

Dairy cows emissions research update *

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An important group of researchers are dealing with air quality and dairy production at UC Davis Animal Science Department. This group is led by Dr. Frank Mitloehner, who is the Cooperative Extension Air Quality Specialist. Besides the researchers from UC Davis, this group is also made up of specialists (atmospheric scientists, engineers and physicists) from other Universities. Today, UC Davis has the largest university air-quality program in the USA.

There are some very important reasons which explain why scientists are working on air quality in California. First, the air quality problems are well known to affect human health in the Central Valley. Second, information about dairies and air quality in California is urgently needed, because the \$4.6 billions total gross production value and the 1,5 million cows of the largest Dairy Industry in the world are located here. Finally, there are some strictly technical aspects. The air quality emissions from dairies are currently estimated using a questionable factor derived from data published in 1938, and today dairy producers have to comply with strict pollution regulations.

The sources of air emission from dairies may vary, being the main causes: solid and liquid manure, feeds (mainly silages), open corrals, barns or freestalls and gases coming directly from cows (both ends). These gases are: ammonia, methane and probably more than 700 different volatile organic gases or VOC, which are also referred to as ROG or reactive organic gases. Some of these gases react in the air to form ozone and particular matters. Several different methods are being employed to estimate air emissions from dairies. The on-farm measurements have the advantage of the real life conditions, but in some situations can be confounded by wind speed and direction, ambient weather and other variables that can not be controlled. The results coming from UC Davis are direct measurements from cows and its manure in specially designed chambers. These closed chambers have the possibility to control all the inputs and outputs for short periods of time (e.g. some weeks) including air and internal environmental conditions, and changing animals in different physiological stages and diets.

According to some preliminary results presented in recent meetings, California dairy cows produce only half the amount of air pollution as had previously been believed and, perhaps more important, most of a dairy cow's contribution to smog comes not from her manure, but from her belching. The old estimate says that one cow can produce 12.8 pounds of VOC per year, which is twice the amount that researchers found. The studies indicate that about 2.5 pounds (40%) are coming from the excreta and the other 60% are gases produced inside the animals by fermentation and digestion processes and directly eliminated by the cows. These are very important news for dairy producers. Of course, trials will continue working with different animal's categories and diets. Much more research it is needed on animal nutrition to decrease and mitigate the effect of gases coming directly from cows. Information at farm level it is also highly necessary and many dairy producers are very conscious of that.

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