

Photoacoustic measurement may significantly overestimate NH₃ emissions from cattle houses due to VOC interferences

Dezhao Liu^{1,2*}, Li Rong², Jesper Kamp², Xianwang Kong¹, Anders Peter Adamsen³, Albarune Chowdhury², Anders Feilberg^{2*}

General comments

This manuscript describes experiments investigating VOC interference during NH₃ measurements using PAS in cattle barn emissions.

The novelty is the analysis of VOC interference. PTR-MS measurements were used for this purpose. The experimental design is sound. Some details of M&M should be worked out.

Correction factors are proposed which should improve emission factor determination for cattle barn emissions. The necessity to perform both PTR-MS as well as PAS complicates the emission measurements.

In the discussion attention could be paid to the possible transferability to other emission sources e.g. pig farm emissions.

Detailed comments

190. The CRDS is introduced without any further explanation. In line 96 "two PAS instruments ..." are mentioned. This is confusing. Please explain why CRDS is included.

195-199. The headspace in the silage box was analysed by PTR-MS therefore a flow of 75 ml/min was withdrawn. Was there any balance gas introduced into the box compensating the sampled air?

203. What is meant by "pretested"?

218. More information should be given on how the water solution containing VOC was prepared. pH? Concentrations? ...

Table 1. Suggestion: use consequently (throughout the paper) the acronyms for the methods (PTR-MS; CRDS; PAS) not the instrumental brand names.

Figure 3. How were the concentrations calculated? Just by the instrumental data base or own calibration.

Figure 4 Why ppbv in [A] and [B] and ppmv in [C] and [D]? Are the concentration ranges (acetic acid up to 40 ppmv) realistic for cattle barn emissions?

Table 2. For some compounds the correlations are based on 4 data points only (N). Validity?

394-396. What is the meaning for field measurements?

Table 5. Explain in the M&M section how the concentrations of the individual compounds were calculated.

Table 5. Acetic acid concentrations here are between 50 and 100 ppbv. In Figure 4 concentrations up to 40 ppmv are tested. Relevance?

539. Which greenhouse gases. Specify.