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# H5N1 HPAI OUTBREAKS IN THE UK 2021/2023

## EPIDEMIOLOGICAL OVERVIEW AND BIOSECURITY LESSONS FROM AVIAN INFLUENZA

HPAI WORKSHOP - OTTAWA

29 March 2023

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Head of the UK National Emergency Epidemiology Group &

Head of the GB Field Epidemiology Team

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# Overview

1. The epidemiological findings from the 2021-2023 UK HPAI outbreaks
2. Our thoughts on:
   - Biosecurity and outbreak prevention
   - Contingency planning for outbreak resilience

# Putting things in perspective

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5,000 to 10,000 infectious doses

Survival time in the environment 4 – 12 weeks

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# The epidemiological findings from the 2021-2023 UK HPAI outbreaks

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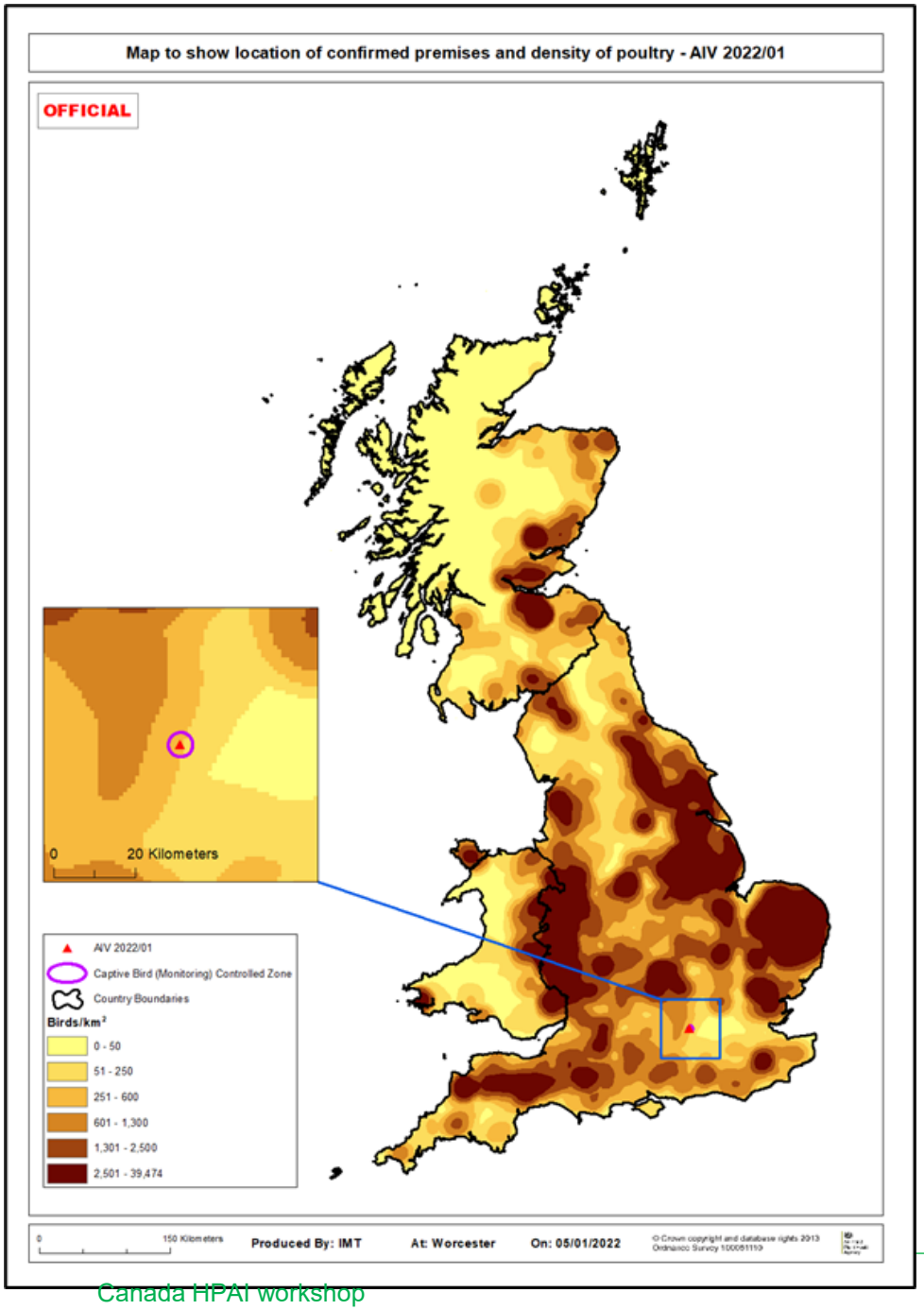
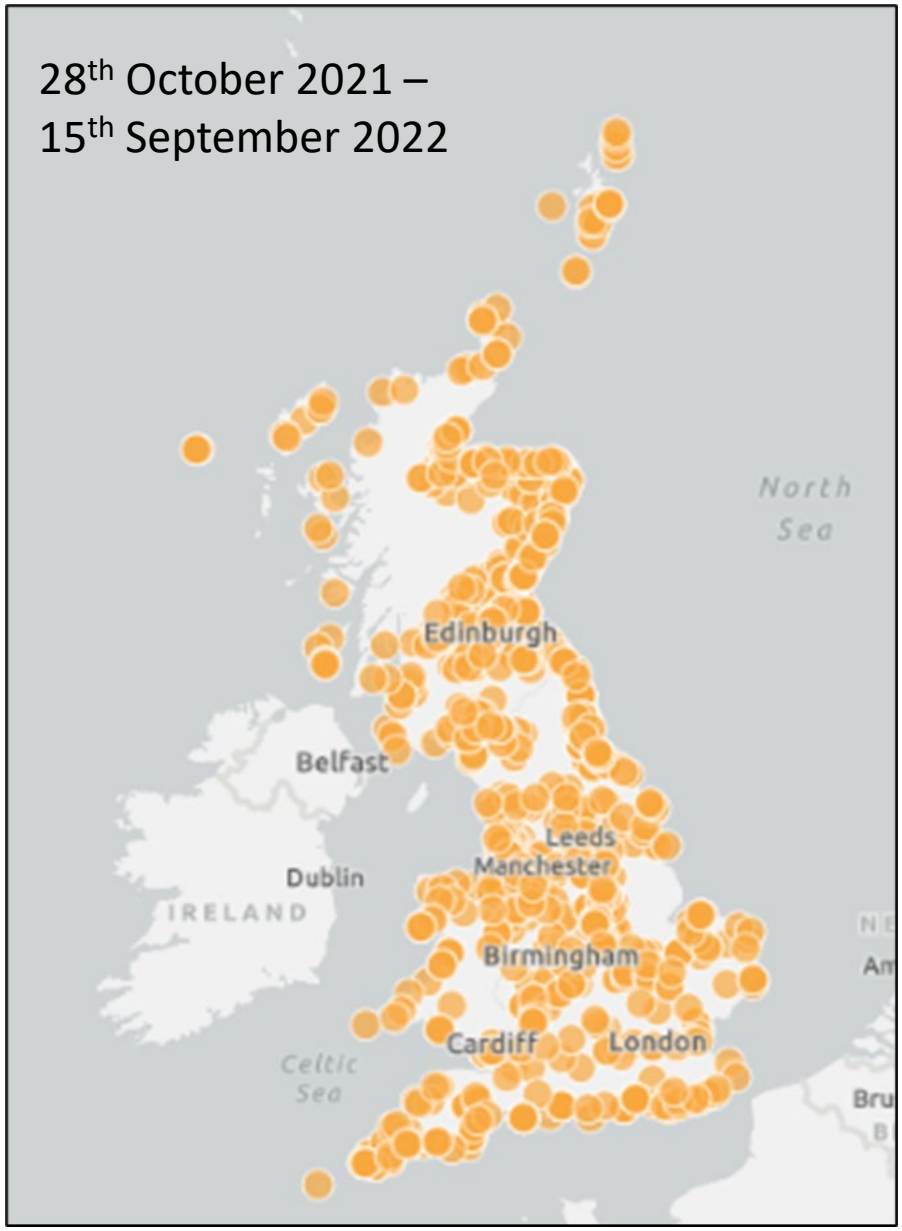
# Wild bird surveillance positive cases 2020-2022

