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Risk factors for respiratory symptoms in French and California farmers

By Youssef Hassani

From Oct. 25, 2013 to Jan. 17, 2014, I had the privilege of collaborating with the Western Center for Agricultural Health and Safety (WCAHS) as an international visiting scholar to UC Davis. This visit would never have happened without the help of Dr. Marc Schenker, who gave me a chance to enrich my research experience by comparing regional risk factors for respiratory symptoms of farmers in the Auvergne region of France and the Central Valley of California.

My research is focused on the epidemiology of allergic and respiratory diseases (EPAR) at the French Institute of Medical Research (INSERM), and supervised by Dr. Isabella Annesi-Maesano, the head of EPAR team.



Visiting scholar Youssef Hassani and his wife, Antufa, from the tiny island country of Comoros, photographed near WCAHS offices on Old Davis Road.

Many studies have confirmed that farming is associated with health hazards, especially respiratory diseases. The main focus of my research in France is environmental factors of allergic and respiratory diseases among farmers from the Auvergne region. During the period 2009-2010, my colleagues and I conducted a comparative health study of 481 farmers, who were members of the Mutual Agricultural Employees (MSA) and had complete health data available.

Using data from my study and the WCAHS Farmer Health Study, investigating the environmental exposures and health impacts of farming on California farm workers, I conducted

a comparative health analyses between French and California farmers.

California farmers were divided into two groups: those who spend more than 20 hours a week farming with an average hour working time equal to 47.5h (+/-18.9), and those who spend less than 20 hours farming with an average working time equal to 8.8 (+/-5.5). As French farmers spend on average 35 hours per week farming, we selected California farmers who spend more than 20 hours farming per week for comparative analyses.

French farmers were younger than California farmers (46.8 vs 52.9 years old), and more female farmers are in the French cohort than in the California cohort (28.3 vs 7.7 percent). California farmers had a higher educational level than French farmers (31.9 vs 15.6 percent), and 84.6 percent of California

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WCAHS PI tackles 'meat vs. miles' climate-change myth

By Suanne Klahorst

In a 1,000-year-old village in Germany, Juehnde, methane is not a dirty word. The recovered methane from a manure-fueled bioreactor feeds the burners that heat water for every household in the village. The same hot water provides heating.

These households benefit from living adjacent to a livestock economy whose manure was once just a smelly nuisance. The manure is transported by truck to an enclosed bioreactor, thereby reducing odor and feeding a system that powers an entire community.

Frank Mitloehner once called this village home. Now a professor and University of California Cooperative Extension air quality specialist in the Department of Animal Science at UC Davis, Mitloehner thinks that if this village can do it, so can California.

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Director of NIOSH Office of Agricultural Safety & Health visits WCAHS

NIOSH Director John Howard, M.D., MPH, J.D., LL.M., has requested that Capt. Brad Husberg, director of the NIOSH Office of Agricultural Safety & Health (OASH), visit



From left, Capt. Brad Husberg, director of the NIOSH Office of Agricultural Safety & Health (OASH); Marc Schenker, WCAHS director; Shirley Gee, WCAHS researcher; Steve McCurdy, WCAHS director of outreach; and Teresa Andrews, WCAHS education and outreach specialist.

the 10 NIOSH Agricultural Safety and Health Centers. WCAHS was pleased to host Capt. Husberg on Dec. 10, 2013, for an all-day meeting. The purpose of these NIOSH ag centers visits is two-fold: 1) an opportunity for Capt. Husberg to meet individual project researchers and their key staff to hear from them directly about their projects, special areas of interest and the communities they serve, and 2) to provide the ag centers with an overview of NIOSH's reorganized Office of Agricultural Safety & Health (OASH), goals of the National Occupational Research Agenda (NORA), a framework for identifying priorities, developing partnerships to address them and implementing interventions), and the importance of tracking project and program activities, outputs, intermediate outcomes, end outcomes and their effectiveness.

Capt. Husberg also had the opportunity to tour the UC Davis Department of Biological and Agricultural Engineering with WCAHS project Investigator Fadi Fathallah. He ended his UC Davis visit with a hands-on tour of the Joe A. Heidrick, Sr. Western Center for Agricultural Equipment.

