

## ORIGINAL RESEARCH

# Veterinarians' knowledge and experience of avian influenza and perspectives on control measures in the UK

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## Abstract

**Background:** The scale of the outbreak of highly pathogenic avian influenza (HPAI) in 2021–23 due to the influenza A/H5N1 virus is unprecedented.

**Methods:** An online survey was designed to explore veterinarians' experiences of and confidence in treating avian species, experiences of dealing with suspected HPAI and perspectives on control measures in the UK. The survey ran between December 2021 and March 2022.

**Results:** Survey responses were received from 26 veterinarians. Although veterinarians are well placed to communicate HPAI-related information and guidance, a lack of confidence around treating birds and dealing with suspected cases of HPAI represent key barriers for non-specialist practices, and this limits opportunities to educate clients.

**Limitations:** This study presents the views of a small group of self-selected respondents and may over-represent veterinarians with existing interests in avian species and/or avian influenza and who engage with online fora.

**Conclusions:** Improved training and resources designed to increase confidence with avian species, along with guidance on diagnosing and reporting notifiable diseases, are needed for first opinion practices. Governing bodies should clarify regulations on treating birds in veterinary practices when HPAI outbreak numbers are high.

## KEYWORDS

highly pathogenic avian influenza (HPAI), poultry, UK, veterinarian survey

## INTRODUCTION

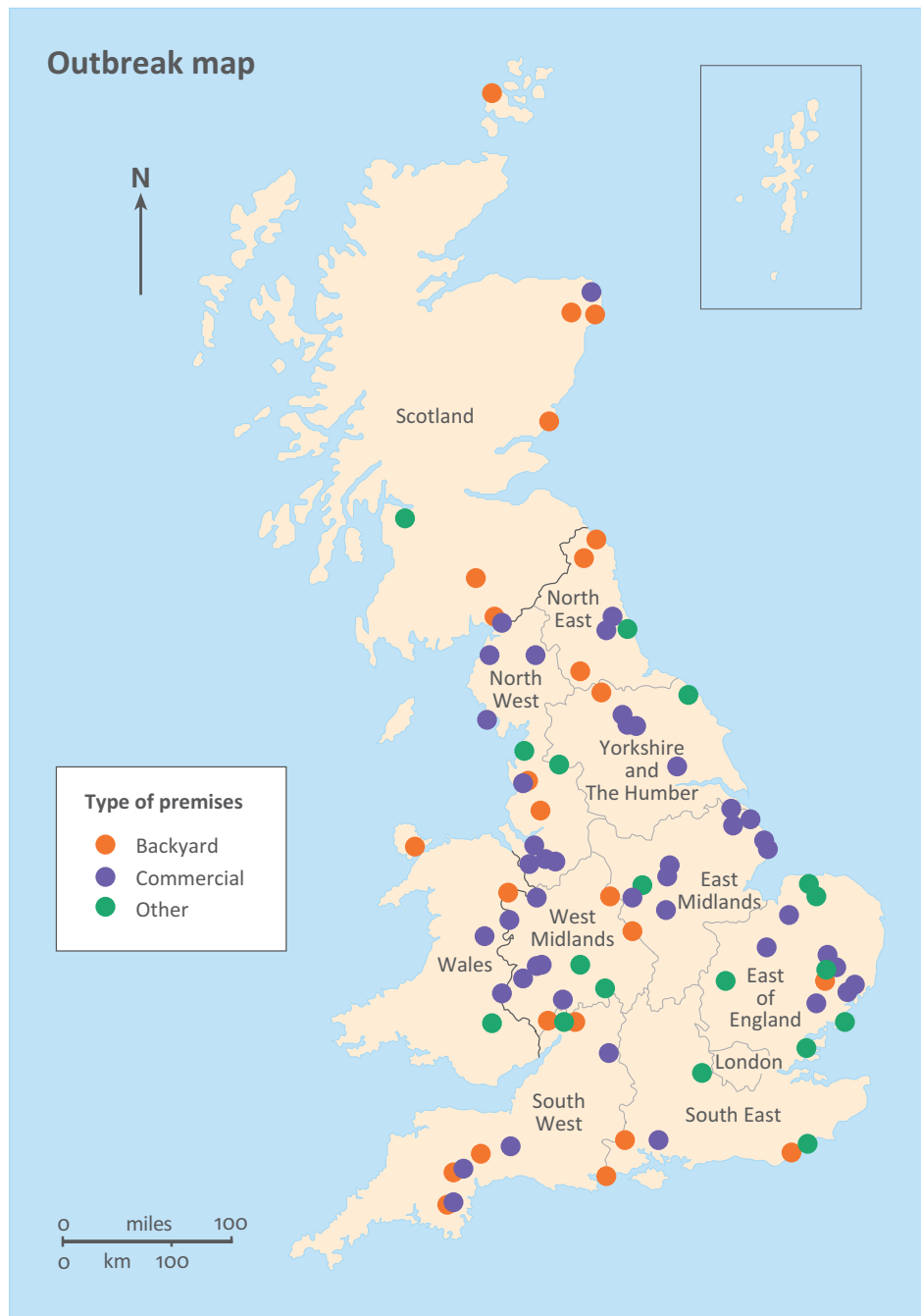
The scale of the outbreak of highly pathogenic avian influenza (HPAI) in 2021–23 due to the influenza A/H5N1 virus is unprecedented. Between October 2021 and September 2022, over 50 million birds were culled in Europe in association with outbreaks linked to Clade 2.3.4.4b H5N1. Of these outbreaks, 2520 affected poultry and 227 affected captive birds.<sup>1,2</sup> In the UK, 158 H5N1 events were confirmed between October 2021 and September 2022, resulting in the death or slaughter of thousands of wild and captive birds.<sup>3</sup> Many of these occurred in areas previously thought to be at low risk for avian influenza and, unusually, infections continued to be documented through the summer months of 2022. Moreover, the