15th October 2020 – 30th September 2021


28th October 2021 – 15th September 2022


Map to show location of confirmed premises and density of poultry - AIV 2022/01
OFFICIAL
0
20 Kilometers
AIV 2022/01
Captive Bird (Monitoring) Controlled Zone
Country Boundaries
Birds/km²
0 - 50
51 - 250
251 - 600
601 - 1,300
1,301 - 2,500
2,501 - 39,474
0
150 Kilometers
Produced By: IMT
At: Worcester
On: 05/01/2022


28th October 2021 –
15th September 2022
North Sea
Edinburgh
Belfast
Leeds
Manchester
Dublin
IRELAND
Birmingham
Cardiff
London
Celtic Sea

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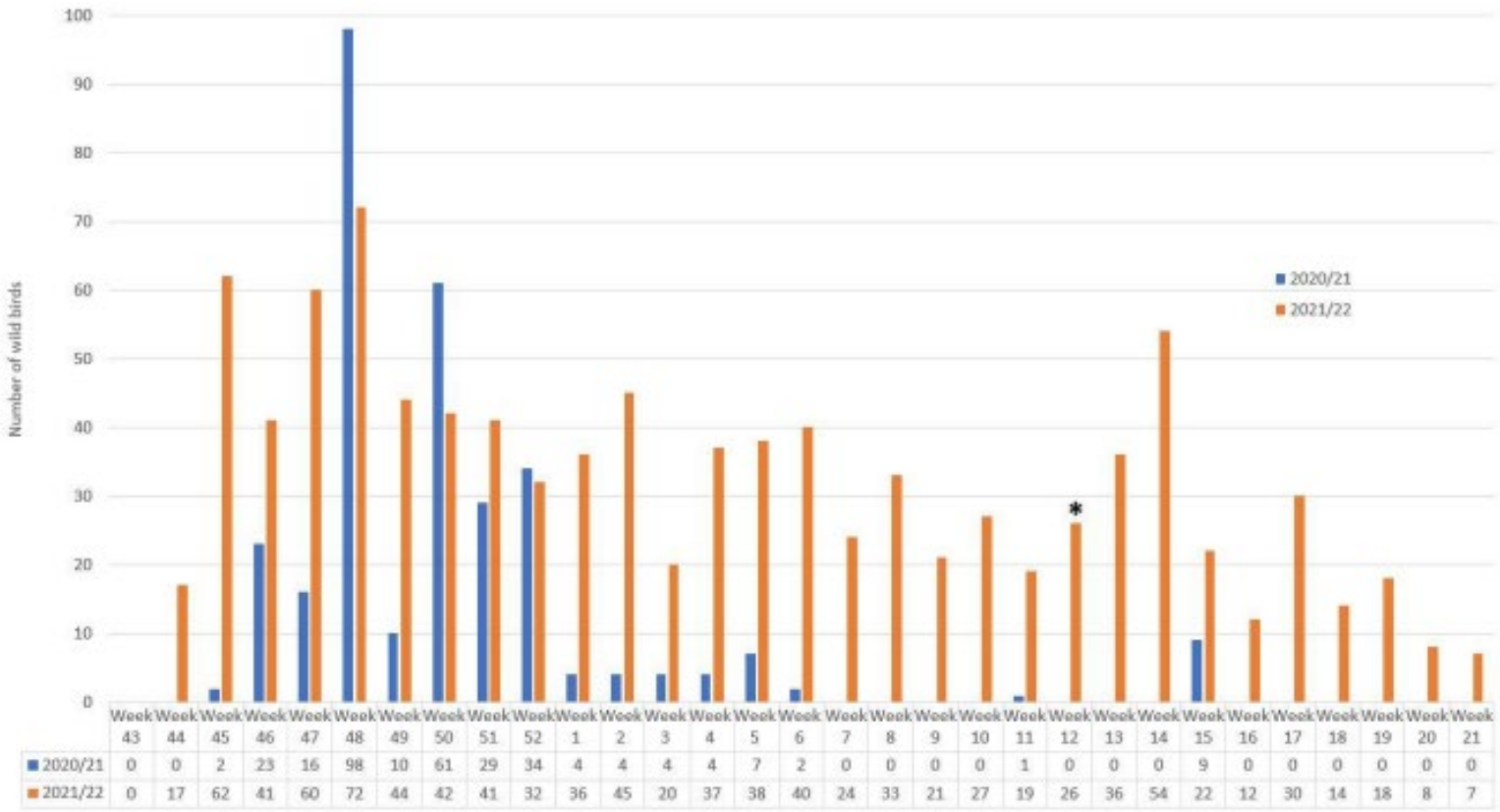
# Wild bird positives across GB

**Figure 1: Wild bird HPAI H5N1 positives across Great Britain 2020 to 2021 and 2021 to 2022 seasons. The asterisk denotes an increase in surveillance sensitivity in England.**




| | Week 43 | Week 44 | Week 45 | Week 46 | Week 47 | Week 48 | Week 49 | Week 50 | Week 51 | Week 52 | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 | Week 9 | Week 10 | Week 11 | Week 12 | Week 13 | Week 14 | Week 15 | Week 16 | Week 17 | Week 18 | Week 19 | Week 20 | Week 21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2020/21 | 0 | 0 | 2 | 23 | 16 | 98 | 10 | 61 | 29 | 34 | 4 | 4 | 4 | 4 | 7 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2021/22 | 0 | 17 | 62 | 41 | 60 | 72 | 44 | 42 | 41 | 32 | 36 | 45 | 20 | 37 | 38 | 40 | 24 | 33 | 21 | 27 | 19 | 26 | 36 | 54 | 22 | 12 | 30 | 14 | 18 | 8 | 7 |

