Plan Overview

A Data Management Plan created using DMPonline

Title: Gas_emissions_from_welfare-friendly_pig_housing_systems_with_outdoor_runs_v01

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Data Manager: Fei Xie

Affiliation: Wageningen University and Research (Netherlands)

Template: Data Management Plan | Wageningen University and Research

Project abstract:

With the emerging of welfare-friendly pig farms with outdoor runs, more attention is paid to the environmental impact of these farms in the Netherlands. To quantify gaseous emissions, it is important to select reliable methods. However, current methods for intensive farms are not applicable to open and naturally ventilated barns with outdoor runs, where the ventilation rate is almost impossible to measure. In addition, outdoor climate conditions are more variable, and pigs may show different elimination behaviours due to lower stocking density and larger excretion areas. In this project, an existing process-based model is further developed and optimized. A local approach, combining process-based modelling with on-site measurements simulates the ammonia emissions at pen level. A farm-level approach, using micrometeorological methods, validated by the tracer gas ratio method, estimates total emissions of both ammonia, methane and nitrous oxide. The research objectives are: (1) to explore the temperature and air velocity effect on ammonia release rate (puddle level); (2) to develop a real-time model for monitoring pig elimination behaviour and the emitting area (pen level); (3) to estimate ammonia emissions at pen and farm level using optimized process-based modelling; and (4) to quantify ammonia, methane and nitrous oxide emissions using micrometeorological methods validated by the tracer gas ratio method.

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Gas_emissions_from_welfare-friendly_pig_housing_systems_with_outdoor_runs_v01

A. Describe the research project

1. Name researcher (please, add your full name):

Fei Xie

2. What is the name of your department(s)?

- Plant Sciences

3. What is the name of your chair group(s) or business unit(s)? English name and abbreviation for chair groups from this page; business units from this page (expand to Wageningen Research and keep expanding to find your specific division / group). Examples: Bioprocess Engineering (BPE) or Contract Research Organization (CRO).

Agricultural Biosystems Engineering (ABE)

4. Describe the organisational context of your research project.

DMP version (or date last modified)	v01
Supervisor / (co-)promotors	Promotor: Prof.dr.ir Peter Groot Koerkamp Co-promotor/daily supervisor: Dr.ir André Aarnink Daily supervisor: Dr. Paria Sefeedpari Daily supervisor: Dr. Marc Bracke
Graduate School (WU only)	PE&RC
Start date of project	20230101
End date of project	20260731
Project number	
Funding body	WUR Library

5. Give a short description of your research project.

Title	Gas emissions from welfare-friendly pig housing systems with outdoor runs
Summary	This project studies the limitations of existing emission measurement methods for welfare-friendly pig farms with outdoor runs in the Netherlands. By combining process-based modelling with on-site and micrometeorological measurements, it quantifies ammonia, methane, and nitrous oxide emissions at pen and farm levels, considering the effects of climate conditions, air velocity, and pig elimination behaviour to improve emission estimates.

6. List the individuals responsible for the following data management tasks.

Data collection	Fei Xie (PhD candidate) Klaas Blanken (Technician) Yvo Goselink (Technician)
Data quality	Fei Xie (PhD candidate) Klaas Blanken (Technician) Yvo Goselink (Technician) Paria Sefeedpari (Researcher) André Aarnink (Senior researcher)
Storage and backup	Fei Xie (PhD candidate)
Data archiving / publishing	Fei Xie (PhD candidate) Paria Sefeedpari (Researcher) André Aarnink (Senior researcher) Peter Groot Koerkamp (Professor)
Data stewardship / support	Petey Awesomedatasteward (chair-group data steward). Lisa Awesomecoordinatingdatasteward (department data steward coordinator). WUR Library RDM support (data@wur.nl).
Any other role [.....]	

7. I have requested a review of this data management plan from:

- WUR Library - Data Management Support (data@wur.nl).

8. Name of the data management support staff and / or data steward consulted during the preparation of this plan and date of consultation.

Dr. Sydney Jordan
WUR Library – Research Data Management Support
data@wur.nl
Date: 2026-02-23

B. Describe the data to be collected, software used, file formats and data size.

9. Will you use existing data for this project?

- No. Please describe below any constraints to reusing existing data.

All data will be collected in this project., because we aim to measure the annual emission from innovated housing farms, which were not measured before and need to be measured by ourselves.