Hammock receives ASPET award

Distinguished Professor Bruce Hammock of the UC Davis Department of Entomology and Nematology, received the 2014 Bernard B. Brodie Award from the American Society for Pharmacology and Experimental Therapeutics (ASPET). The award recognizes Hammock's outstanding original research contributions to the understanding of human drug metabolism and transport, and the continued impact of his research in the area of drug discovery and development. Hammock has



had on-going significant human health research projects with WCAHS since almost its inception in the early 1990s. His current research project within the Center's Prevention/Intervention core, is "Rapid Assays for Human and Environmental Exposure Assessment."

Hammock, who directs a laboratory of more than 40 scientists and students, explores the biochemical basis of human and environment interactions and their implications for improving both human and environmental health. For more than 35 years, he has worked on the mechanism of certain hydrolytic enzymes and their effect on human health. His work has helped identify new targets for the action of drugs and other compounds to improve health and predict risk from various environmental chemicals. He will be honored by ASPET at an April event in San Diego.



Lisa Blecker (left) and Maria Alfaro presented the results of their 2012–2013 WCAHS Seed Grant award at the Feb. 3 WCAHS Seminar. Blecker is the UC Statewide IPM Program Pesticide Safety Education Coordinator and UC ANR Pesticide Coordinator, and Alfaro serves as Pesticide Coordination Assistant. The title of their presentation was "Respirator Training Module for Pesticide Handlers & Applicators." Seminar Series PowerPoint presentations may be viewed at <http://agcenter.ucdavis.edu//seminar/webcast.php>

It is easy to see how Mitloehner was inspired to study ways that California can take advantage of its plentiful supplies of animal methane. In eight bovine bio-bubbles that function as airtight barns, he captures and measures every emission from his resident livestock in order to understand how methane emissions vary with feed and herd management.

At Davis, a commercialized version of a similar methane bioreactor has been patented and licensed by Ruihong Zhang, professor in the Department of Biological and Agricultural Engineering. It has been constructed at the local landfill and will be used to demonstrate a sustainable village on the UC Davis campus.

Mitloehner recently gave a seminar for the Western Center for Agricultural Health and Safety at Davis. Since the Food and



Frank Mitloehner

Agriculture Organization of the United Nations committee released its 2006 report entitled *Livestock's Long Shadow*, he has challenged two key misleading sentences in the report. One compared the contribution of livestock emissions to that of transportation. By saying the contributions to climate change were similar, the report led many environmental advocates to the conclusion that eating

less meat was the equivalent of taking cars off the road, setting up a meat vs. miles tradeoff that exaggerated the methane contributions of livestock everywhere.

Mitloehner's response was the publication *Clearing the Air, Livestock's Contribution to Climate Change*. After his paper was released, the BBC, CNN and other media published his science-based estimate that the livestock contribution in the U.S. is 3.4 percent of emissions. Globally, 18 percent of warming was estimated to be livestock-related. This estimate included livestock in the broadest sense – changes in land use, deforestation and desertification in developing countries.

Mitloehner shared a few facts that help explain why U.S. methane emissions remain low:

The U.S. has fewer dairy cows. Today's 9 million dairy cows supply 60 percent more milk than the 16 million cows in production in 1950. That means there is increased efficiency per cow for the same methane produced.

Thirty percent of the methane in dairy production is from manure in ponds. There is the potential for recovery on the approximately 1,500 California farms, where the average herd size is 1,100 head.

Methane has 20 times the warming potential of carbon dioxide, but when burned to heat water or to generate power, its warming potential is reduced by a factor of 20.

The more fiber in the feed, the more methane is released by the rumen of the animal. One dairy cow in the U.S. produces an average of 20,000 pounds of milk per cow annually, the same amount of milk as five cows in Mexico, or up to 100 cows in India for the same or less methane per cow. Reasons: low-fiber diet, fewer parasites and less disease result in large differences in production per cow.

Mitloehner believes that "sustainable intensification" is the solution to keeping local dairies viable. He believes that science will provide the path to better regulation. A number of dairy nations and private organizations have formed an international partnership at FAO called LEAP to address the issues. Mitloehner's leadership as chairman of the partnership will keep methane bioreactors on the agenda.

Excerpted from an article that appeared in the Dec. 18, 2013, issue of the California Farm Bureau Federation publication AgAlert.