# GB Poultry cases 2021/2022 season

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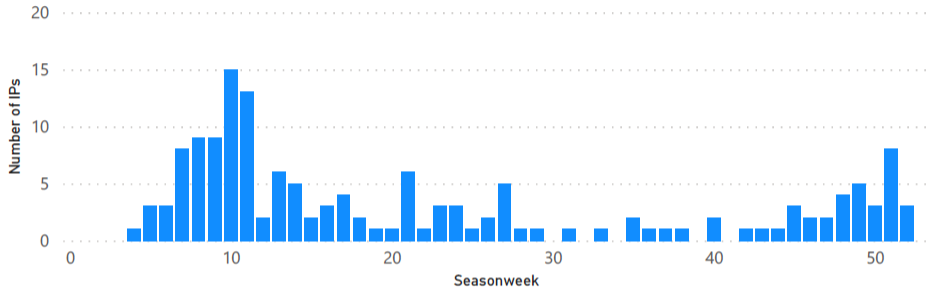
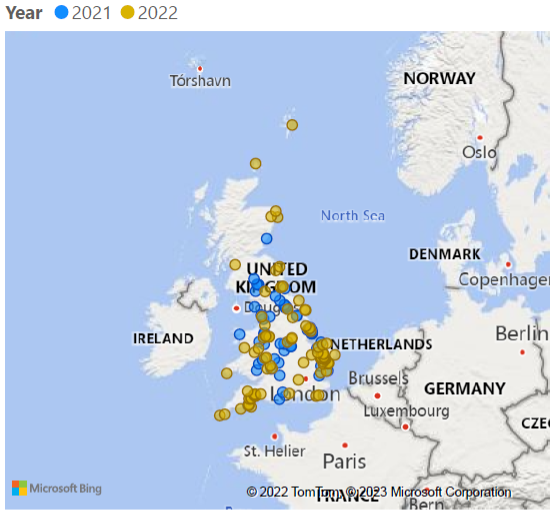
| Total number of IPs | Total number of birds dead or culled |
|---|---|
| 152 | 3.17M |

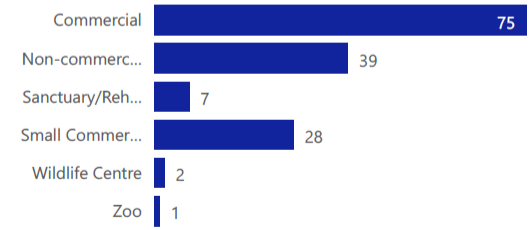
- England: 134
- Scotland: 11
- Wales: 7

Epidemic curve: number of poultry IPs by week

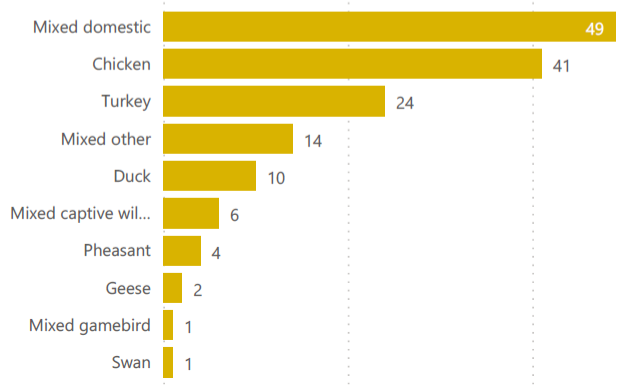


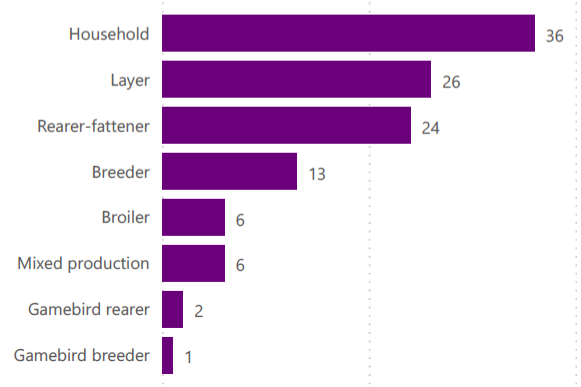

Number of IPs by purpose




Number of IPs by species




Number of commercial IPs by production type




Number of IPs by flock size

# GB Poultry cases 2022/2023 season

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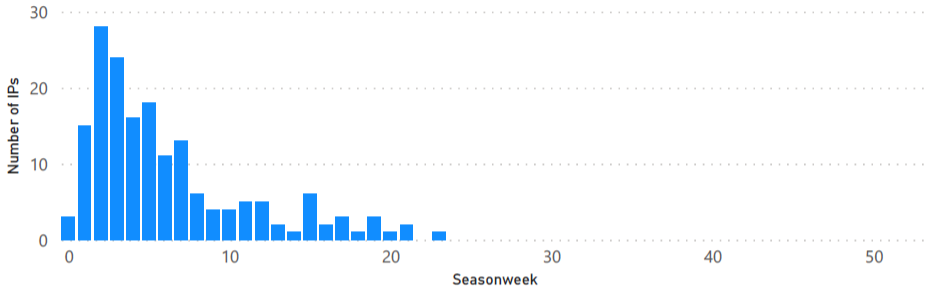
| Total number of IPs | Total number of birds dead or culled |
|---|---|
| 174 | 5.06M |

