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**For questions or comments, please contact Maurice Pitesky
at 530-752-3215 or mepitesky@ucdavis.edu**

Antimicrobial Drug Use and Resistance in Adult Cattle on California Dairies

California citizens have a secure and ample supply of dairy products due to the health of their dairy cattle. Good management practices and the use of antimicrobial drugs for the treatment and prevention of diseases play an important role in sustaining the health and welfare of the dairy herds. The use of antibacterial drugs in livestock, however, comes with the risk of bacterial resistance, which threatens the future availability of effective antimicrobial drugs to treat both livestock and human infections.

Understanding the relationship between on-farm drug use and antimicrobial resistance in dairy cattle populations is key to developing antibiotic stewardship practices that guarantees the health and welfare of the dairy herds while preserving the future availability of antibiotics. In response to this need, a team from UC Davis School of Veterinary Medicine (SVM) and the University of California Cooperative Extension (UCCE) are currently conducting a surveillance study to assess the impact of antimicrobial drug use legislation on California dairies. The research team include Sharif Aly (PI), Emmanuel Okello, Terry Lehenbauer, Deniece Williams, Betsy Karle, Richard Pereira, Munashe Chigerwe, Randi Black, Pramod Pandey, Essam Mahmoud Abdelfattah and Pius Ekong. The 2-year study is funded by the California Department of Food and Agriculture (CDFA), with the goal of quantifying antimicrobial drug use and drug resistance in adult dairy cows. This kind of information is necessary to help develop guidelines for sustainable use of antibiotic drugs to protect animal health and welfare.

Continued on page 3



Northern California Field Team

Antimicrobial Drug Use and Resistance in Adult Cattle on California Dairies (cont.)



Southern California Field Team

The surveillance study is being conducted on 10 California dairies spread across Northern California, San Joaquin Valley, and the Greater Southern California. In the study design, a group of 12 cows were enrolled from each study dairy last winter, just before calving, and followed for 120 days in milk. A second group of cows were again enrolled in March 2019 and are currently being followed to 120 days in milk. During the study period, the research team collects fecal samples from enrolled cows, waste milk, and lagoon water samples every month. Indicator bacteria (*Escherichia coli* and *Enterococci* spp.) are isolated from these samples and tested for antibiotic resistance against a panel of antibiotic drugs. An estimated 4800 bacterial isolates will be tested over the entire study period to determine the changes in bacterial resistance to these drugs in adult dairy cattle. Additionally, the relationship between the drug use records of each dairy and the antimicrobial resistance will be determined. Results of this research are expected to guide the antimicrobial stewardship practices and advance the needs of the dairy industry to protect animal health and welfare. The researchers are grateful for the cooperation of the participating dairies.

-Emmanuel Okello, Essam Abdelfattah, Pius Ekong and Sharif Aly

Youth Science Education Update

Effective educational curricula are considered to be a foundational component of successful programming in 4-H (Smith et al., 2017). The development of science curriculum materials for youth through Dr. Martin Smith's CE efforts is based on the theoretical underpinnings of constructivism. Curricula developed using this learning theory emphasize the acquisition of knowledge and skills through learners' experiences. More specifically, learners construct understanding through guided inquiry that involves interactions with others and their environment and the application of knowledge and skills to real-world issues.

Curricula developed for 4-H follow this theoretical framework and address needs identified within the 4-H Program (Worker et al., 2017). All curriculum materials go through multiple iterations, are piloted tested for formative feedback, field tested for the purposes of outcome data collection, and must pass peer review for publication.

New curriculum materials (available currently or in press):

- **Animal Welfare Proficiencies for 4-H** (Smith & Meehan, *in press*): This curriculum includes activities that promote a conceptual understanding of animal welfare. Furthermore, youth gain knowledge and skills to help advance the health, husbandry, and welfare of their 4-H project animals.
- **Best Practices in Your Backyard: Poultry Care and Welfare** (Meehan et al., available at: <https://campus.extension.org/enrol/index.php?id=1542>). This curriculum module is designed to provide youth with knowledge and skills associated with raising and caring for backyard poultry. Specifically, this curriculum module provides backyard bird owners with strategies to design/improve poultry housing. (Note: Additional modules are under development.)
- **At the Interface between Livestock and Predators: Reducing Depredation through Livestock Husbandry** (Cheung et al., *in press*). The content of this curriculum focuses on husbandry strategies that help mitigate the risk of predator interactions with livestock and poultry. The content focus of the curriculum is on understanding predator risks, risk assessment, and risk mitigation. The curriculum also includes a youth service-learning component.
- **A "Fear-Less" Approach to Understanding Dogs, Their Care, and Training** (Kozlowski, Bain, & Smith, *in press*): This curriculum is designed to provide 4-H youth with general knowledge and skills needed to provide care for a dog. The activities in this curriculum encourage the understanding of breed groups, dog behavior, proper dog care, and training.

