

Interactive comment on “Trimethylamine emissions in animal husbandry” by J. Sintermann et al.

Anonymous Referee #1

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General Comments

This manuscript was a pleasure to read. It reports a well-designed experiment, to investigate a question nobody had looked at before, namely: where exactly and how originate the TMA emissions that had previously been found to be associated with the presence of cattle. The authors show an impressively broad command of the TMA-related literature, truly interdisciplinary (spanning from animal physiology to atmospheric chemistry), and the manuscript is thus excellently-placed within the scope of Biogeosciences. It is also well-organized and thereby manages to give the reader an excellent overview of the topic and its significance. The following list of suggestions is of minor editorial nature.

Specific Comments

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p.6521 last paragraph: details such as “Federal Research Station”, the location and the long parentheses with instrument names should not be in Introduction. They appear in Methods section anyway.

p.6525 r2: Schallhardt et al. “in preparation” is not a valid reference. If this is not submitted to a journal by the time of revision, then I suggest to provide an outline of the calibration and calculation procedures here as “Supplementary Material”.

p.6525 r25: “sticky molecules” is too casual, replace with “concentration”.

p.6526 r19: CH₄ background of 7 ppm is very high. Is this a typo (Fig. 2 would suggest that)? Or is there a strong CH₄ source permanently upwind of the experiment location?

p.6527 r11: At what height were wind speeds measured? Was temperature measured, too? Temperature affects NH₃ emission rates; those of TMA as well?

p.6529 r11-15: There is nothing wrong in these sentences about CH₄ release, but it may be worthwhile pointing out more clearly that the CH₄ peaks are less frequent than those of acetone, because CH₄ release occurs with every “burp” while acetone release (apparently) occurs with every breath. Hence, correlation of the two time series is actually quite poor (Fig. 3a).

p.6536 r9-14: If the lifetime is only 1 min, why is dispersion considered for 8.4 min? How was the dilution “down to 1 ppt” obtained, from a model calculation or a reference? Why is “mixing... with cleaner air” considered separately, when it is the very same process of turbulent mixing that spreads a plume and entrains air from outside its initial boundaries to the inside? Please rework this passage.

Fig. 2: Nice display of some essential results. The NH₃ time series looks rather messy, though, not as convincingly affected by excretion and scraping as the TMA time series. Also, there is no clear diurnal cycle. How much did temperatures differ between day and night? Addition of some comments to the text in these respects would be desirable.

Also Fig. 2: Why is acetone elevation higher and more prolonged after the afternoon

milking than it is after the morning milking? I find this counter-intuitive because stronger accumulation should occur in the morning when stratification tends to be stable, rather than in the afternoon when I would expect good mixing due to unstable stratification. This is not really the topic of this paper, but I'm still curious.

Fig. 3 caption is too compact. Suggest rewrite to: "Mixing-ratio correlation plots (1-min averages) for the period... of a) CH₄ vs acetone, b) ... c) ... d) ... Red circles: ...".

Technical Comments

p.6521 r9: delete Schade & Crutzen reference (duplication from r7).

p.6522 r12: delete first of two "current".

p.6522 r24: insert hyphen between "well" and "ventilated". This is only one example of many where the hyphen between an adjective and a qualifier to it is lacking.

p.6524 r26: remove surplus "d" from what should be "determined"

p.6525 r19 add hyphen between "temperature" and "regulated".

p.6529 r5 add hyphen between "TMA" and "enriched".

p.6534 r1: move "maximum" to between "with" and "TMA : NH₃"

Fig. 1 caption: add hyphen between "High" and "resolution".

Fig. 2: Not sure if this is something the authors can fix (perhaps it is a matter for the journal's PDF production process): The vertical dashed lines (indicating scraping) are invisible in my printout (Fuji Xerox Apeos Port-IV C-2270 printer, Windows 7). They are visible on screen.

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