reported occurrence of H5N1 in numerous 'backyard' flocks<sup>3,4</sup> has challenged assumptions over the relative importance of these vis-à-vis commercial holdings in the spread of avian influenza<sup>5</sup> (see Figure 1). Over the same period, there were significant numbers of deaths among non-migratory species and seabirds in Britain that were not previously known to be affected by HPAI.<sup>4</sup> H5N1 2.3.4.4b also appears well adapted to waterfowl; it is highly infectious and shed at high levels in ducks.<sup>6</sup>

Possible explanations for these changes to HPAI-related epidemiological patterns include an increased ability to infect existing hosts, greater virus shedding from host species, longer survival in the environment and an ability to infect previously unsusceptible species.<sup>2</sup> These explanations raise public health

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**FIGURE 1** Distribution of outbreaks of highly pathogenic avian influenza due to the H5N1 virus in the 2021–2022 season in Great Britain. Confirmed outbreaks by type of premises are plotted for the period to 1 August 2022. *Source:* Data from [www.gov.uk/guidance/avian-influenza-bird-flu](http://www.gov.uk/guidance/avian-influenza-bird-flu) (accessed 5 Sep 22)

concerns about further opportunities for virus evolution and spillover into humans and the associated risks of an influenza pandemic.<sup>2,5,7</sup>

Veterinary involvement with HPAI has increased in recent years, with more veterinarians completing the official Notifiable Diseases Outbreak Training course (a total of 661 veterinarians as of February 2023, APHA, personal communication 2023). Although it has been observed that first opinion general practice (GP) veterinarians tend to lack knowledge of poultry medicine,<sup>8,9</sup> their experiences of and confidence in dealing with suspected HPAI cases are poorly understood. Likewise, little is known about their views on

HPAI control measures or how different types of clients respond to these measures, yet such information is of great value given the public health concerns surrounding H5N1's zoonotic potential. Although the routine use of avian influenza vaccines is not currently approved in the UK, attitudes have started to shift in the EU and a recent report commissioned by Defra's Chief Scientific Adviser<sup>2</sup> explored its potential and drawbacks. Should vaccination be approved as an HPAI control measure, there is an additional gap in knowledge surrounding veterinarians' opinions about the matter and their views about potential uptake among their clients.