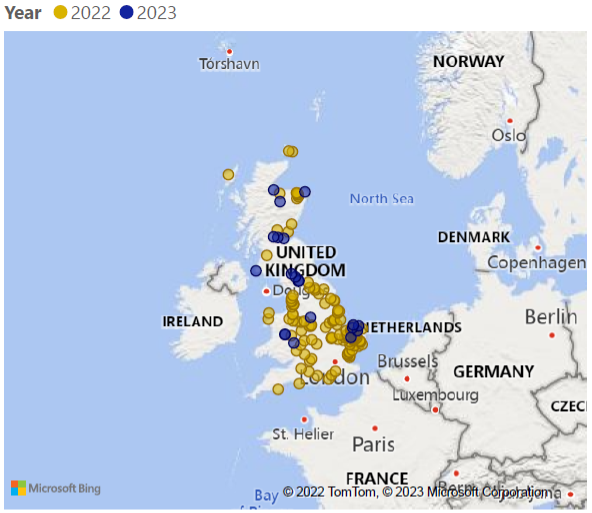
England
148

Scotland
21

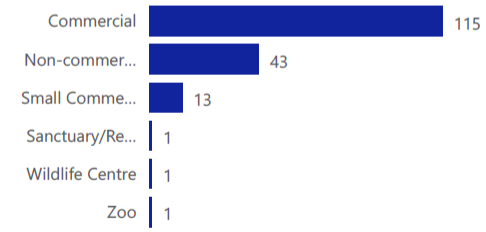
Wales
5

Epidemic curve: number of poultry IPs by week from 1 October 2022

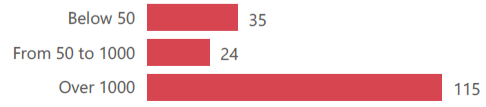


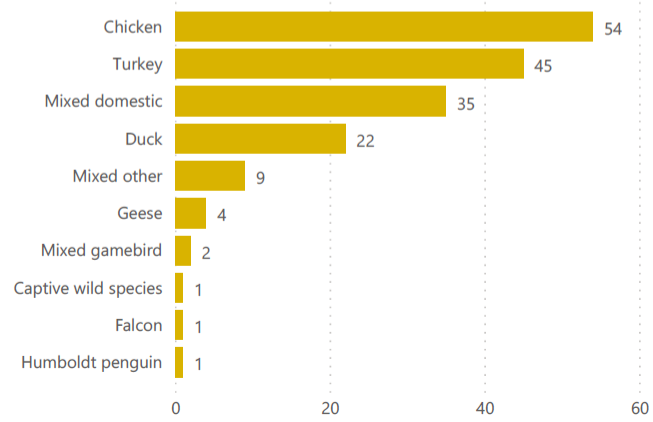

Number of IPs by purpose



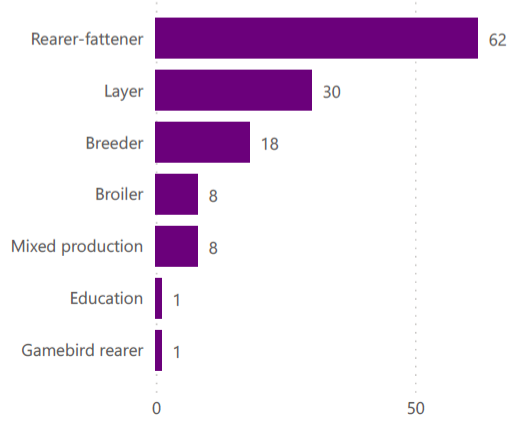

Number of IPs by flock size




Number of IPs by species




Number of commercial IPs by production type



# Wild bird cases 2022/2023 season

Most recent wild bird collection date in the dataset

14 March 2023

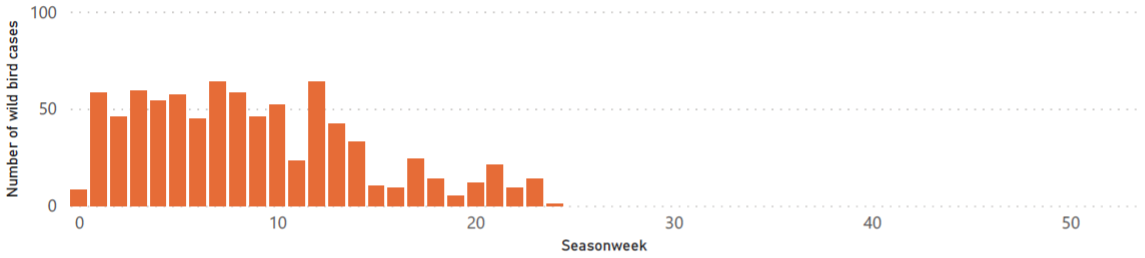
828

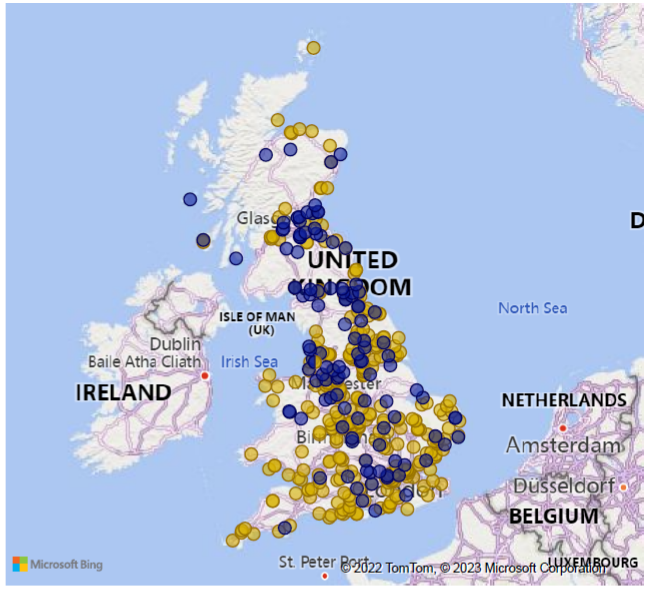
Number of wild bird cases

56

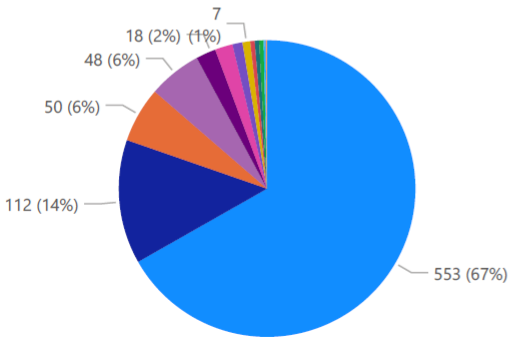
Number of species

Epidemic curve: No. of wild bird cases by collection week from 1 Oct 22



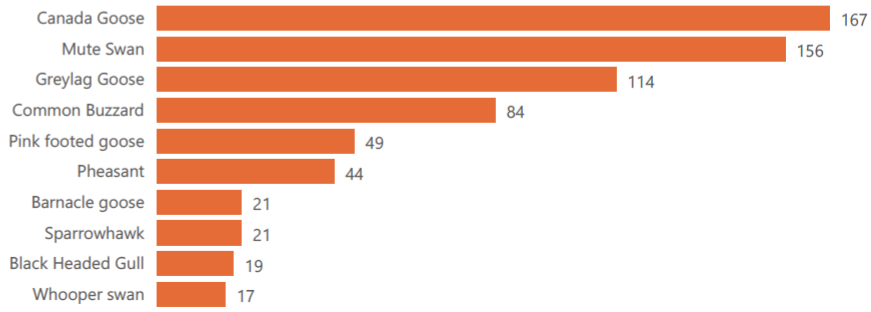




Number of wild bird cases by Order





Top ten wild bird species with HPAI detections (full list of species on page 5)



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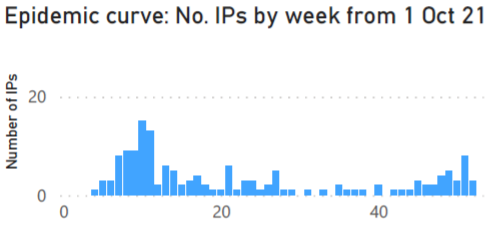
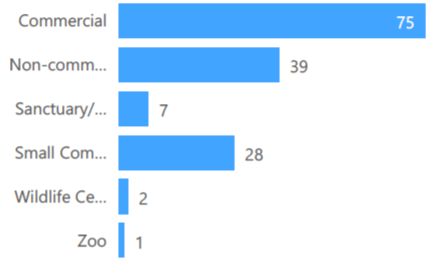
# Comparison of the two recent poultry seasons


