

# **\$2 Million Grant Funds Organic Farming Study of Manure and Food-safety**

Alda Pires, UC Davis School of Veterinary Medicine-Cooperative Extension and UC ANR



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Inside the New Vet Med Extension Website Organic farmers who animal-based use manure to improve soil quality and nourish crops are receiving help through a nearly \$2 million grant for a food-safety research project, led ŪČ by the Davis School of Veterinary Medicine and involving a multi-state network o f collaborators.

The U.S. Department of Agriculture Organic R e s e a r c h a n d Extension Initiative grant (grant award number 2016-51300-25724) will support



Lettuce fields-photo courtesy of Alda Pires

studies needed to develop national guidelines and best practices for using raw manure while improving soil health and minimizing food-safety risks in organic crops such as leafy greens, tomatoes and root vegetables.

Raw and minimally processed animal manure has been shown to be a rich source of nutrients for improving soil fertility and quality, offering organic farmers an alternative to chemical fertilizers. But animal-based soil amendments may also contain naturally occurring microbes that can cause food-borne illnesses in people.

"This study is designed to determine how much time should pass between the applications of untreated animal manure in the field and crop harvest, in order to minimize any risks that these microbes might pose to consumer health," said <u>Alda</u> <u>Pires</u>, UC Cooperative Extension <u>urban agriculture and food safety specialist</u> in the School of Veterinary Medicine at UC Davis.

#### \$2 Million Grant Funds Organic Farming Study of Manure and Foodsafety, continued

Pires is leading the project with Michele Jay-Russell, a veterinary research microbiologist and manager at the Western Center for Food Safety at UC Davis.



Cattle manure pile-photo courtesy of Michele Jay-Russell

"This research aligns closely with our center's goal to help farmers achieve compliance with the prevention-oriented activities outlined in FDA's produce safety regulations," said Jay-Russell.

In addition to UC Davis, project collaborators include the University of Minnesota, University of Maine, USDA Agricultural Research Service's Beltsville Agricultural Center, USDA Economic Research Service's Resource and Rural Economics division, Cornell University, and The Organic Center. More information and updates can be found at the dedicated website of The Organic Center.

## UC and UC ANR as Leaders in Planetary Health: Developing Innovative and Sustainable Solutions for the 21st Century

Woutrina Smith, UC Global Health Institute Center for Planetary Health, UC Davis David Lopez-Carr. UC Global Health Institute Center for Planetary Health. UC Santa Barbara Martin Smith. UC Global Health Institute Center for Planetary Health. UC Davis

> By 2050, the world's agricultural systems must provide food for a projected 9.8 billion people. To accomplish this, however, will require creating just, equitable, and sustainable agricultural systems while simultaneously limiting environmental degradation. This challenge emerges at a critical time, as climate change and variability threaten the ability of natural and built systems to provide the goods and services upon which humanity depends to survive.



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## UC and UC ANR as leaders in planetary health: Developing innovative and sustainable solutions for the 21st century, continued

Planetary health and the state and stewardship of our natural and built systems directly impact human and animal health outcomes in California, with UC Cooperative Extension (CE) at the front lines addressing needs and issues at the level of the county and the community. In the case of smallholder agriculturalists, the integrity of the environment (i.e. the health of soils, predictability of local climates, presence or absence of pollinators, existence of invasive species) remains integral to the provisioning of an ample and nutritionally diverse food supply. Environmental impacts on these food systems, and therefore food and nutritional security, will vary spatially and temporally, with disproportionate impacts on the most vulnerable populations. **Figure 1** on the previous page shows a planetary health paradigm with bidirectional effects of environment on populations and populations on environment.

We are at a unique time in history, when it is critical that we recognize that the trajectory of demands associated with the world's population in the coming decades is beyond the ability of what the planet can provide. The question is not *whether* we become sustainable, but *when* and *how* we become sustainable. We have the opportunity to innovate, unite, and work as a global society to manage our resources and populations in a more integrated, sustainable fashion. To this end, the UC Division of Agriculture and Natural Resource (UC ANR) has already made important strides with the *Strategic Vision 2025* that highlights key strategic initiatives for the 21<sup>st</sup> century that focus on individual, community, and environmental health and well-being.