This paper investigates the knowledge and experiences of veterinarians in relation to avian influenza and the treatment of avian species more generally. It identifies variations in avian caseloads and explores veterinarians' knowledge of avian influenza and experience of dealing with suspected cases. It also explores respondents' perspectives on barriers to the control of HPAI and suggestions on how to address these barriers. This is particularly important given the role of backyard flocks in the recent H5N1 outbreak, the owners of which typically rely on veterinary care from non-specialist veterinarians.<sup>9</sup>

## MATERIALS AND METHODS

### The survey

To explore the knowledge, experiences and opinions of UK-based veterinarians whose caseloads include poultry, a survey was designed by three of the authors (R.T., M.C. and S.E.) using Microsoft forms. It was piloted in December 2021 by veterinarians in the School of Veterinary Medicine and Science at the University of Nottingham and amended to improve clarity. During this process, irrelevant steps were removed for respondents on their journey through the survey (see Appendix 1). The final version of the survey comprised 25 questions, of which 20 were 'closed' questions and five (Q.11, Q.13, Q.16, Q.21 and Q.25) requested open-text responses.

Following the granting of ethics permission by the School of Veterinary Medicine and Science, University of Nottingham Committee for Animal Care and Research (Ref: 3523211209), the survey was distributed through established veterinarian networks, online fora for veterinarians and the veterinarian-only Facebook group 'VetWings'. Veterinarians who see poultry were the main target group for the survey, which ran from December 2021 to 31 March 2022.

To preserve the anonymity of respondents, no identifying information was captured other than the first part of the postcode (outward code) of the practice (Q.1). To ascertain variations in respondents' caseloads, the initial questions focused on the types and numbers of birds seen by the practice (Q.2, Q.3, Q.5 and Q.6). Information was also collected on their awareness of and sources of information on avian influenza (Q.7–Q.9) and where they believed their clients obtained such information (Q.10). Information on confidence in seeing and treating birds, knowledge of the clinical signs of avian influenza and reporting protocols, confidence in assessing a suspected case and any barriers to their practice seeing such a case was requested (Q.4 and Q.11–Q.14) to help identify potential obstacles to the diagnosis and reporting of HPAI. Variations in respondents' experiences dealing with HPAI cases were captured in Q.15, which asked if they had dealt with an HPAI case during the recent outbreak. For those who had, additional information was sought on how they handled this (Q.16), the cost and reputational impact on the practice (Q.17 and

Q.18) and impacts on the client (Q.19). Respondents were also asked if they considered the current control measures to be appropriate (Q.20), with Q.21 providing an opportunity for those who answered 'no' to elaborate on what they felt would be more appropriate. Veterinarians' perceptions of the ease with which clients could implement the housing measures, their level of demand for vaccination and the price that they might pay for this per dose were sought in Q.22–Q.24. Finally, Q.25 provided respondents with an opportunity to add further information on avian influenza.

### Data analysis

Summary statistical analysis was undertaken on the closed question responses, while the open question responses were analysed qualitatively using an approach adapted from directed content analysis.<sup>10</sup> Patterns of interest were established both prior to and during analysis as key themes emerged from the data, along with suggestions for improvements in controlling future HPAI outbreaks (see Discussion section). The relatively small amount of text obtained from the open question responses enabled the use of manual coding approaches. For responses to Q.11, predetermined codes from a list of 19 clinical signs taken from UK Government guidance<sup>11</sup> were used and additional signs provided by respondents were noted. Some offered alternative descriptions of the same signs that were coded under one category (e.g., 'purple discoloured skin' and 'cyanotic combs' were coded as 'swelling and blue discoloration of comb and wattles' in line with official guidance). For Q.13, we drew on established understanding of biosecurity, potential knowledge gaps and client perspectives from a survey of backyard keepers<sup>12</sup> as barriers to a practice accepting suspected cases. Analysis of Q.16 was guided by understanding recommended processes for reporting suspected cases,<sup>11</sup> and analysis of Q.21 drew on prior understanding of appropriate biosecurity measures in veterinary practice (also taking into account responses to Q.13). Finally, Q.25 was coded inductively as this was an open space for respondents to add any additional information. Themes identified were vaccination preferences (for and against), context (provided for consideration during analysis), barriers (information, workload, bureaucracy), preferences for level of involvement (more or less), suggestions for going forward, opinion (misplaced focus) and owner accountability. Information provided here was taken into consideration during the analysis. The findings from all the open text questions add contextual depth to the closed questions, and extracts from these responses are provided in the Results section, where veterinarian perspectives on confidence, information sources, protocol, experience and views on control measures are reported in relation to HPAI. All analyses were carried out in Microsoft Excel (version 16.72), and anonymised quotes are reproduced in the Results section denoted by respondent number (e.g., R1).

