

# A night at the farm: results of a year-long camera-trap survey to detect wildlife visits to three large extensive outdoor pig premises, in the North-East of Scotland

## Introduction & background

Many pathogens causing important infectious diseases, such as **African swine fever (ASF)**, **Foot-and-mouth disease (FMD)**, **bovine tuberculosis (bTB)**, **highly-pathogenic avian influenza (HPAI)** can be successfully transmitted **between livestock and wildlife**. Not only disease control in wildlife is inherently more difficult, but a wild reservoir could become the source of frequent spillovers to farmed animals, causing great detriment to the farming community, the rural economy, and potentially compromising food security.

In **Scotland**, and in Great Britain more generally, a significant portion of the pig breeding herd is kept in large outdoor premises. While this practice provides higher standards for animal welfare, it exposes the animals to potential contacts with wildlife. However, great uncertainty lies around which species are actively coming into contact with domestic pigs, especially **feral pigs**: originally extinct, the current population is the result of accidental and deliberate illegal reintroductions. This makes feral pigs' spatial distribution uncertain, as the only available data are based on voluntary sightings reported in the NBN portal<sup>1</sup> (Fig.1).

## Main objective

The aim of this pilot project was to assess the wildlife visits at three outdoor pig breeding premises in the North-East of Scotland, an area with a high concentration of pig population.

While we were interested in all potential disease-spreading species (i.e. badger, deer, waterfowls), our focus was on verifying the presence or absence of feral pigs.