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farmers live with partners, while only 63 percent of French farmers live with partners. Concerning the exposure to risk factors for respiratory symptoms, the average age a farmer started smoking was around 18 years in both regions. The number of smokers in France was almost two times more than in California (21.1 vs 11.5 percent, respectively); however, more California farmers were exposed to pesticides (50.8 vs 18.1 percent) and fertilizers (53.3 vs 39.1 percent). Auvergne agriculture is dominated by livestock production (56% vs 39.1%) or livestock and vegetable crop production (42.9% vs 33.4%), while in California many farmers were involved only in vegetable crop production (89.8% vs 1%).

Besides these differences in terms of exposure in farms in Auvergne and California, regional differences of the prevalence of respiratory symptoms have been observed: French farmers had a high prevalence in asthma (15.2 vs 7.9 percent), chronic bronchitis (6.1 vs 4.1 percent), and usual cough (36.8 vs 6.0 percent), while in California more farmers declared fever or allergic nasal symptoms (23 vs 20.5 percent).

My wife, Antufa, and I are from Comoros, a small country formed by three islands located in the Mozambique Channel, between Africa and Madagascar, in the western Indian Ocean. My stay at the University of California, Davis, is part of my Ph.D. program, funded by the School of Public Health (EHESP). We enjoyed our three-month stay in Davis, and are very pleased by the warm welcome we received.

Seed grants awarded to three grad students, three faculty members

The NIOSH-funded WCAHS Seed Grant Program encourages development of creative research, prevention/intervention, translational, training and outreach projects in agricultural safety and health. This annual program is open to the WCAHS four-state region: Arizona, California, Hawaii, and Nevada. In January the Center funded six projects – three graduate student projects, and three faculty projects for NIOSH grant year three (2013-2014). The titles of projects and the researchers involved appear below.

GRADUATE STUDENT PROJECTS

THE EFFECTS OF AGRICULTURAL PARTICLES ON PULMONARY ALLERGIC RESPONSES: A FOCUS ON DENDRITIC CELLS

Alejandro Castañeda, M.S., Ph.D. student

ASSESSING CLOTHING AS A PREVENTATIVE METHOD FOR HEAT ILLNESS IN CALIFORNIA'S AGRICULTURAL WORKERS

Alondra Vega, M.S., Ph.D. student

HEAT ILLNESS AND KIDNEY FUNCTION IN CALIFORNIA'S AGRICULTURAL WORKERS

Sally Moyce, RN, BSN, Ph.D. student, Betty Irene Moore School of Nursing

FACULTY FUNDED PROJECTS

DEVELOPING THE NEXT GENERATION OF AG SAFETY AND HEALTH LEADERS

Ben Swan, Ph.D., assistant professor, Agricultural Education & Communication, Cal Poly

EVALUATING INHALATION EXPOSURE OF BIOCHAR PARTICULATE MATTER AND BOUND CONTAMINANTS FROM AGRICULTURAL ASSOCIATED DUST

Sanjai J. Parikh, assistant professor of soil chemistry, Dept. of Land, Air & Water Resources, UC Davis

ASSESSMENT OF ARIZONA AGRICULTURE HEALTH DATA

Philip Harber, M.D., MPH, professor of public health, Mel and Enid Zuckerman College of Public Health, University of Arizona, professor emeritus, UCLA

For more information about these projects, please visit the WCAHS website at http://agcenter.ucdavis.edu/seed_grant.php



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Assoc. Director Kent Pinkerton
Director of Education Stephen McCurdy
Director of Research Frank Mitloehner
Education/Outreach Specialist Teresa Andrews
Manager/Editor Sandra Freeland

Calendar

Monday, March 3, 2014, 4:00 – 5:00 p.m., C.H.E.

“The Case of Methyl Bromide Alternatives: Progress Towards a Fumigation Independent Future.” **Daniel Kluepfel, Ph.D.**, Crops Pathology and Genetics Research Unit, USDA, ARS, Davis

Monday, April 7, 2014, 4:00 – 5:00 p.m., C.H.E.

“Challenges in Air Quality in the Agricultural Setting – How to Meet Needs and Demands.” **Keith Bein and Kent Pinkerton**, Center for Health & the Environment, WCAHS Investigators

Monday, May 5, 2014, 4:00 – 5:00 p.m., C.H.E.

“Reproductive Health Findings of the MICASA Study.” **Stephen McCurdy, M.D., MPH**, WCAHS Director of Education, and Investigator

WCAHS Seminars are held in C.H.E. on Old Davis Road



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