

University balloon tracks dairies' acrid gases

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An orange balloon floated 50 feet above California State University, Fresno's small dairy herd last week, helping in the unsavory task of gathering air samples from a plume of pungent gases.

On the ground, a gas chamber held more samples while massive Holstein and Jersey cows drooled and munched feed nearby. Researchers sweated in the barnyard stench, making sure sampling instruments worked properly.

It's not glamorous, but this is the cutting edge of air-quality science. In just the last decade, dairies have emerged as a serious source of air pollution, and there's work to do.

Fresno State is among 10 universities around the country studying every angle of the gases coming from the multibillion-dollar industry. What chemicals are in them? What can be done to limit them?

For good reason, the scientists at Fresno State are among the research leaders. California's San Joaquin Valley is the nation's most productive dairy region, with about 2 million milking cows.

Until now, no researcher has used a balloon to track the gases as they move away from a dairy, said Segun Ogunjemiyo, a Fresno State geography professor and one of the lead investigators.

"Are the gases diluted as they move?" he asked. "Do they disperse? Are there other chemical reactions taking place?"

The research is important because there already has been a major misconception about dairy emissions. Five years ago, government officials thought most of the pollution gases came from cows and their waste.

But University of California at Davis this year found that the biggest dairy emission comes from feed, such as fermenting corn silage.

It is considered a significant problem. Dairies create almost twice as much reactive organic gas as cars do in the Valley, according to recent studies.

The gases cook together with [nitrogen oxides](#) from vehicles and other combustion sources, such as fires, to make ozone in the Valley, one of the nation's most [polluted air](#) basins.

Fresno State researchers are trying to determine if dairies cause problems on a regional basis, not just around the farm.

The research will help in designing rules and emission controls, say both state and Valley air-quality officials. For instance, covering feed piles more completely might help reduce gases.

Ogunjemiyo is working with Fresno State chemistry professor Alam Hasson and Steven Trabue, a federal scientist who works with Iowa State University. They obtained a \$600,000 grant from the U.S. Department of Agriculture for a three-year study in the Valley.

The money came from more than \$5 million in federal grants to the 10 universities across the country for such research. The other schools include the University of Minnesota, Ohio State University and Texas Tech University.

At Fresno State, the latest innovation is using the \$100,000 orange balloon, purchased with a previous grant from the federal National Science Foundation. It looks like a miniature airship or dirigible.

Filled with helium and attached to a nylon line, it takes instruments aloft to measure wind speed and to collect air samples for later analysis. The instruments are operated by remote control, and data are transmitted to receivers on the ground.

Hasson said the team spent the last three months setting up the work with the balloon. The researchers will go into the lab over the next several weeks and begin analyzing the gases.

One complication is that Fresno State dairy's gases mingle with emissions from traffic. So the next step will be to analyze a dairy away from the city.

"April is the next time we will be sampling," Hasson said. "There are many different kinds of dairies, so we will try to find one that is representative of many dairies."

The professors said there are 14 students involved in the research, mostly undergraduates and graduate students at Fresno State. The helpers also include Kaitlyn Sims, 16, a Buchanan High School junior.

Last week, she worked with Fresno State students Austen Scruggs, 19, Lucien Nana, 19, and Jeff Cole, 25, around the cows. They monitored air sampling at the gas collector next to the stalls.

"The feed is what we're interested in right now," said Cole.

At 2 p.m., the animal waste will be flushed out of the area, he said. It's not the best time to be standing around the cows or their waste, but the

students are nonetheless interested in [air samples](#).

Kaitlyn didn't seem to mind the work or the conditions. She said she liked the routine and being around the animals.

"The Holsteins are kind of cranky," she said. "But the Jerseys are nice."

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