Additional Information: <https://ucanr.edu/sites/youthscientificliteracy/>

- Martin H. Smith and Abigail Cappa

Healthy Animals, Healthy People *Survey*

[Survey available at: <http://bit.ly/HAHPsurvey>]

If you have backyard livestock or poultry or are a small-scale producer of livestock or poultry, this survey is for you. This questionnaire asks about the specific practices and perceptions that you apply to your animals' health, husbandry, and antimicrobial use. It is being conducted for research and outreach purposes in order to find better ways to serve people and communities with backyard and small-scale livestock or poultry.

Conducted by the University of California Cooperative Extension (UCCE) and the UC Davis School of Veterinary Medicine (SVM) and funded by the California Department of Food and Agriculture (CDFA), this survey will take about 20 minutes to complete. Provided information will be kept strictly confidential. We will not connect your name with your responses.

Originally created as part of the Healthy Animals, Healthy People workshop series in California, the survey is now open to all owners and small-scale producers of livestock and poultry in California regardless of workshop attendance. We would appreciate your time and participation in this survey, accessible at the following link: <http://bit.ly/HAHPsurvey>

If you have any questions, please contact the questionnaire administrator, Jasmin Bardales, at jabardales@ucdavis.edu, or the principal investigator, Dr. Alda Pires; Extension Specialist in Urban Agriculture & Food Safety (apires@ucdavis.edu, 530-754-9588), Veterinary Medicine Extension, UC Davis School of Veterinary Medicine).

-Jasmine Bardales and Alda Pires

Trivia: Can you identify where each of our Cooperative Extension specialists (see pg 6) are from and what language(s) they speak?

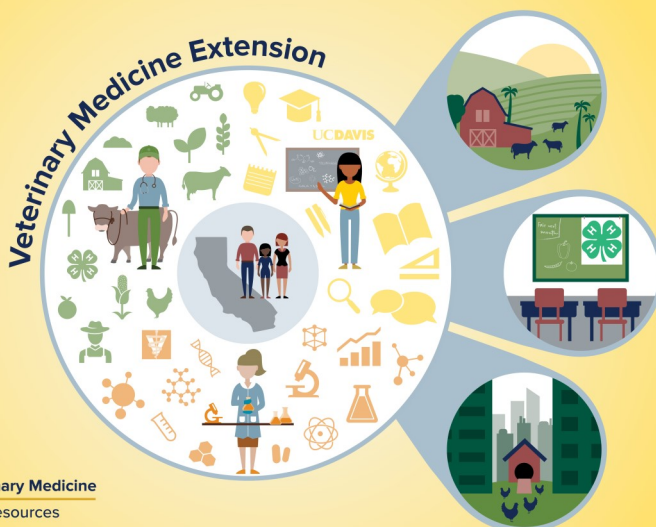
Answer from last issue:

Caterpillars actually do have six legs coming from their thorax, just like all other insects! The additional "legs" you see are called "prolegs". These are not true legs, but serve the same function!

Expert Panel for the 2019 4-H Animal Science Symposium



Our UC Davis School of Veterinary Medicine Cooperative Extension Specialists served as the expert panel for the 2019 4H Animal Science Symposium. From left to right, we have Dr. Martin Smith (youth literacy), Dr. Gaby Maier (beef cattle herd health & production), Dr. Fernanda Ferreira (herd health & management economics), Dr. Pramod Pandey (microbial waste treatment), Dr. Emmanuel Okello (antimicrobial stewardship), Dr. Noelia Silva del Rio (dairy production & food safety), Dr. Alda Pires (urban agriculture & food safety), and Dr. Maurice Pitesky (poultry health & food safety epidemiology).



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School of Veterinary Medicine
University of California
One Shields Avenue
Davis CA 95616

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Maurice Pitesky, editor in chief

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