**TABLE 1** Types of birds seen by the 26 survey respondents

Bird type	Number of respondents	Percentage
Pet birds	22	85
Game birds	15	58
Small-scale commercial (defined as <200 birds)	10	38
Large-scale commercial (defined as ≥200 birds)	10	38
Wild birds	9	35

**TABLE 2** Species seen by the 26 survey respondents

Species	Number of respondents	Percentage
Chickens	26	100
Ducks	20	77
Game birds	17	65
Turkeys	14	54
Geese	13	50
Wild birds	11	42
Parrots	7	27
Other	8	31

**TABLE 3** Number of wild and owned birds seen by respondents per year

Number of birds seen per year	Number of respondents seeing wild birds	Number of respondents seeing owned birds
1–5 birds	4	4
6–10 birds	4	4
11–15 birds	1	2
16–25 birds	4	2
>26 birds	2	14
None—not accepted at practice	8	-
None—other reason	3	-

## RESULTS

### Caseload and characteristics

A total of 26 veterinarians from across Great Britain responded to the survey, representing a mixture of commercial poultry practices and small animal practices that occasionally see pet poultry. Pet birds were the most widely seen category (85% of respondents), followed by game birds (65%). Meanwhile, 38% reported having small-scale commercial clients (defined as <200 birds) and 38% reported large-scale commercial clients (defined as ≥200 birds). Wild birds were seen by 35% of respondents (Table 1). The most common species seen were chickens (100%), ducks (77%) and game birds (65%) (Table 2), while the total number of birds seen by many respondents in a year was typically small (Table 3).

**TABLE 4** Respondents' confidence in seeing birds

Confidence in seeing birds	Number of respondents	Percentage
1 = Not at all confident	2	8
2 = Slightly confident	5	19
3 = Somewhat confident	4	15
4 = Fairly confident	4	15
5 = Very confident	11	42

