

Ammonia concentrations around pig farms in the central plateau of Spain

Sanz, M.J.¹, Sanz, F.¹, Montalvo, G.², García, M.A.², Piñeiro, C.³, Bigeriego M.⁴

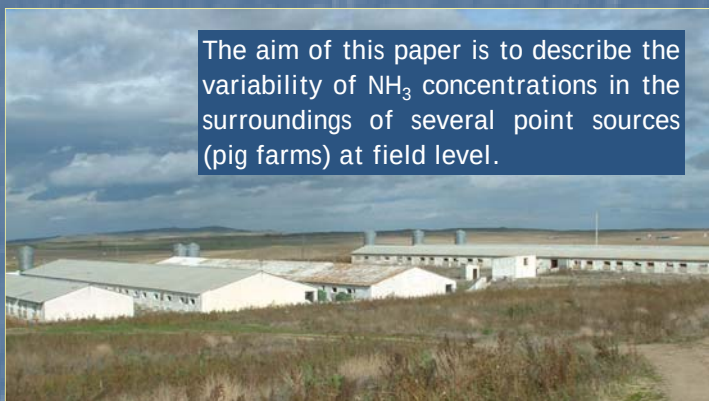
¹Fundación CEAM; ²Tragsega, S.A., Grupo Tragsa; ³PigCHAMP Pro-Europa; ⁴Spanish Ministry of the Environment and Rural and Marine Affairs.

Introduction

- ✓ A large proportion of ammonia (NH_3) emitted locally is deposited in the immediate neighbourhood of the source rather transported over long distances.
- ✓ Quantitative information about the spatial location of emission sources, as well as estimations of the emissions, is crucial for target-oriented abatement.
- ✓ A realistic distribution of NH_3 sources and sinks, as well as for later appropriately modelling atmospheric transport and deposition at local and regional scales, is based on:
 - A suitable spatial resolution
 - The acquisition of data in different climatic conditions

Objective

The aim of this paper is to describe the variability of NH_3 concentrations in the surroundings of several point sources (pig farms) at field level.



Material and Methods

Three farms were selected as representative of most types of pig farms in the area:

- ✓ Grower finisher pigs
 - ✓ Sows with piglets
 - ✓ One-site pig farm
 - ✓ One-site pig farm
- In the central plateau
- In Mediterranean area

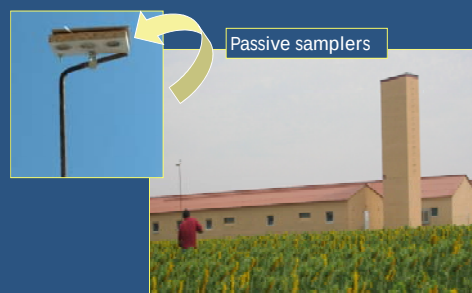
Climatic conditions were similar in all trials

Ammonia concentrations were estimated:

- ✓ Over an area of 1 km in each farm
- ✓ By *Ferm* type passive samplers, located at:
 - In 4 transects (N, S, E, W) for each farm
 - In a systematic grid for the sows with piglets farm and for the one-site pig farm (in Mediterranean area)

Emission rates were calculated:

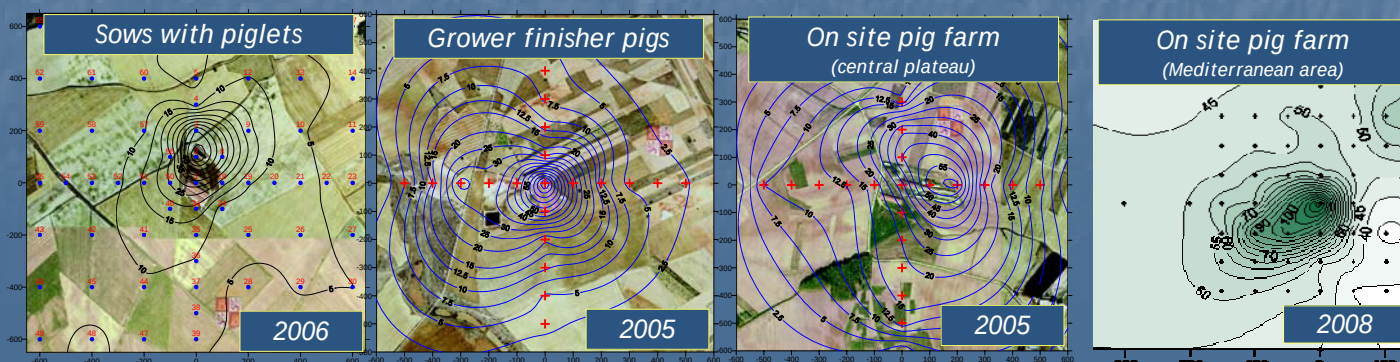
- ✓ Based on the *Gaussian* dispersion equation as input parameters.
- ✓ The output of the model were compared with the experimental concentration measurements at surface level for one-site farm and sows with piglets farm.



Results and Discussion

- The highest concentrations near the buildings for the **sows with piglets** and the **on-site pig farm** in the central plateau were similar (around $60 \mu\text{g}/\text{m}^3$).
- Around the **grower finisher pig farm**, concentration reached $81 \mu\text{g}/\text{m}^3$
- Concentration around on-site pig farm in Mediterranean area was $120 \mu\text{g}/\text{m}^3$, as could be expected due the highest number of animals.
- The concentration predicted by the model show a good correlation ($r > 0.80$) with the passive samplers measurement
- Concentration fields decreased in all cases for both years to levels of 2 and $5 \mu\text{g}/\text{m}^3$ within distances of less than 1km (600m), except in Mediterranean area ($30 \mu\text{g}/\text{m}^3$) due to the larger concentration of farms in the area.

Interpolated air ammonia concentrations ($\mu\text{g}/\text{m}^3$) around pig farms



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