

Supporting Information

Nitrogen Isotope ($\delta^{15}\text{N}$) Signatures of Ammonia Emissions from Livestock Farming: Implications for Source Apportionment of Haze Pollution

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Supplementary Information Contents:

In total 4 pages including:

1. Text S1 (Pages)

2. Figures S1 to S3

Supplementary Text

Text S1. Experimental Design and Sampling Methods for $\delta^{15}\text{N}$ in Livestock Farms.

Experimental Design.

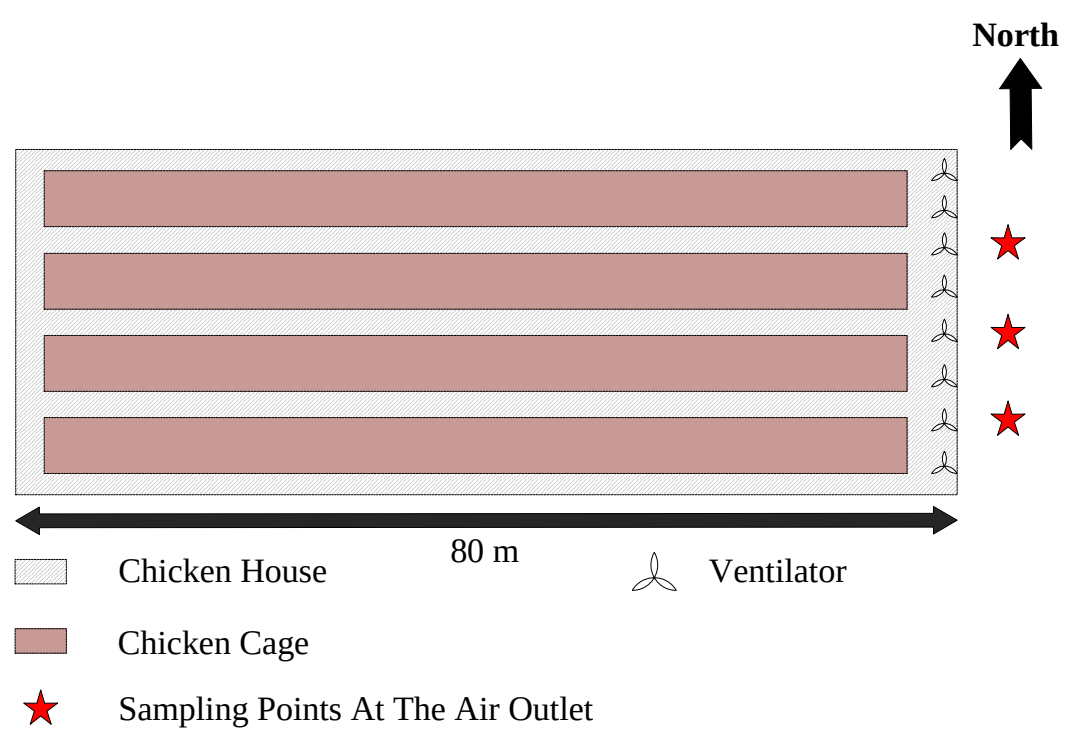
The NH_3 emissions from livestock and poultry farming are collected from the NH_3 emitted by the livestock houses. The layer farms and fattening pig farms have enclosed livestock houses. To achieve effective ventilation, the chicken houses adopt a negative pressure longitudinal ventilation mode. Each layer house is equipped with 8 exhaust fans (Figure S1), with a single fan diameter of 138 cm and a fan speed of $1,400 \text{ r}\cdot\text{min}^{-1}$. During the sampling period, a maximum of 6 exhaust fans were operated simultaneously. Three air samplers were evenly distributed 2.0 meters from the exhaust outlets for

sampling, with the air samplers positioned at a height of 1.6 meters. The fattening pig housing employs a negative pressure longitudinal ventilation system, with each building equipped with six exhaust fans. Each fan has a diameter of 110 cm, a rotational speed of $560 \text{ r} \cdot \text{min}^{-1}$, and a rated power of 1.1 kW (Figure S2). Sampling points are set at the exhaust outlets of the fattening pig housing, with three sampling points located 2 meters behind the center of the negative pressure fans at a height of 1.6 meters. The selected dairy cow shed for the study features an open structure, with four sampling points set along the aisle inside the shed. Each sampling point inside the shed is spaced 10 meters apart at a height of 1.6 meters (Figure S3).