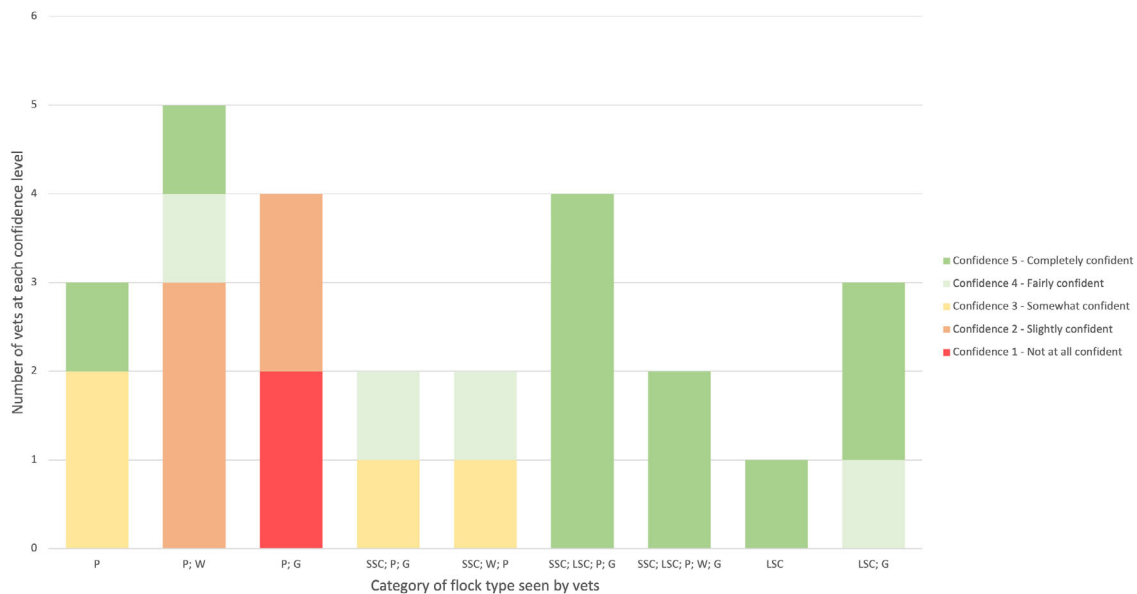
### Confidence in seeing birds

Respondents reported varying levels of confidence in relation to seeing birds, with 57% stating that they felt 'very confident' or 'fairly confident' doing so, while 8% felt 'not at all confident', 19% felt 'slightly confident' and 14% were 'somewhat confident' (Table 4). Veterinarians who did not see commercial poultry reported lower overall confidence levels than those seeing either small- or large-scale commercial poultry flocks in addition to backyard flocks (see Figure 2). Overall, the responses broadly corresponded to the number of birds seen, with the exception of one respondent who saw more than 26 owned birds and 1–5 wild birds per year but claimed to be 'not at all confident'. Of the 'very confident' or 'fairly confident' veterinarians, 46% reported seeing small- or large-scale commercial flocks. All of the respondents who selected 'not at all confident' or 'slightly confident' listed pet birds and game birds but no commercial flocks in their caseloads. The 'somewhat confident' category included two veterinarians (8%) who saw small-scale commercial birds alongside pet and wild birds. One respondent who typically saw 6–10 chickens or ducks per year cited a 'lack of confidence' as a barrier to accepting avian influenza cases and stated that they 'Would love Animal and Plant Health Agency (APHA) or similar to offer some crib sheets/more guidance/advice for GP veterinarians dealing with backyard poultry' (R11).

### Sources of information on avian influenza and awareness of clinical signs

Respondents indicated a comprehensive (100%) awareness of the 2021 HPAI outbreak, with 65% hearing about it through 'regulatory body communication' from organisations including the APHA (88%), Defra (27%) and the British Veterinary Poultry Association (27%). Other organisations included the British Veterinary Association (BVA) (19%) and the National Farmers Union (15%), while respondents also sourced information from within their own practices (31%) and from veterinary journals (12%).

Most respondents thought that their poultry-keeping clients sourced information on HPAI from social media (73%), while fewer than half of the respondents believed that this information was sourced from veterinary practices. Their assumptions



**FIGURE 2** Veterinarian-reported confidence in seeing birds by flock type. G, game birds; LSC, large-scale commercial ( $\geq 200$  birds); P, pets; SSC, small-scale commercial ( $< 200$  birds); W, wild birds

corresponded well with information from a parallel survey of small-scale poultry keepers,<sup>12</sup> which indicated that 53% first heard about avian influenza from social media and that only 2% obtained this information from veterinarians. Nevertheless, the word ‘veterinarian’ appeared repeatedly in this parallel survey in relation to the steps keepers would take following an outbreak in their flock, suggesting that a large proportion would contact a veterinarian in such a situation.

When asked to identify clinical signs of the disease, death/mortality was mentioned by 81% of respondents, while signs of respiratory distress were identified by 54%. Less commonly identified clinical signs include nervous signs (19%), a drop in egg production (19%), swollen head (15%), cyanosis (12%), diarrhoea (12%), ocular/nasal discharge (12%), depression (8%), lethargy (8%), a drop in feed/water intake (8%), coughing (8%) and sneezing (8%).

## Dealing with suspected avian influenza cases

The survey revealed that if clients suspected avian influenza, 73% of respondents would advise them to contact the APHA or Defra helplines, with one saying they would call on behalf of the client (Table 5). Others indicated that they would arrange a site visit (31%) and/or instruct keepers to phone the regional veterinary inspector (23%). Despite RCVS advice<sup>13</sup> that it is ‘important that any bird with avian influenza is not brought into a veterinary practice where other birds could be infected’, and the BVA’s suggestion that veterinarians undertake ‘initial examination and triage outside the practice’<sup>14</sup> with appropriate personal protective equipment (PPE), two respondents (8%) said that they would advise clients to bring a suspected case to the clinic.

**TABLE 5** Where veterinarians directed clients who reported a suspected case of avian influenza

Response	Number of respondents	Percentage
Bring to clinic	2	8
Arrange site visit	8	31
Instruct to phone regional veterinary inspector	6	23
Contact the APHA or Defra helpline	19	73
Poultry veterinary practice	3	12

Abbreviation: APHA, Animal and Plant Health Agency.