Within UC ANR, county-based CE programs can be hubs for the push and pull of local and regional ideas as well as conducting applied research, and campusbased CE Specialists and ANR Research and Extension Centers (RECs) are well placed to conduct studies and outreach that connect UC campus faculty and students with communities and stakeholders throughout California. Furthermore, the work of county- and campus-based academics can be further amplified by partnering with the Planetary Health Center of Expertise (PHCOE) within the University of California Global Health Institute, a network of faculty expertise and resources from the ten UC campuses and the associated National Laboratory network. Such collaborations would work well within and across the UC ANR

> Strategic Initiatives and can help to further UC ANR's efforts of translating research and policy into practice and partnerships.

All of the UC ANR Strategic Initiatives are consistent with a planetary health perspective applied in the California context, which in many ways serves as a microcosm of global societies. The initiatives to improve water quality, quantity, and security, to enhance

competitive, stable food systems, to ensure safe and secure food supplies, and to manage invasive pests and diseases are as critical in California as they are in the rest of the world. The solutions we develop towards sustainability here in California

UC

"We have the opportunity to innovate, unite, and work as a global society..."



Vet Med Extension Digest

## UC and UC ANR as leaders in planetary health: Developing innovative and sustainable solutions for the **21**st century, continued

may be adapted and evaluated well beyond our borders.

initiatives The to promote sustainable natural ecosystems, and to improve energy security and green technology through innovative science linking engineering, agricultural, biological, environmental and sciences are also built on a foundation of collaboration across disciplines to develop new solutions. Faculty and researchers that are part of the UC-wide Planetary Health



Figure 2: Youth 4-H Biosecurity Project personnel discussing connections between human health, animal health, and environmental health factors at California county fairs.

Center of Expertise are currently working on new ideas related to these initiatives, and the role of Cooperative Extension in helping to evaluate these technologies on the front lines will be critical to success.

Last but not at all least, the initiatives to promote healthy families and communities, and to increase scientific literacy in natural resources, agriculture, and nutrition, are grounded in the recognition that culture and experience will help shape an informed population. Additionally, by building the confidence and competence of youth in these areas, we are helping to develop our leaders of the future. Figure 2 shows UCD personnel working with California youth on a biosecurity farm and fair research project where a One Health approach to promoting the health of people, animals, and their shared environments was successfully implemented. These universityand stakeholder-aligned projects are critical to developing practical solutions to our real world problems, and the youth enthusiastically embraced the ideas.

### **Strategic Perspectives on Innovation in Agrifood Supply Chains**

#### David Zilberman, UC Berkeley Department of Agriculture and Resource Economics

UC Berkeley is offering the second installation of their Agrifood Supply Chain program in April. The three-day program will host speakers highlighting the innovations behind the success of various agrifood firms. There will be retailers and financial firms <u>among many other leading firms</u> in attendance. For those that are seeking new collaborative opportunities with UC Berkeley or these representatives, this program will be a perfect opportunity to explore various possibilities. Visit the <u>website</u> for more information.

## **Updates on Subclinical Hypocalcemia**

#### Noelia Silva del Río, UC Cooperative Extension Dairy Health Specialist

Hypocalcemia is an important postpartum metabolic disease. Although the use of anionic salts as a preventive strategy in prepartum diets has been widely implemented, hypocalcemia remains one of the most important postpartum In California's Central Valley the diseases. prevalence of clinical hypocalcemia when dietary cation-anion difference (DCAD) diets are fed has been reported to be 3%, whereas subclinical hypocalcemia ranged from 14% to 67% for cows in their 2<sup>nd</sup> to 8<sup>th</sup> lactation.

Clinical and subclinical hypocalcemia have been associated with dystocia, retained placenta, metritis, endometritis, displaced abomasum, mastitis and decreased fertility. Since there are no cow-side diagnostic tools to identify subclinical hypocalcemia, prevention is an important goal of



transition cow programs. Postpartum calcium supplementation, administered intravenously (IV), orally and less frequently subcutaneously, is a strategy implemented on dairies to prevent subclinical hypocalcemia. However, calcium blood levels are influenced by the route of administration.

