

ABSTRACT

IDENTIFICATION AND QUANTIFICATION OF VOLATILE FATTY ACIDS FROM A COMMERCIAL DAIRY IN CALIFORNIA USING A FLUX CHAMBER AND SPME ON GC/MS

California's San Joaquin Valley is an area subject to elevated levels of ozone during the hot summer months. Dairies located within the valley increase the volatile organic compounds (VOCs) found in the area through emissions into the atmosphere. Regardless of the shortage of studies to substantiate the claim, volatile fatty acids (VFAs) or short-chain carboxylic acids are thought to make up the majority of the VOC emissions from these dairy facilities. In this work a method was developed utilizing a flux chamber coupled to solid phase microextraction (SPME) fibers, which were then analyzed using gas chromatography-mass spectrometry to quantify emissions of six VFAs from non-enteric sources: acetic acid, propanoic acid, butanoic acid, pentanoic acid, hexanoic acid and 3-methyl butanoic acid. This technique was then utilized to quantify the VFA fluxes on the campus dairy at California State University, Fresno. While animal feed and animal waste were both found to be majority sources of VFAs, acetic acid was found to be the dominant species emitted from all sources. VFA emissions from the sources tested substantially higher than regulatory agency estimates at 25 lbs/cow/year. These data support high fluxes of VFAs from dairy facilities.

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