



How to assess gas concentrations in broiler farms?



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Legislation

Directive 98/58 EC, Annex, Paragraph 10:

“[...] gas concentrations must be kept within limits which are not harmful to the animals.”

Directive 2007/43 EC, Annex II, Paragraph 3:

“[...] (a) the concentration of ammonia (NH₃) does not exceed 20 ppm and the concentration of carbon dioxide (CO₂) does not exceed 3000 ppm measured at the level of the chickens' heads.”



Method



Description of the method:

The method involves measurements of concentration of ammonia (NH₃) and carbon dioxide (CO₂) using a gas meter



Preparation for each inspection:

- Make sure that the gas meter has been calibrated within the last six months in a certified laboratory.
- Make sure that the gas meter measures 0 ppm NH₃ outdoor in open air.



During the inspection:

Number of points measured in the barn:

≥600 m²: six measures in total, with two measures per one-third of the barn.

<600 m²: four measures in total, with two measures in each half of the barn.

For each measure, the gas meter is held still at the height of the birds' heads for 60 s, after which the gas concentration is noted

When choosing the specific measuring point:

- Take the airflow from the ventilation into account.
- Make sure that some measures are near feed and water lines.
- Avoid the wettest areas.

When measuring CO₂ concentration:

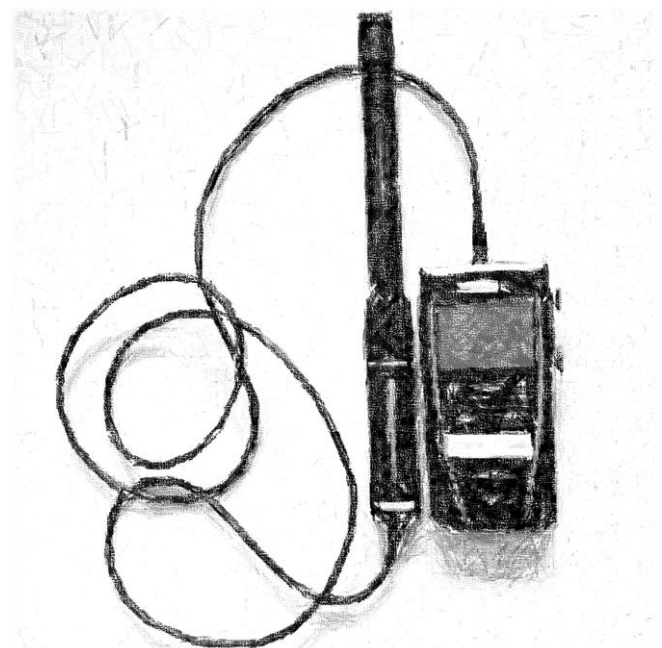
- Make sure not to exhale in the direction of the gas meter.
- Do not measure directly under the heating sources.



After inspection:

Disinfect the gas meter.

Let the gas meter run in open air outdoor until it shows 0 ppm NH₃ before being used during a new on-farm inspection.



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Interpreting the data

From interviews of official veterinarian inspectors from different Member States, it appears that there are two main ways of using the measurements:




- 1) Calculate the average of the six measures and use the mean to decide whether the gas concentration complies with the legislation.
- 2) Use the highest measure to decide whether the gas concentration complies with the legislation.



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Uncertainties/reservations

-  Gas concentrations fluctuate within a day, between days and between seasons. The method described above is a point observation valid only for the time of measuring.
-  The gas meter is costly and needs regularly calibration for a sufficiently high level of reliability.
-  There are differences between models and brands of gas meters in accuracy, so before purchasing gas meters this should be examined. The accuracy has been shown to be between 1% and 15% when the measurement is carried out on a reference gas (a mixture of CO₂ or NH₃ in pure air)¹.

Sources

A number of sources have been searched for protocols on how to measure gas concentration in poultry barns. These include scientific peer-reviewed articles and documents collected from competent authorities in Member States within EU and from non-EU countries within Europe. The methods considered to have the highest validity and reliability, while still being feasible during on-farm inspections, were found in protocols from the French² and Swiss³ competent authorities. The present method has been developed based on these protocols.

¹ Précision de la mesure des concentrations en gaz. The French Poultry Technical Institute (ITAVI) and Institut National de la Recherche Agronomique (INRA).

² Protocol 'DGAL/SDSPA/2017-998', Direction générale de l'alimentation, Service des actions sanitaires en production primaire, Sous-direction de la santé et de protection animales, Bureau de la protection animale (BPA), France.

³ Protocol 'Luftqualität', Division of Animal Welfare, Federal Food Safety and Veterinary Office FSVO, Switzerland.



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For any questions or suggestions regarding this factsheet, please contact info@eurcaw-poultry-sfa.eu