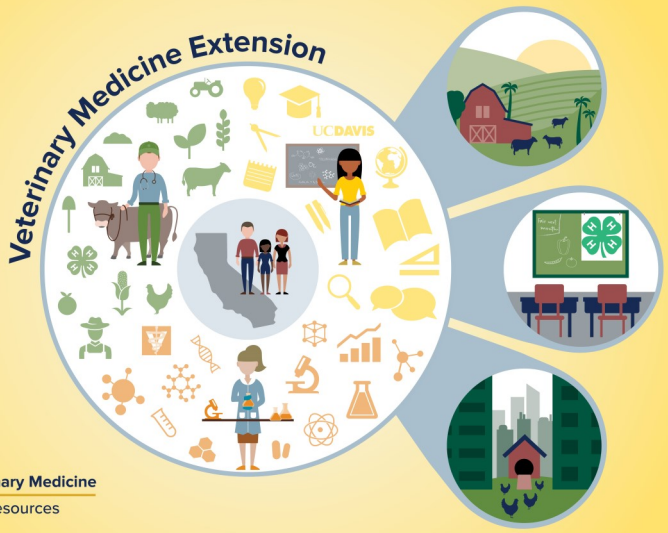
***What videos do we post?***

On our YouTube channel, you'll be able to see videos explaining what our Cooperative Extension specialists are working on. You can learn about their current projects and find out how you can help as a citizen scientist. We also post videos of recorded workshops and other events hosted by UC Davis Veterinary Medicine Cooperative Extension.




***Should you I subscribe?***

Absolutely! You can subscribe to our YouTube channel free of charge. Subscribers will receive notifications when new videos are posted, so you can be up to date on the latest news and projects from Cooperative Extension.

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**Maurice Pitesky, editor in chief**

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