**Season 2021/22**

**152**

Number of IPs

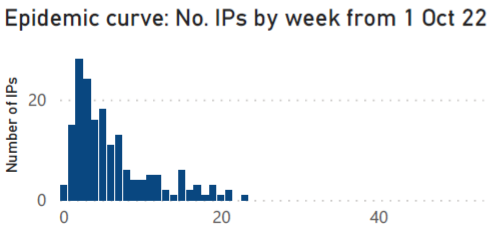


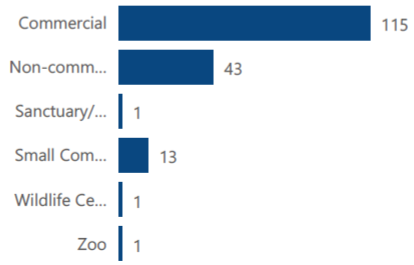



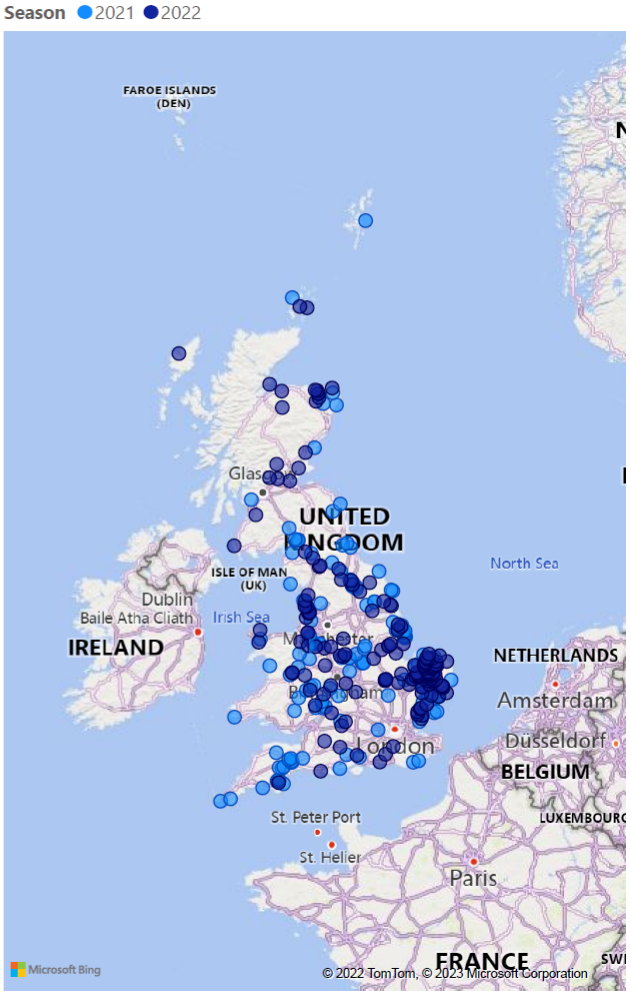

**Season 2022/23**

**174**

Number of IPs



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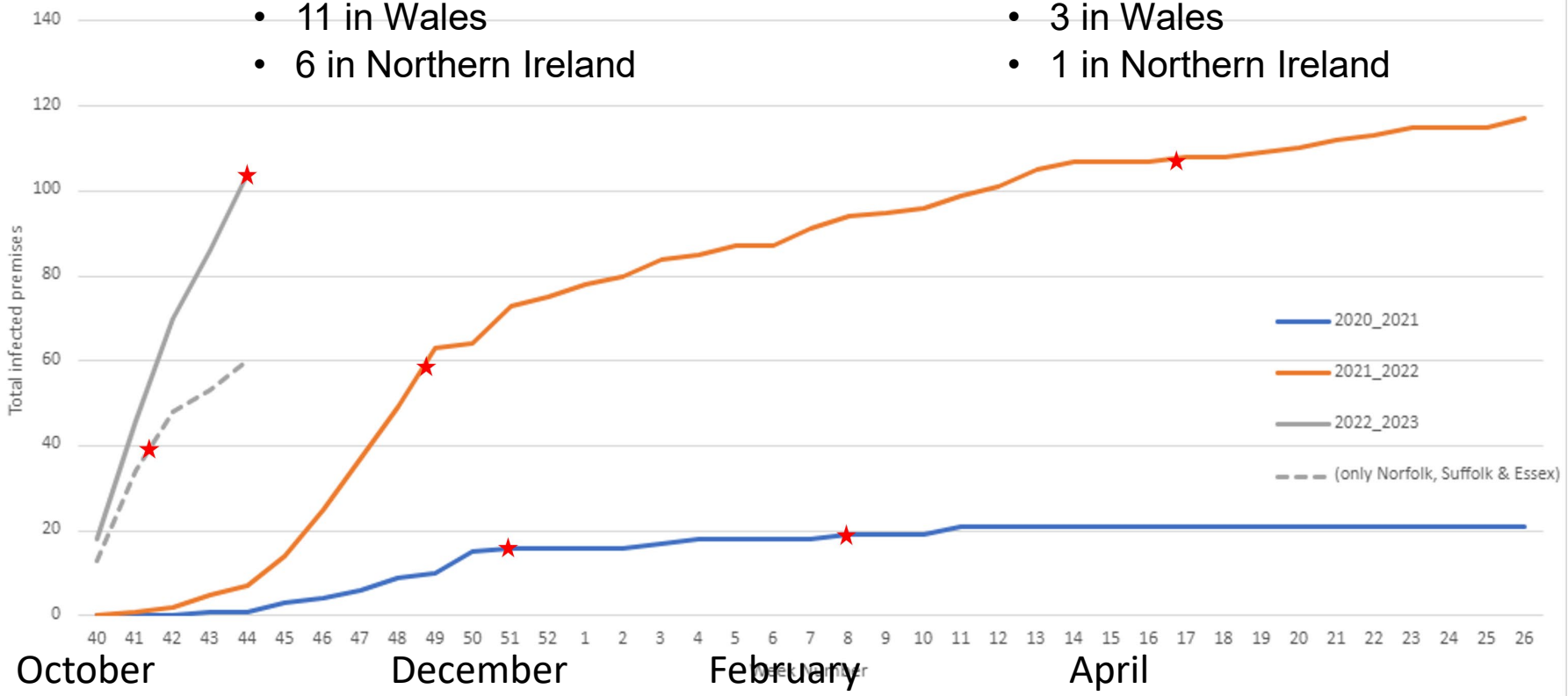
# GB poultry outbreaks compared with previous years

**Outbreak Year 1:**

- 26 October 2021 - 30 September 2022
  - Total: 158 cases
    - 134 in England
    - 7 in Scotland
    - 11 in Wales
    - 6 in Northern Ireland

**Outbreak Year 2:**

- 1 October 2022 - 15 November 2022
  - Total: 121 cases
    - 111 in England
    - 6 in Scotland
    - 3 in Wales
    - 1 in Northern Ireland