Almost half of the respondents (46%) reported that they would not be confident in assessing a suspected avian influenza case at their practice. Barriers to the practice accepting a suspected avian influenza case included a lack of ‘subject knowledge’ (R3), poor familiarity with ‘biosecurity handling and reporting requirements’ (R17) or low confidence in diagnosing HPAI:

‘Concerns about getting diagnosis wrong and causing further problems’ (R2)

‘Also having someone knowledgeable enough to diagnose it definitively’ (R13)

‘Confidence—very few vets keen on seeing birds!’ (R21)

Another set of barriers included a lack of facilities or biosecurity measures in practice to safely assess birds (23%—R1, R15, R17 and R26), concerns about staff health and safety (4%—R24) and the risk of restrictions being placed on the practice if a bird seen on the premises was confirmed to have avian influenza (8%):



**TABLE 6** Experiences of veterinarians who had dealt with a highly pathogenic avian influenza case and the associated impact on practices and clients

Type of case	Response (quoted verbatim)	Impact/cost to practice	Impact on client
R6: Backyard flock	Back yard flock inspection	Small	Some negative
R7: Commercial	Client contacted me regarding high mortality. I suspected avian influenza and contacted APHA. I did not visit the site to avoid becoming contaminated	Small	Significant negative
R8: Backyard and commercial	Seen cases in backyard ducks and commercial turkeys. I rang Defra to report in both cases. APHA attended farms, I was in attendance for turkeys, was not for backyard ducks so as not to affect my commercial poultry work. APHA culled all birds on site in both cases	Small	Very damaging
R10: Backyard	Owner reported it under our guidance	High	Very damaging
R15: Wild bird	Told client not to bring it in. Took details from them and passed on to apha (sic). Apha said actually to tell RSPCA (sic) and it is the client who needs to call them	None	None
R21: Backyard	Called in, APHA arrived on site and took samples (20 OP [oropharyngeal] and cloacal swabs per house), placed site on restrictions, case confirmed within 48 hours, clients had instructed livetec (sic) on to site the following day, took 5 days to clear site	None	Very damaging

Abbreviation: APHA, Animal and Plant Health Agency.

'Potential restrictions placed on practice by APHA following confirmation of AI (avian influenza). Therefore, other clients may be unable to visit' (R7)

'Biosecurity and having to be bird clean for other clients' (R19)

'no biosecurity plan in place for dealing with notifiable diseases in birds' (R1)

Echoing RCVS advice,<sup>13</sup> two respondents referred to regulations preventing suspected avian influenza cases from being brought into their practice:

'Currently not allowed to bring into practice as per apha (sic) rules' (R13)

'... will not physically see suspect cases at practice, will organise a visit or provide advice over phone depending on client to prevent restrictions if confirmed' (R8)

However, consistent with cases discussed by Kodilinye-Sims and Royden,<sup>9</sup> another indicated that such restrictions applied to all birds rather than suspected avian influenza cases specifically:

'Not allowed birds into the practice currently ...' (R10)

### Experience of dealing with HPAI cases

At the time of completing the survey, six (23%) of the respondents had dealt with a total of seven cases of

HPAI during the 2021–2022 season (Table 6). Of these cases, four were in backyard flocks, two in commercial premises and one in wild birds, with visits or inspections mentioned in three instances:

'Backyard flock inspection' (R6)

'Seen cases in backyard ducks and commercial turkeys.

'Called in, APHA arrived on site and took samples ...' (R19)

All but one of the outbreaks resulted in minimal costs to the practice and none were believed to have damaged the reputation of the practice. In three cases, respondents reported that the effects on the client were very damaging (Table 6).

### Views on the appropriateness of HPAI control measures

Most respondents (81%) considered the current control measures<sup>a</sup> to be appropriate. Those who disagreed mentioned delays in implementing the housing order ('Too late in ordering birds inside' R10), the importance of a 'Faster response by the APHA to a positive case' (R19), '... More resourcing needed for APHA to cope with the heavy workload' (R19) and a desire to 'allow vaccination rather than culling ...' (R1). The need to 'develop control measures that distinguish

<sup>a</sup> These included a UK-wide avian influenza protection zone implemented between 3 November 2021 and 16 August 2022,<sup>15</sup> with housing measures in place between 29 November 2021 and 2 May 2022.<sup>16</sup>

between pet/hobby flocks and commercial operations' (R1) was also mentioned, while two respondents highlighted problems of ensuring compliance among small-scale keepers:

'While the measures are good, backyard keepers are refusing to follow them' (R21)

'Not really enforceable in pet birds outside' (R3)