10. Will new data be produced?

- Yes.

11. Please describe the data you expect to generate and / or use in the table below. Include reused existing data as well (as these are files that you manage and store).

File contents	Data type	Software	(Open) file format	Estimated size of each file (range)	Estimated number of files (range)
(e.g. lab analysis, gene sequence, interviews, lesion scores, etc.)	(e.g. numerical)	(e.g. Excel)	(e.g. .csv)	(e.g. 20-50 Mb)	(e.g. 50-100)
Images	numerical	python	.jpg	1-2Mb	10,000 - 20,000
Thermal images	numerical	Python/FLIR Studio/Testo Studio	.seq/.tiff	2-5Mb	10,000-20,000
Gas concentration	numerical	R/Matlab	.R/.m	2-5Mb	5000-10000
Wind parameter	numerical	R	.R	1Mb	5000-10000
Report/Paper	Character String	Word/PDF	.doc/.pdf	10-30Mb	500-1000
Code	Character String	Python/R/Matlab	.ipynb/.R/.m	1-5Mb	100-200
Presentation	Character String/Image	Powerpoint	.pptx	30-50Mb	500-1000
Metadata, readme file	Character string	txt	.txt	10 - 500 Kb	100-200

12. Estimate how much data storage you require in total (e.g. by using the information in the table at question 11).

- >1000 GB

C. Storage of data and data documentation / metadata during research

13. Where will the data,code and accompanying documentation / metadata be stored and backed up during the research project (see the WUR Data Storage Finder)? Include platforms you use to share data, collect data on, or send data to for processing or analysis.

- Git@WUR (GitLab locally hosted at WUR)
- Other, please specify below the storage medium / system and describe back-up frequency, access management, and geographic location (e.g. within or outside the EU).
- WUR SharePoint / Teams - only when an up to date version of the research data is also safely stored on the W:drive or Yoda.
- WUR OneDrive for Business - only when an up to date version of the research data is also safely stored on the W:drive or Yoda.

Gitlab will be used to save all my codes and generated files. All the data will be saved following a 3-2-1 rule, which means 1 file needs 3 copies in at least two locations (local and online).

D. Structuring your data and information

14. Give a (visual) representation of the folder structure you intend to use.

```
├─chapter 1
│  ├─code
│  ├─data
│  ├─literature
│  ├─presentations
│  └─report&paper
├─chapter 2
├─chapter 3
└─chapter 4
```

15. Describe the file naming conventions you intend to use. Please give one or multiple example(s).

The project consists of four chapters. For each chpater, the folders of literature, data, code, presentations, report&paper will be created. The raw and pre-processed data will be stored into data file, the code and generated analysis results will be stored at code. The results will be described and summarized in report&paper folder. All the file name will be corresponding following this path and with date and version update in the end. For example:

- chapter1_ammoniaconcentration_rawdata_20240101.txt
- chapter1_ammoniaconcentration_filtered_20240501_v1.csv
- chapter1_ammoniaconcentration_result_20240601_v1.doc

16. How will you distinguish between versions of files (multiple answers possible)?

- We will use Git versioning for code / scripts.
- Dates within file names are updated when files are modified.
- The designation 'vRAW' is added to file names that contain raw unaltered data (before any processing and cleaning). Any alteration of RAW data is done on a copy of the RAW data and appended with a version number which increases with each file modification (e.g. v01, v02, v03 etc.).

E. Data documentation and data quality

17. Describe below what data documentation and metadata will accompany the data to help make the data findable, understandable, and reproducible.

- The WUR codebook template (see template at https://doi.org/10.5281/zenodo.7701727).
- The WUR readme file template (see template at https://doi.org/10.5281/zenodo.7701727).
- Elaborate documentation and notes within scripts / codes.

18. Describe what data and analysis quality controls will be used?

- We will use a statistical power analysis before and after the experiment.
- We will consult statisticians.
- Statistical model assumptions are adhered to and assessed (e.g. (residual) distribution analysis, outlier analysis, (accounting for) independence, homogeneity of variance, etc.).
- We will use discipline specific community standards for labelling and coding of data. Please specify the community standard used.
- We will perform preliminary (pilot) experiments to validate intended experimental methods.
- We will use standardised coding and terms of data throughout all experiments so that data descriptions are equal throughout various datasets created.
- Supervisors or peers will review the data and results for any anomalies (e.g. unexpected inconsistencies, outliers, correct labeling of data and / or treatments, correct and consistent coding applied, etc.).
- We will use repeated measurements to validate results (e.g. duplicate or triplicate analysis, multiple observer agreement, measurements taken over time, etc.).
- We will use standard and validated protocols where appropriate.