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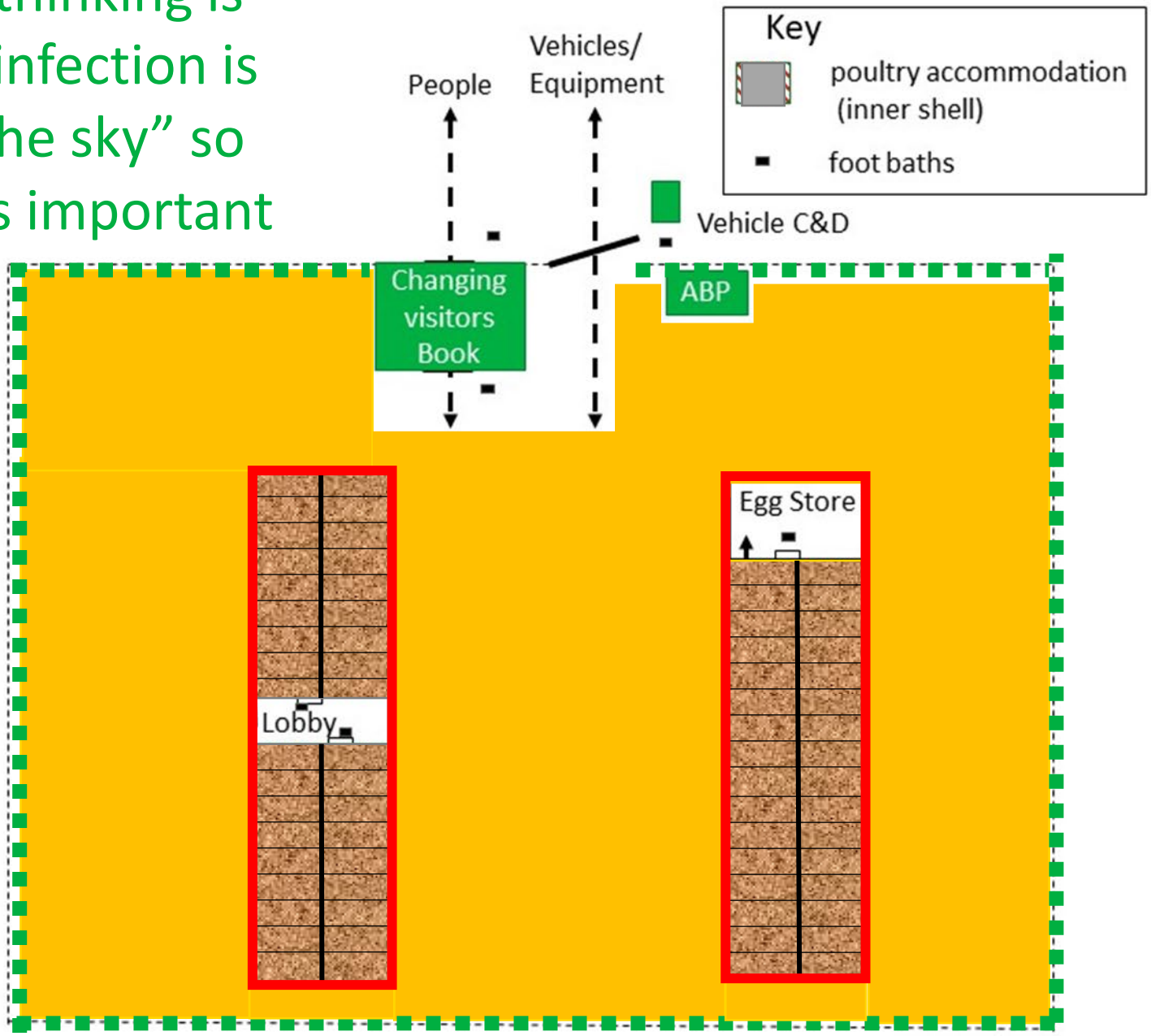
# Outbreak prevention and biosecurity

# Big change in thinking is needed - The infection is "falling from the sky" so "inner shell" is important



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# Most significant new biosecurity observations

## (1) a significant management event


- A high proportion of the current IPs **have had a significant management event just before our high risk source window**
- Therefore not a high-priority tracings
- These are **events with a large number of movements in and out** of the building, such as **thinning, vaccinating, weighing, bedding.**
- These **gangs are not tracings in the conventional sense**
- We **do not think they are bringing infection in** from another premises
- The evidence is that they are **bringing infection into the buildings from the curtilage** surrounding the inner shell

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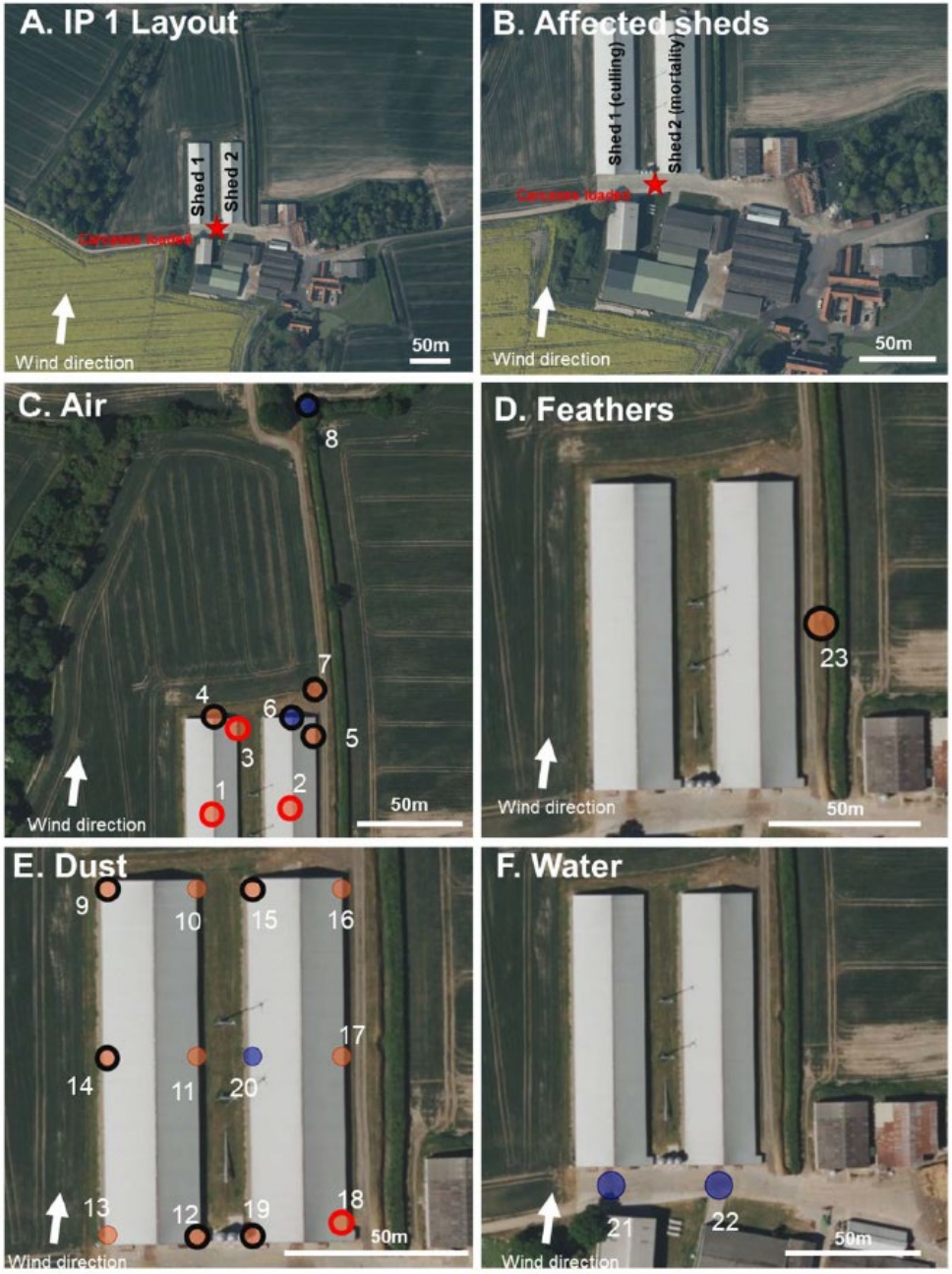
# (2) Airborne spread