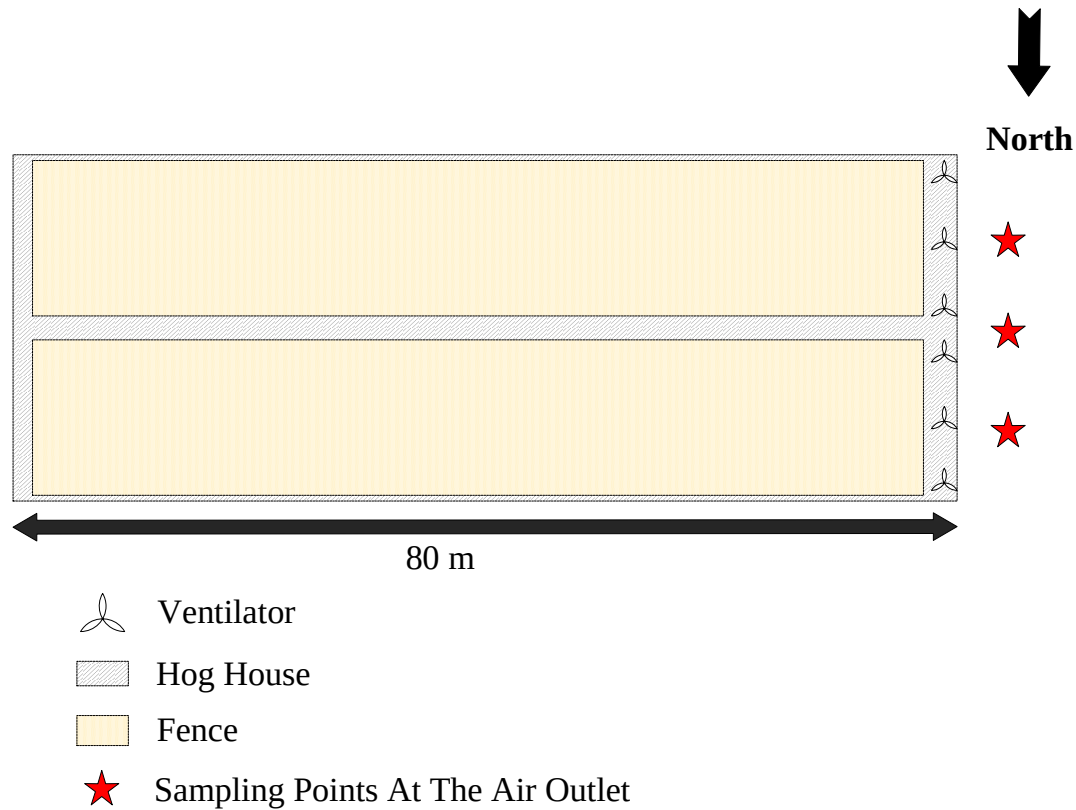
Sampling method.

Use deionized water as the NH_3 absorption solution. Transfer 10 ml of unused clean deionized water to a large bubble absorption bottle. Connect the absorption bottle to the air sampler using a 10 cm rubber hose. Set the gas sampling flow rate of the air sampler to $2 \text{ L} \cdot \text{min}^{-1}$ and perform a single sample collection for 60 minutes. After sampling, transfer the absorption solution to a 10 ml centrifuge tube and store it at -20°C for subsequent determination of $\delta^{15}\text{N}$.

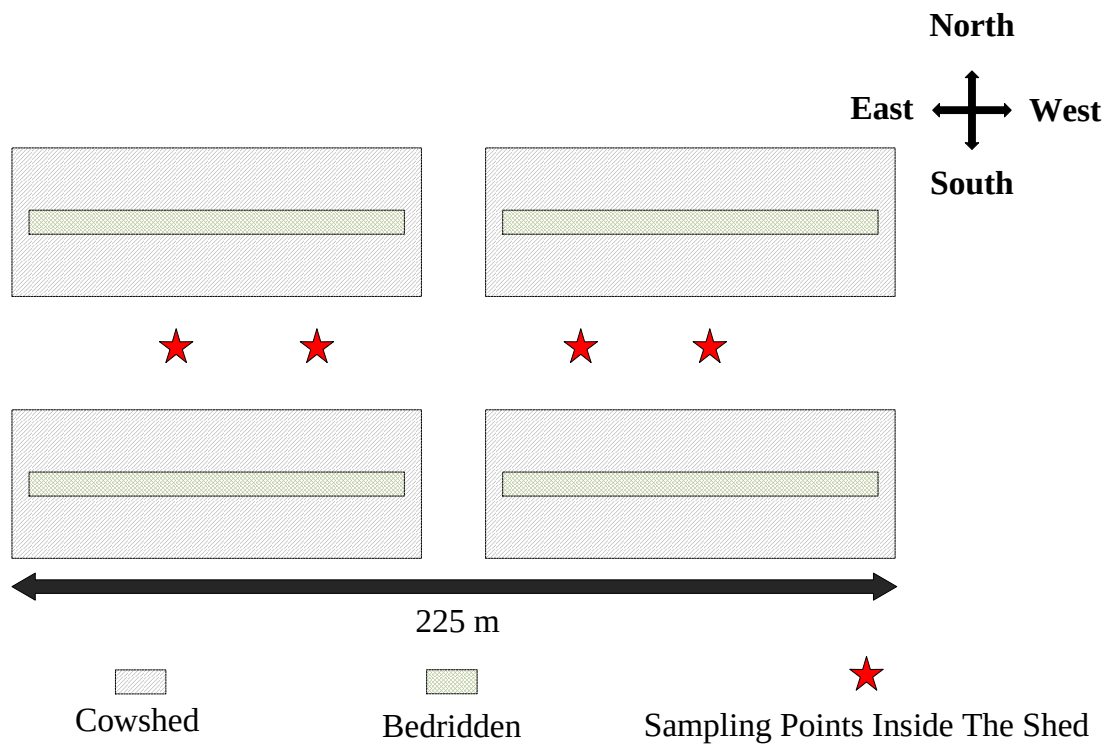
Supplementary Figures



46 Figure S1. Structure of the intensive layer farm hen house, with the placement of atmospheric samplers
47 at sampling points.



48
49 Figure S2. Structure of pig pens in an intensive fattening pig farm, with locations of atmospheric samplers
50 for sampling points.



52 Figure S3. Structure of the dairy cow barn in an intensive dairy farm, showing the placement of
53 atmospheric samplers at sampling points inside the barn.