Researcher looks to clear the air about cow emissions

By Kathleen Hennessy, The Associated Press

DAVIS, Calif. — In a white, tent-like "bio-bubble" on a farm near Davis, eight pregnant Holsteins are eating, chewing and pooping — for science. "The ladies," as they're called by University of California researcher Frank Mitloehner, are doing their part to answer a question plaguing one of California's largest agricultural industries: How much gas does a cow emit?

UC research Frank Mitloehner's research suggests that cows are less responsible for air pollution than previously thought.

Rich Pedroncelli, AP

The findings will be used to write the state's first air quality regulations for dairies and could affect regulations nationwide.

But before he explains how it works, Mitloehner wants one thing to be clear.

"We're not talking about flatulence," he says.

He emphasizes the point because his research has been dismissed as "fart science," a label he says doesn't do justice to the seriousness of his work.

There are more than three million cows in California, the vast majority living in the booming Central Valley, home to some of the most polluted air in the country. How much to blame the cows and how much to blame the cars for the bad air is no small concern.

Mitloehner's research has suggested that cows are responsible for far fewer of the compounds that contribute to smog, known as volatile organic compounds or VOCs, than previously thought, perhaps as little as half the amount.

That puts the air quality specialist and animal emissions expert in the middle of a heated dispute coming to a head Aug. 1, when the San Joaquin Valley Air Pollution Control District will announce its new emissions factor for cows—the amount of VOCs, in pounds, that a cow releases each year. The number will eventually determine which dairies must apply for air quality permits and invest in mitigating air pollution equipment.

"This is a multibillion decision," said Mitloehner. "It's not just a number."

Currently, regulators assume that a cow produces 12.8 pounds of VOCs a year.

But regulators, environmentalists and many in the $4 billion dairy industry agree that the current emission factor, which is based on a 1938 study, is out of date.

A regulator for the air control district has proposed an increase to 20.6 pounds per cow. Industry groups estimate that number is around 5 pounds.

Mitloehner says he just wants to make sure the new number is based on science.
His solution was to recreate a cow’s living conditions in a modern dairy and then seal it off.

In one experiment, eight cows spend two days in the space-agey, air-conditioned “bio-bubble.” The large white structure houses a typical dry-lot corral, blanketed with dirt and, by the end of the experiment, manure. The cows are left to eat, chew and emit compounds while their every move is caught on video and the air is monitored by machines so sensitive they can detect one molecule out of a trillion others.

A similar test is conducted in a smaller environmental chamber simulating a typical stall with a concrete floor.

To Mitloehner’s surprise, the first results from that study show the presence of smog-causing compounds dropped significantly after the cows left chamber, even though they left fresh manure behind.

“We thought it was the waste that would lead to the majority of emissions, but it seemed to have been the animals,” he said.

The chief offender appears to be the ruminating process. After a cow eats, the food is briefly deposited in its bathtub-sized stomach. There it mixes with bacteria, begins to break down and produces methane, a greenhouse gas. About 20 minutes later, the food comes up again as cud. As the cow chews it, the methane is released into the air. The process also emits methanol and ethanol, both VOCs.

For some in the industry, the results indicate that dairy farmers who may be forced to mitigate pollution may be trying to fight nature.

"Is this something that we really want to do, try to regulate a living thing?” said J.P. Cativiela, a program coordinator for Dairy CARES, an industry-funded environmental group. "All living things have emissions, plants, animals, even, people. It absolutely makes sense to regulate the industrial part of a dairy, are we really seriously talking about regulating animals?"

Cativiela said changing a cow’s food may prove to be more effective than expensive technologies. He and other industry advocates are concerned that regulators will call for expanded use of methane digesters. The digesters cover a dairy’s lagoon of diluted waste, trap pollutants and create electricity. They also cost about $1 million a piece, and industry groups argue their effectiveness is unproven.

Meanwhile, environmentalists contend that the import of Mitloehner's research has been exaggerated. They note that it tests only one of the many polluters on a modern, large-scale dairy.

"It doesn't take into account the lagoons that store the waste or the decomposing feed, the decomposing corn stored on a dairy," said Brent Newell, an attorney with the Center on Race, Poverty and the Environment.

San Joaquin regulators say Mitloehner's research is just one factor in the decision.

"The district's assessment is based on all of the science in total," said spokeswoman Jaime Holt. "It is not based on any one study, or any one process being measured."

Mitloehner agrees that his research should only be one of several factors being considered by regulators. But he's recently criticized the other studies being used by regulators, as well as how the district, which funded part of his research, is interpreting his findings.

He and other scientists have written letters to San Joaquin Air Pollution Control Officer David Crow expressing their concerns.

But for now, Mitloehner has returned to his bio-bubbles to continue researching other cow-related air quality problems, like dust and ammonia.

Someday, he and his students joke, he may like to use the bio-bubble to measure emissions from another polluter: the car.

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