- H5 HPAIV RNA detected
- Infectious virus detected
- H5 HPAIV RNA Negative
- No infectious virus detected




https://www.biorxiv.org/content/10.1101/2023.03.16.532935v1

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# Most important risk factors / pathways to focus on

- Attracting wild birds – **mossy roofs and ponds**
- The entrance door:
  - **Reduce the number of movements** in and out
  - **Shed specific PPE**
- The **curtilage** of buildings
- Maintenance failures:
  - **Water ingress** – leaking roofs and flooding events
  - Ventilation systems - netting
  - Building damage e.g. storms
- **Bedding management**
- **Rodents and wild birds** in buildings
- **Mindset** / culture
- **Unexpected events** – sickness absence, holidays etc

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# Epidemiological findings relevant to biosecurity

- Infection caused by **one introduction of a small amount of infection** – if that has been prevented, then no infected premises.
- The **small-holder backyard flocks form no part of the epidemiology** of the outbreak
- Infection due to **direct or indirect introduction from wild birds**
- Geographical clustering is due to **geographical risk from wild birds**
- **Apparent company clusters** are due to the companies themselves being clustered - not long distant spread – genomics & tracings data
- A **high proportion of free range poultry** in UK
  - conflicting regulatory, consumer and market pressure for environmental enhancements e.g. trees and ponds in ranges
  - Don't make your site attractive to birds and wildlife
- **Seasonal producers** – turkeys and game birds with **poor biosecurity and multi-purpose buildings that are hard to improve.**

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# How to improve biosecurity?

- **Regional managers are key, but need an accountable Director**
  - **Health and safety is a good analogy**
- **There is a lot of human behaviour / social science underpinning successful biosecurity:**
  - **Make biosecurity easy to do** – coloured boots.
  - **Help workers understand** why it is important.
  - Understanding why people don't do it – ? language issues.
- **Important because there are many "single points of failure"**
- How do you compare to others? **Benchmarking – but who does this?.**
- It needs **proper quality assurance** as part of **the business culture**.
- **Who should do it?** An independent, fresh pair of eyes
  - Private Vets / Assurance schemes / Government / you?
- **How to do it?**
  - Performance payments / biosecurity contracts
  - How to do it, is a business decision – what is your acceptable level of risk?

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# This is not biosecurity


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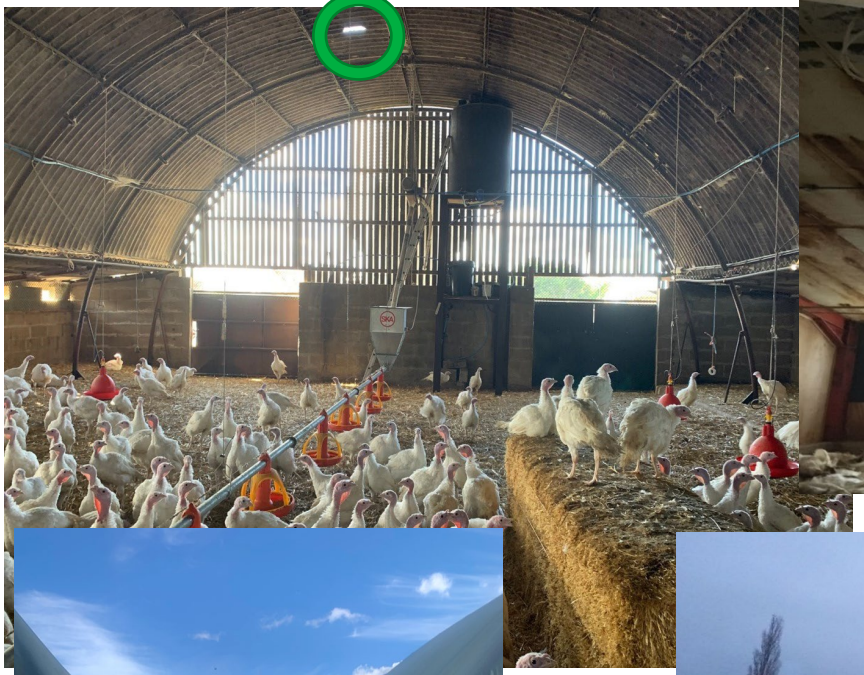
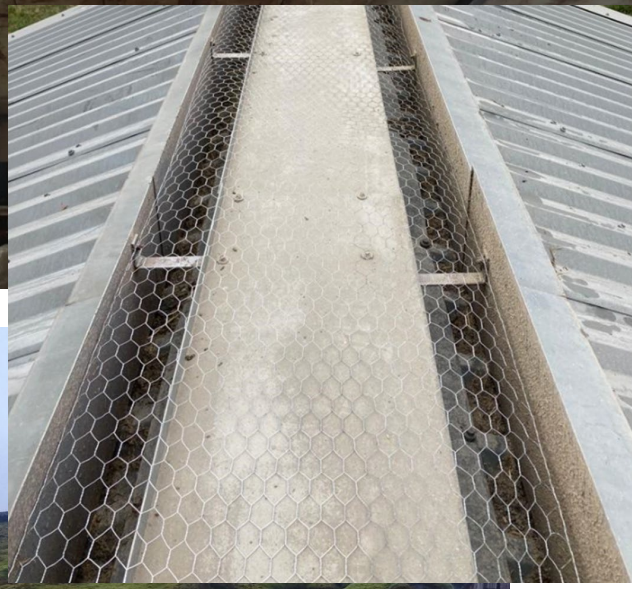
# Look after your roofs, guttering and moss





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# Don’t make you site attractive to wild birds and rodents

