**Ammonia emissions from finishing pigs in fully slatted systems**

**Application:** The ammonia emission value of 1.55kg/pig place/year and 16.9% TAN (total ammoniacal nitrogen) will be presented to the United Kingdom (UK) Ammonia Inventory with a view to updating the standard value for finishing pigs. The updated emission value will provide an accurate baseline of ammonia emission.

**Introduction:** Ammonia gas is a pollutant which results in a detrimental effect on areas of special scientific interest with the loss of biodiversity, negatively affecting the environment and reducing carbon sequestration ability. Ammonia is also a significant source of nitrous dioxide, a potent greenhouse gas, and there is a global drive to reduce ammonia emissions (Phillipe et al., 2011). Ammonia emission from pig production in the UK is relatively small and the industry has been proactive in reducing emissions. To do this even more effectively, it is important to have an accurate understanding of ammonia emissions from pigs in modern systems. The current emission factor in the UK Inventory (2021) is mainly based on historic data. Since it was derived, dietary crude protein (CP) has been reduced and production efficiency has increased resulting in lower nitrogen (N) excretion. However, the standard value for ammonia emission has not been updated and therefore the baseline value for ammonia emission is unknown, making it difficult to understand the effect of ammonia mitigation strategies or to make informed decisions on business expansion. The objective of this study was to quantify ammonia emissions from finishing pigs on fully slatted systems to update the value in the UK Ammonia Inventory (2021).

**Material and methods:** Ammonia emissions were measured from two pig units in Northern Ireland; at AFBI Hillsborough (Site 1) and a pig unit at Antrim (Site 2). Both units were similar in structure, pen size, ventilation and management and are representative of indoors finishing pig units across the UK. The study followed the principles of the Verification of Environmental Technologies for Agricultural Production (VERA) Test Protocol for Livestock Housing and Management 2.0. Ammonia emissions was assessed over three years and measurements were conducted over five different time points and over a range of pig weights (41-121kg). At each time point, continuous measurements were taken for a minimum of 24 hours. Ammonia concentrations were recorded using tuneable diode laser absorption spectroscopy (Solus Ammonia Analyser). Site 1 had two rooms and Site 2 had four rooms with sampling tubes placed on each fan outlet in each room and at two inlets. Ammonia emissions were measured every 15 minutes. The ventilation rate at each fan outlet was calculated which allowed for calculation of room ventilation rate (m3/hr) and conversion of ammonia concentrations from ppm to g/d/LU and kg/pig place/year. Total ammoniacal nitrogen (% TAN) was calculated from ammonia emissions kg/pig place year using the value of 10.8 kg/pig place/year for N excretion for finishing pigs derived from Beattie et al. (2020). Statistical differences between sites were tested for using ANOVA with each measurement taken as a replicate.

**Results:** Although there was a numerical difference, there was no significant (P=0.205) difference between ammonia emissions or %TAN between the two sites (1.80 and 1.46 kg/pig place/year, SED=0.26 and 19.7 and 15.9%, SED=2.90 for site 1 and 2 respectively). The mean ammonia emission across the sites was 1.55kg/pig place/year and the mean %TAN was 16.9%. Ammonia emissions ranged from 0.59 to 3.31 kg/pig place/year and %TAN ranged from 6.5 to 36.2%.

**Conclusion:** The non-significant difference in ammonia emissions between the two sites indicates that ammonia emissions are comparable across different finishing units. The range in ammonia emissions and of %TAN is in keeping with those from other studies, but the mean values are lower than those in the current UK Ammonia Inventory (2021). Ammonia emissions in kg/pig place/year are 46% lower and % TAN is 42% lower. These reductions are a reflection of the lower dietary CP now being offered to finishing pigs and the increased efficiency of modern genetics. Having an accurate quantification of ammonia emissions from finishing pigs on slatted systems will enable more effective implementation of mitigation strategies.

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**References:** UK Ammonia Inventory (2021). Inventory of Ammonia Emissions from UK Agriculture, DEFRA Contract SCF0107.

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