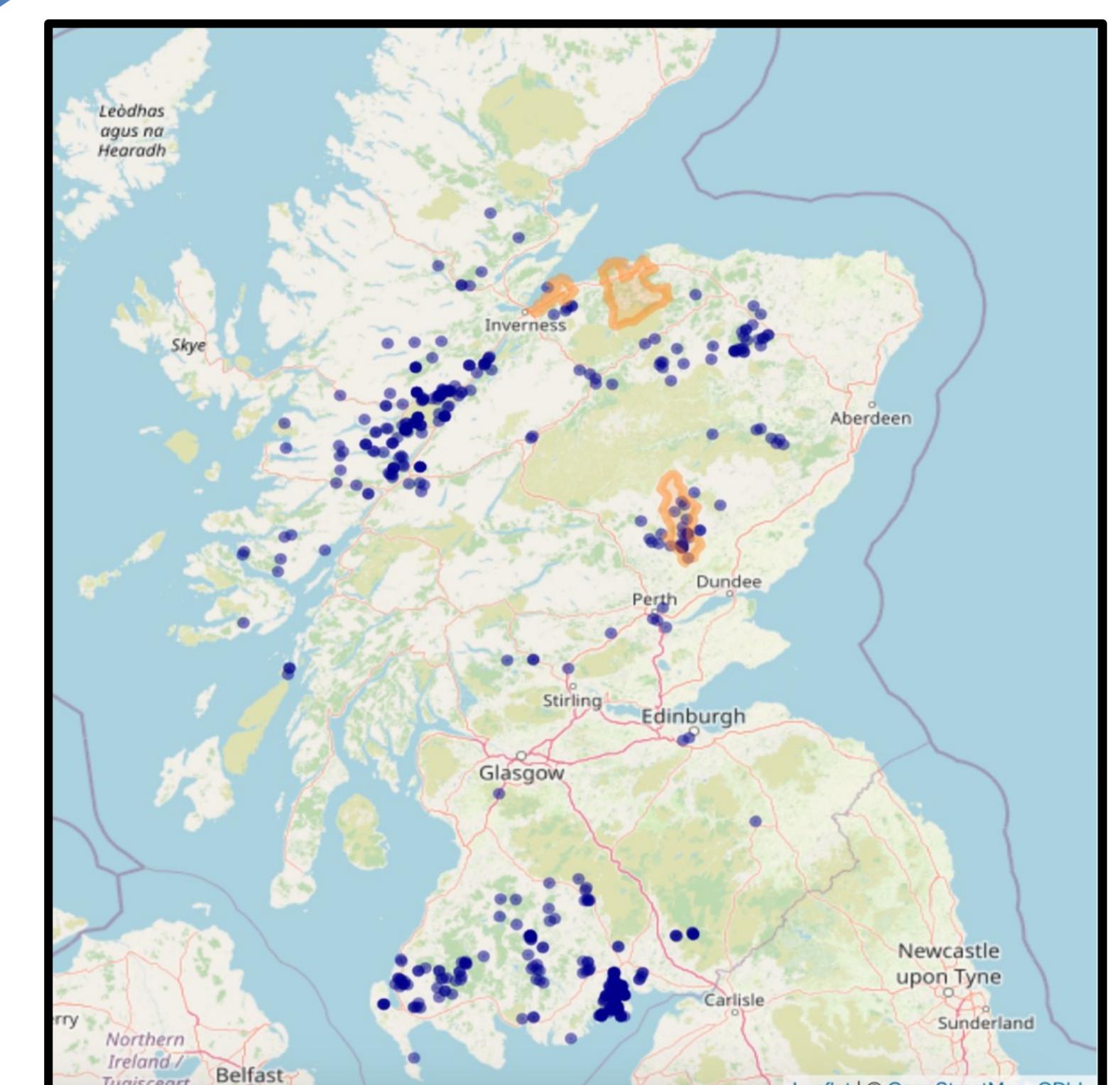


Figure 1: Post sector areas of the three commercial pig premises of the study (orange polygons) and feral-pig sightings from the National Biodiversity Network (NBN) database (blue dots, 2000-2024)

## Material and methods

In September 2024 we placed 40 motion activated camera traps (Browning Elite HP5, BTC-8E-HP5) around three premises, in **Inverness-shire (Farm 1, 12 cameras)**, in **Perthshire (Farm 2, 15 cameras)** and **Moray (Farm 3, 13 cameras)**. The collection period was initially 6 months, but it was then extended for another 6 months.

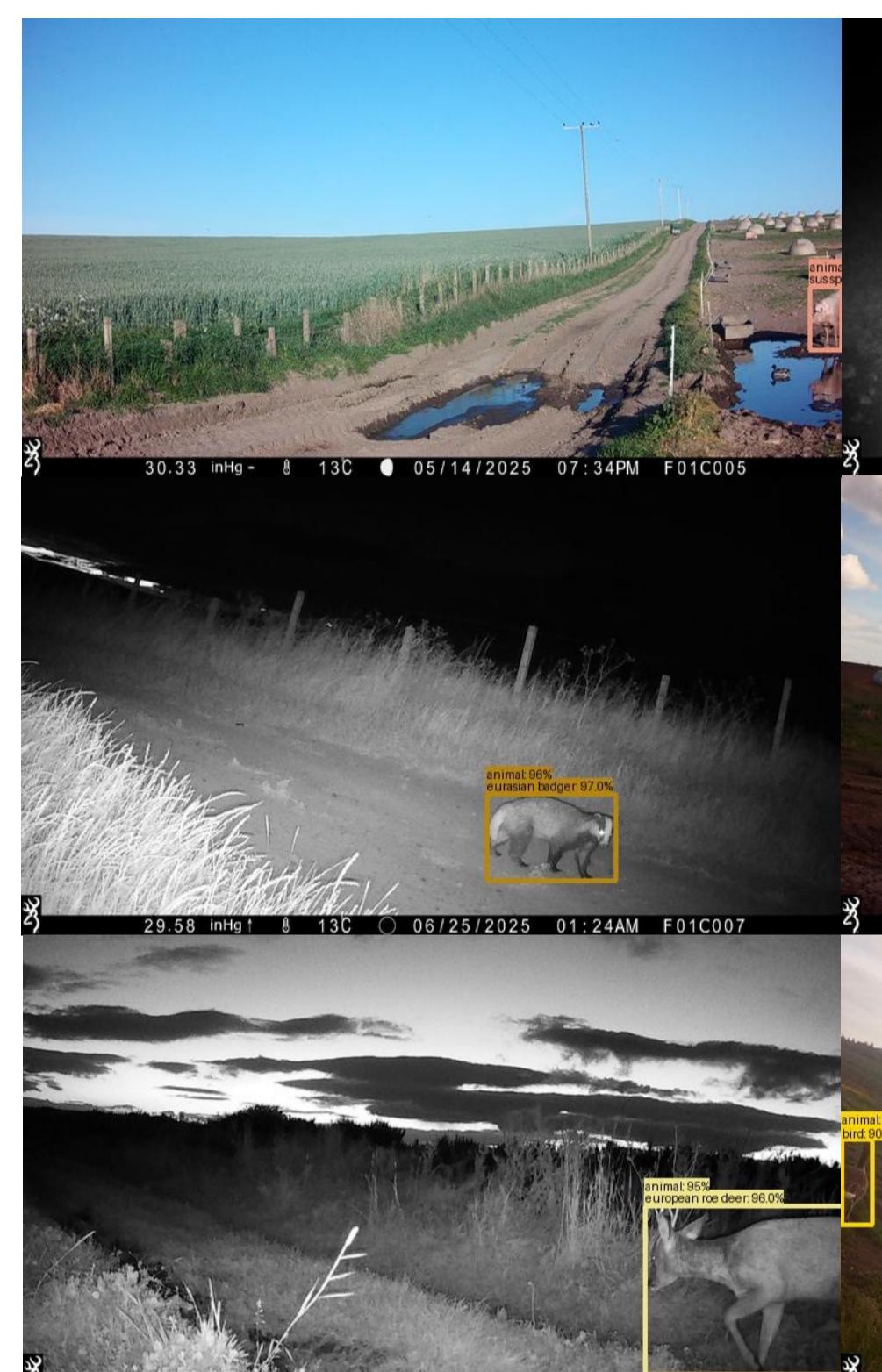
Cameras were activated between 18.00 and 6.00 to capture night activity between the internal paddocks and external fences of the farms, and each activation triggered a burst of 4 shots. The metadata (location, day of placement, etc.) were recorded with the **KoboToolBox<sup>2</sup>** app.