F. Working with sensitive data (personal data, ethics), data ownership, sharing and access

19. Who is the (rights)holder of the data (commonly known as the owner of the data)?

- WUR is the (rights)holder of the data.

20. What is the data classification for your project (for example as specified in SmartPIA) taking into account the (privacy) sensitivity of the data?

- Negligible.

21. Is this project registered in SmartPIA?

- No. Please register in SmartPIA in the case (privacy) sensitive data is collected (when applicable: via your supervisor, the project manager, see guidance).

22. Please specify the (sensitive) data and privacy protection measures. Note that any measures undertaken should be consulted with the Information Security Officer (ISO) and Privacy Officer (PO).

- Informed consents are present when information from humans are involved.
- Only WUR provided storage, processing, and analysis platforms are used as consulted with the ISO and PO where applicable.
- Data is classified as negligible and standard WUR security measures are undertaken.
- Personal or other sensitive data will be removed when not required for verification of research.
- We will consult with the ISO and PO for appropriate measures to undertake.
- Access management to the data is either managed or approved by the project leader / supervisor of the project and contains clear documentation of who has access.
- Personal and / or other sensitive data will be separately stored where possible to increase difficulty of linking data for those with unauthorised access to data.
- Personal and other sensitive data will not be made openly available and will at most be shared under formal agreements for which the ISO and PO are consulted.

23. Are there other ethical issues that need to be taken into account which may include approval from ethical committees?

- No.

24. Will there be any intellectual property (IP) rights or alternative applications or routes to impact (such as commercial interests) associated with the data?

- No.

G. Data archiving and publishing

25. Are there reasons to restrict access to the data or limit which data will be made publicly available?

- Commercial interests.

26. Describe what data from question 11 will be archived internally (e.g. WUR network drive / Yoda@WUR) and not published, for a minimum of 10 years? Include the exact name for the storage medium chosen (see the WUR Data Storage Finder).

- Due to sensitivity of data we will need to archive (part of the) data underlying publications or reports internally. Please specify below which data and the chosen storage medium.

Data that cannot be made public, such as sensitive and personal data, will be archived in Yoda@WUR. Along with that archived data, a reference to the data publication (the data that can be made public, see next question) will be present (to avoid duplicate storage).
The data concerns interview recordings and associated transcripts; raw video recordings of animal behaviour that include persons such as animal caretakers, students, and researchers. Where possible, anonymization / pseudonymization efforts will be undertaken.

27. What data will be published and made available for reuse via a data repository?

- Only the metadata is published in a data repository as the data are too sensitive to openly share.
- Data underlying publications or reports. Please specify below which data listed in question 11.

28. When will the data be available for reuse, and for how long will the data be available?

- Data will be available for at least 10 years as soon as the article or report is published and not

required for any other article publication.

29. Which data repository do you intend to use to make the data findable and accessible (see the WUR Repository Finder)?

- DANS Data Stations

Sensitive data will remain archived in Yoda.
If the publication module of Yoda is active by the time we will consider publication,
then we will use Yoda as our repository.

30. Which metadata standard will be used to describe the data during internal archiving and / or depositing in a data repository?

- Yoda metadata (DataCite metadata standard).
- Metadata standard from DANS Data Stations, 4TU.ResearchData and / or Zenodo (which often are the DublinCore or DataCite standard).

31. Which licence/terms of use will be applied to the data?

- Open access (Creative Commons Attribution licence (CC BY); anyone can access and reuse with attribution).
- Restricted access (custom licence text or data sharing agreement is required, dictating restrictions of access and reuse). When a data sharing agreement is required, the Privacy Officer or Information Security Officer is consulted.

H. Data management costs

33. What resources (in time and / or money) will be dedicated to data management, data archiving or publication, and ensuring that data is reusable? Indicate as well how these costs will be covered.

- The PhD candidate and supervisor will spend at least 10% of their time on research data management to approach the FAIR principles as much as possible.
- All costs for 10 year data storage and access management to that data after journal publication or report are covered by the research group / project.