



Interactive comment on “The relationship between ammonia emissions from a poultry farm and soil NO and N₂O fluxes from a downwind source” by U. Skiba et al.

U. Skiba et al.

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Response to referee 2:

1) 'Emission factors' Referee 2 states: 'One important objective was to derive emission factors (EF)'. However, our main objective of this study was to investigate the influence of different rates of N deposition on NO and N₂O emissions. The data are not long term and frequent enough to calculate accurate EF, especially for N₂O. However calculating these from even limited data provides a means to compare our data with the literature. Unfortunately most IPCC emission factors are based on very few data sets, the comparison of emission factors derived from our data with the 'status quo' highlights the fact that the 'status quo' needs to be reviewed.

2) 'Deposition velocities' We did not apply a resistance model, but a simple concen-

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tration dependent v_d derived from previous measurements at the same site by Fowler et al, as mentioned in the result section. We did not measure atmospheric turbulence and therefore are not able to calculate v_d 's. We have however calculated v_d 's based on very recent research on this matter at CEH and also by applying a standard v_d for NH_3 used by NETCEN. All methods suggest that our estimate of N deposition rates is a conservative estimate. We can therefore safely suggest that N deposition is dominated by dry deposition rather than wet deposition. However to avoid any speculation we have removed some sentences and have minimised the comparison of calculated dry deposition with wet deposition to: 'Assuming that the calculations of dry deposition rate using the concentration dependent deposition rates are correct, then in this forest the dry deposition of NH_3 was more important than the wet deposition of NH_4 '.

Calculations of EF's are now based on wet deposition N only, and the last paragraph in the discussion section has been changed accordingly (see response 2 to referee 1)

3) 'Spatial variability and static chambers' N_2O is spatially very variable, and we should have installed three rather than two chambers per site, especially as fluxes were only measured monthly (see response 1 to referee 1 for further details). Manual chamber measurements were only made once at each measurement date. This bulk sample was analysed for N_2O by gas chromatography at least twice and more often if agreement between duplicates was poor. This has been clarified in the method section: 'By closing the chambers for a 1 h period around midday. This bulk sample was analysed for N_2O by gas chromatography at least twice and more often if agreement between duplicates was poor.'

4) 'Autochamber and overestimation of flux by measuring at noon' The role of the autochamber was to establish relationships between N_2O emission and variations in climate (rainfall and temperature). Unfortunately these relationships were not significant, as stated in the result section of our manuscript. The temporal scatter of the N_2O emissions was normally distributed over the entire measurement period and the average fluxes were in agreement with the monthly static chamber measurements. Between 28

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May and 11 June the diurnal pattern of N₂O emission was studied on a 6 hourly cycle. No consistent diurnal pattern could be established (as stated in the manuscript), and there was no evidence that the routine measurements at noon are likely to overestimate the calculated the annual flux. The manuscript has been altered accordingly:

'The autochamber positioned close to sites A was employed to provide 1 daily N₂O flux measurement. The temporal scatter of the N₂O fluxes was normally distributed over the entire measurement period and the average flux (12.9 ± 15 µg N₂O-N m⁻² h⁻¹, n=136) was in reasonable agreement with the monthly static chamber measurements from site A.'

5) 'Concentrate on NO rather than N₂O data,' The manuscript already concentrates more on NO than N₂O. We believe that in the current manuscript the correct balance has been struck. N₂O data should not be deleted, the biological processes leading to NO and N₂O are the same, and even with less frequent data, the differences and similarities in NO and N₂O behaviour is of interest to all of us.

6) 'Technical corrections': all have been adhered to as advised. 'Title of the paper': I agree with the changed title proposed by Referee 2. 'Map of site': We have drawn a map of the site, but do not feel this will improve the verbal description of the site.

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