All the images showing humans or recognisable vehicles were deleted at the time of data recovery for privacy, while the remaining files were renamed using **R v4.4.1** and analysed using **SpeciesNet<sup>3</sup>**, an AI based software to identify animals in images. Data were extracted and plotted using **R**.

## Main (preliminary) results

1. Feral pigs were never recorded at the three premises
2. Regular visits of other potential disease reservoir species have been observed at all of the three premises

### Farm 1



### Farm 2



### Farm 3



## Results and considerations

Throughout the year, the number of active cameras/night at farm 1, 2 and 3 was 9.7, 12.1 and 10.9, because of batteries/memory running out, time reset, or removal by the farm staff. After cleaning the dataset, we recorded 11,026 activations at **farm 1** (44,007 images), 21,528 at **farm 2** (86,033 images) and 5,355 at **farm 3** (21,419 images).

As expected, feral pigs were not observed in the surveyed areas, which are strategic for the Scottish pig industry. Thus, the risk of spillover and back of diseases like ASF between feral and domestic pigs is extremely low, providing reassurance in case of potential introductions of the disease in Scotland.

Other observed animals like deer and badger (Fig.2) have been observed at all three sites, especially in the spring. Roe deer in particular, were present most nights throughout spring and summer. These species could theoretically spread pathogens to domestic pigs, so although diseases like bTB and FMD are not currently present in Scotland, this possibility needs to be considered in case of outbreaks. If required, external fences could be strengthened.

Waterfowls (grey goose, common mallard, common shelduck) have been observed mostly at farms 1 and 2 (Fig.2) in spring and early summer. In this case, avoiding contacts would be more challenging, but in case of HPAI circulation, extra pathogen monitoring (in sediment or dropping) would be advised. Among other species often captured in this study, red foxes are cause of concern for pig keepers as they may prey on piglets (not observed in this study).

## Limitations and next steps

Camera traps at farms require extra care due to active work environment (i.e. cameras accidentally moved, time reset, or other environment/landscape changes), especially when cameras point towards open spaces.

Data analysis is only preliminary, SpeciesNet identification needs to be reassessed and improved. In particular, it would be useful to use an improved algorithm able to associate images taken in the same burst of shots, at the same location and at similar time.

In the next phase, camera traps will be placed in areas of known feral pigs presence, in order to (i) estimate the local population size and (ii) place camera across a transect to understand the extent of the population movements and potential contact with both commercial and non-commercial (i.e. backyard) farms.

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## Essential references

<sup>1</sup> National Biodiversity Network: <https://nbn.org.uk/>

<sup>2</sup> KoboToolbox: <https://www.kobotoolbox.org/>

<sup>3</sup> Gadot T, Istrate Stefan, Kim H, Morris D, Beery S, Birch T, et al. To crop or not to crop: Comparing whole-image and cropped classification on a large dataset of camera trap images. *IET Computer Vision*. 2024;18(8):1193–208. GitHub: <https://github.com/google/cameratrapai>