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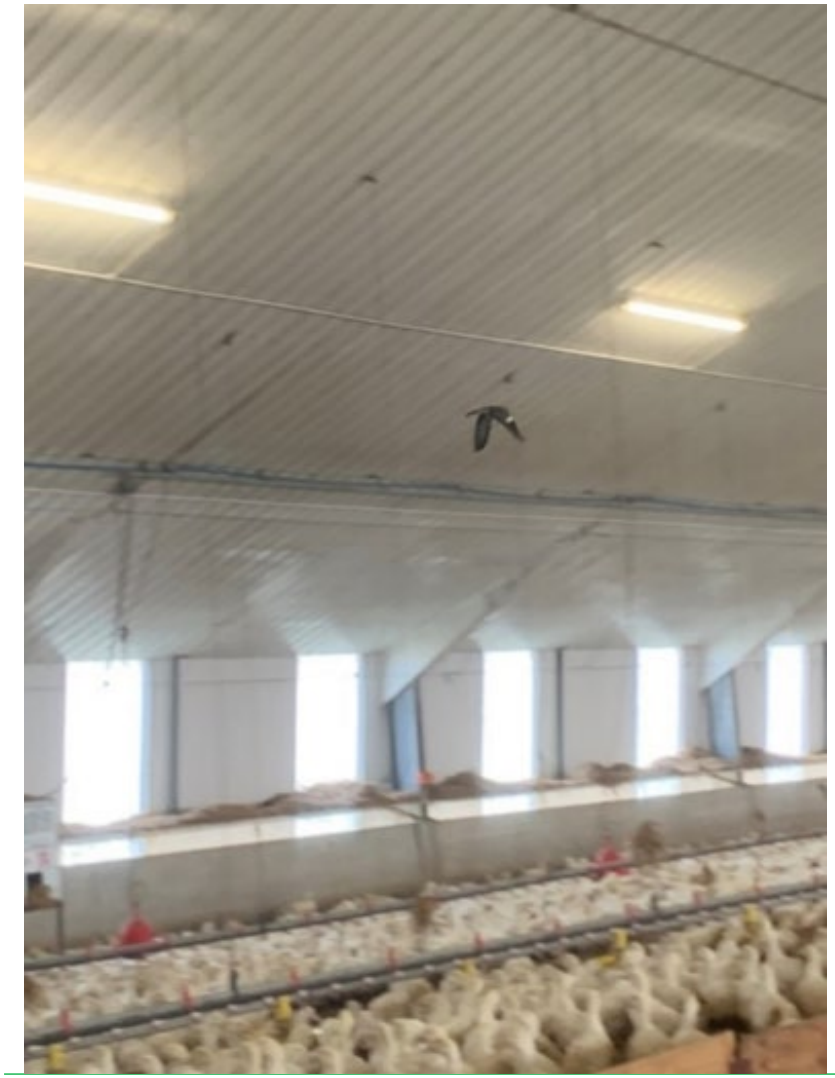
# Wild birds and water bodies



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# Bedding

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# Fully netted straw storage with straw chopper under cover when not in use

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# Gaps around gate and absence of foot dips, flooding standing water outside gate, that extends into the building

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# Water – flooding / standing water in yards / water bodies / coastal wetlands.

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# Make foot dips easy to use

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# Wide gauge mesh and gaps above will allow entry of wild birds and rodents

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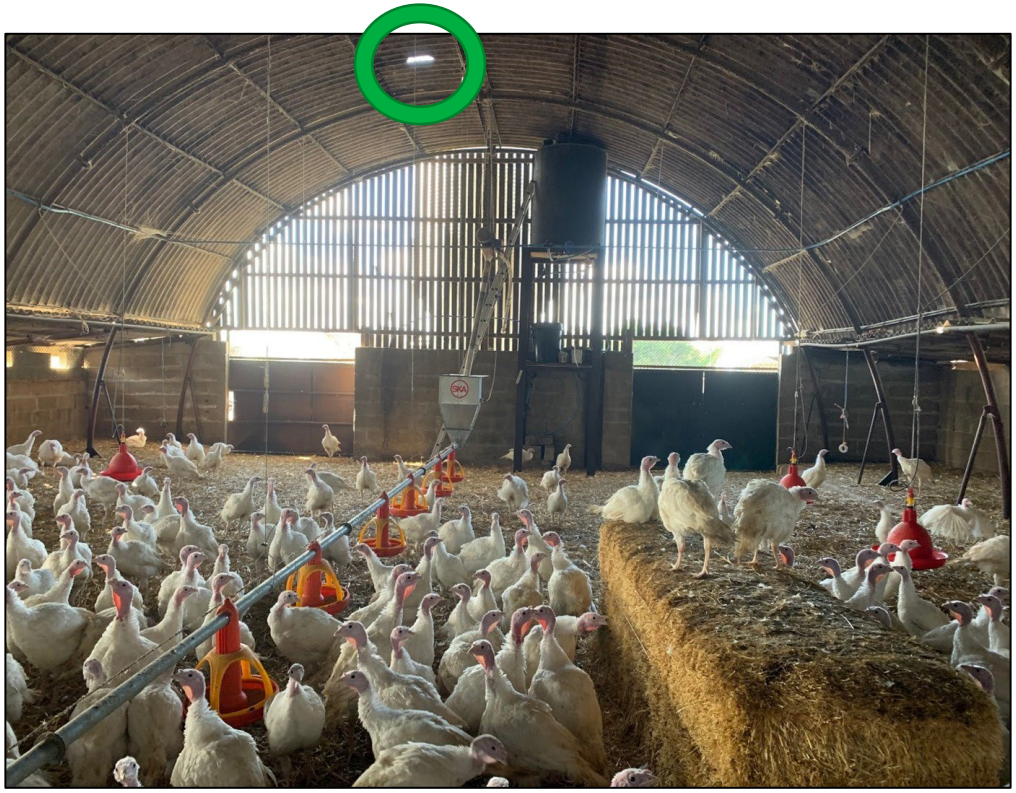
# Holes in the roof



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# Storm damaged wire mesh

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# Good vestibule, but foot dip placement could be better and unnetted gaps in polytunnel structure

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# Maintenance issues such as blocked guttering & leakage into buildings

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# Gaps around gate and absence of foot dips, But particularly flooding - standing water outside gate

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# Disposable boot covers (beloved of management) can give a false sense of security

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# Outbreak resilience and contingency planning

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# Contingency planning for outbreak resilience

1. Need to take measures to both **reduce the impact** of becoming an IP (contingency plan), **as well as the likelihood** of becoming an IP.
2. Understand **what will happen to you in an outbreak** before it happens – designation of hatcheries.
3. **Think about the co-location of critical infrastructure** – feed mills, hatcheries, egg stores, cutting plants etc..
4. **Record keeping for tracings – good records reduce the impact**:
   - YOU HAVE TO PROVE WHAT YOU HAVEN'T DONE
   - ALL visitors, mortality, feed, water, bird movements for at least 3 months
   - In electronic format
   - Must be complete and legible with contact phone numbers.
5. **Licencing - needs evidence** of ability to comply with conditions
6. **Run a company exercise**
7. Agree a **single point of contact** in the company for each activity
8. Provide an **on-site pack of information**.

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# Summary of key points

Epidemiological investigation is still showing:

1. Introduction of disease has been characterised by **single introduction events often small doses.**
2. The majority of IPs are due to **direct or indirect introduction from wild birds.**
3. There is **rarely spread between premises**:
    1. Except where they were part of the same business.
    2. There is no long-distance spread.
    3. There has been no disease in compartments.

- The need for a **controlling mind** to be accountable for biosecurity.
- **Human behavioural science is important – make it easy to do the right thing**
- David Brailsford's aggregating **marginal gains** across the business
- The importance of the **hard shell** being **at the level of the shed**.
- The particular importance of e.g. **bedding management, leaking roofs, flooding**, etc.
- The need to **review the business, and contingency plan** – what if? E.g. cutting plants on site or adjacent.

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