Our research team evaluated calcium dynamics after IV and oral calcium



IV fluid administration—Photo courtesy of Ainhoa Valldecabres

administration. We observed that blood calcium spiked shortly after IV administration and it was higher than control cows or cows given oral calcium up to 4 h posttreatment. However, calcium levels after IV administration rapidly declined and bottomed out at 24 h. This led to a higher proportion of cows with subclinical hypocalcemia after IV calcium administration (90%) than in control cows (45%) or cows given oral calcium (18%). It is likely that the initial spike in blood calcium after IV administration downregulated calcium mobilization in cows resulting in a temporary subclinical hypocalcemia.



#### Updates on Subclinical Hypocalcemia, continued

In collaboration with the University of Zanjan (Iran) our research team evaluated the effects of subcutaneous calcium administration at peripartum. After supplementing postpartum cows with subcutaneous calcium we observed an increase in serum calcium levels that were sustained up to 48 h. Moreover, subcutaneous calcium administration had positive effects on uterine and udder health.

At UC Davis VMTRC we continue to evaluate strategies to manage subclinical hypocalcemia in dairy cows. We are currently carrying on two studies

where we are evaluating the effects of oral calcium supplementation on Jersey cows and the effectiveness of DCAD diets on commercial dairies.

## Preparing Small-Scale Livestock Producers for the Veterinary Feed Directive (VFD) Era

#### Myrna Cadena, UC Cooperative Extension

Resistance to medically important antibiotics (i.e. those used in human medicine) is a growing concern for both human and animal health. In order to promote responsible use of antibiotics in livestock feed and water, the U.S. Food and Drug Administration is turning medically important antibiotics into veterinary feed directive (VFD) drugs starting January 1, 2017. This means that a licensed veterinarian must prescribe and supervise the use of such drugs in livestock feed and water. Examples of over-the-counter drugs (OTC) turning into VFD drugs are virginiamycin, penicillin and tylosin. In addition, effective January 1, 2018, all OTC antimicrobials will require a veterinary prescription in California, according to Senate Bill 27. For additional information check out the FDA website here.

In preparation for the upcoming changes, experts from UC ANR, UC Davis School of Veterinary Medicine and Lander Vet Clinic held a workshop for small-scale livestock producers in Modesto. About 30 producers with diverse backgrounds (e.g. beef, dairy, goat, sheep, pig, poultry and mixed flocks) attended the workshop. Of those 30 attendees, approximately half of them raised their livestock on pasture. Responsible antibiotic use, zoonoses, and animal health and husbandry, among other topics were discussed. More information about this meeting can be found on the <u>UC Cooperative Extension</u> <u>website</u>. Keep an eye out for similar workshops in your county!

## **Research Opportunity for Mixed Crop-Livestock** Farms



#### Alda Pires, UC Davis School of Veterinary Medicine—Cooperative Extension and UC ANR

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 located 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: <u>apires@ucdavis.edu</u> or Dr. Michele Jay-Russell (Research Microbiologist & Program Manager): Phone: 530-219-4628, Email: <u>mjay@ucdavis.edu</u>. More information about the study can be found in the <u>Small Farm & Urban Agriculture</u> website.

## **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-

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

animal inter-relationships, and societal concerns related to animal welfare in research, education and animal agriculture.

He was a well-respected veterinarian, and an accomplished fiddle 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.



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

## Inside the New Vet Med Extension Website

#### **Jasmin Bardales**

The new <u>Veterinary Medicine Extension website</u> highlights the projects and people involved in this unique and integrative program. Some of the current projects featured on the Programs page of the website involve animal welfare, cattle herd health, poultry, and small and urban farms. The research gathered from these projects is presented to the public at various workshops and conferences, which can be found on the News and Events page along with more information about how to register.

The projects undertaken by Vet Med Extension are made possible by the <u>Faculty, Cooperative Specialists</u>, and <u>County Farm Advisors</u> located at UC campuses and in county offices all over California. They focus on research, education, and outreach on topics that are important to California farmers. By recognizing locally relevant issues, they work together to develop cogent solutions using science and research-based information. This intricate network of people from the School of Veterinary Medicine (SVM) and the UC Division of Agriculture and Natural Resources (UC ANR) is what gives the Vet Med Extension program its strength. By combining knowledge and increasing connectivity between departments, Vet Med Extension seeks to create bridges to solve some of the most challenging issues facing California's agricultural communities.