When asked how easy their clients found it to comply with the housing order, the most common answer (50%) was 'okay', with 31% describing the measures as 'easy' or 'very easy' to comply with. Veterinarians seeing commercial poultry indicated that the majority of their clients find implementing the housing order measures easier than veterinarians seeing non-commercial birds, who indicated that their clients would find it more difficult. No respondents rated the measures as 'Impossible to comply with', although the view that small-scale keepers were unwilling to comply also appeared in the open text responses:

'Pet keepers could easily house poultry but they can (sic) be bothered and don't understand the impact. They are confident there will be no repercussions so don't bother, and as vets our role is to advise but not to police' (R18)

In relation to perceptions about vaccination as an alternative HPAI control strategy, two respondents made supportive statements about its benefits in the open text comments, while one disagreed:

'A vaccine would be the (sic) most effective way of controlling this disease' (R10)

'allow vaccination rather than culling' (R1)

'I hope we don't vaccinate. [...]' (R25)

The belief that there would be a demand for vaccination within their client base was shared by 65% of respondents, although the veterinarians who do not see commercial poultry believed there would be less of a demand for vaccination in their client base compared with commercial veterinarians (commercial veterinarians: 'yes' = 10, 'no' = 4; non-commercial veterinarians: 'yes' = 7, 'no' = 5). Overall, 42% stated that they thought their clients would pay up to £2.50 per dose, and 31% believed their clients would pay between £2.50 and £5. Only 8% stated that they thought their clients would not pay to vaccinate. These results make an interesting contrast with those from a simultaneous survey of small-scale poultry keepers,<sup>12,17</sup> which indicated that 93.1% of respondents would be prepared to pay to have their birds vaccinated; 26.3% would be prepared to pay between £0.01 and £2.50 per dose, 29.5% would be prepared to pay between £2.50 and £5 and the remainder (37.3%)

stated that they would pay more (Table 7). Differences in the two sets of survey data may reflect the experience of over half (54%) of the veterinarian respondents in dealing with the budget requirements of commercial clients as opposed to owners of pet birds and backyard flocks.

Respondents offered further perspectives on the appropriateness of HPAI control measures in the last open text question. These focused primarily on what was viewed as burdensome bureaucracy and delegation of work by the APHA to poultry practices in the face of already high workloads:

'Whilst i agree with the measures put in place by the APHA, there seems to be alot (sic) of unnecessary paperwork, licensing and visits the content of which are covered in registration with red tractor or being part of certain integrators and these sites are thoroughly audited. As a vet in an independant (sic)/corporate poultry-specific practice we are understaffed and struggling to keep up with the increasing workload dumped on us by the APHA. Also what should take half an hour took 4 hours due to disorganisation when i performed my role as a veterinary inspector in the [location removed] wild bird outbreak' (R12)

'Control measures around the movement licencing of commercial flocks ... uses a lot of time and resources and is focused at the broiler farms and hatcheries which is not where the AI problem is seen' (R14)

## DISCUSSION

Communicating HPAI-related risks and encouraging compliance with biosecurity and housing measures is vital for controlling future outbreaks. Achieving this is particularly difficult among small-scale keepers, who often find existing guidance confusing and/or aimed at the commercial poultry sector.<sup>17</sup> The situation is complicated by a lack of public trust for Defra and the APHA on animal health and welfare-related issues,<sup>17</sup> which was exacerbated following the euthanising of Geronimo the alpaca after bovine tuberculosis antibodies were detected, and the large-scale culling linked to the 2001 foot and mouth disease outbreak.<sup>18,19</sup> Our findings indicate the following areas for improvement in relation to controlling future HPAI outbreaks: (1) information must come from trusted sources, (2) the need for greater confidence in treating birds, and (3) clearer guidance on when, where and how veterinarians should handle and report suspected HPAI cases. The results we report are subject to data caveats associated with using an online survey which may over-represent the views of veterinarians who engage with online fora and social media and who have broader interests in poultry and/or avian

**TABLE 7** Comparison of responses from veterinarians and keepers regarding willingness to pay for vaccination

Cost per single dose	n/a would not pay	£0–£2.50	£2.50–£5	£6–£10	£11–£15	£15–£20	>£20
Poultry keeper respondents <sup>a</sup>	107 (6.9%)	410 (26.3%)	459 (29.5%)	265 (17.0%)	76 (4.9%)	79 (5.1%)	160 (10.3%)
Veterinarian respondents	2 (8%)	11 (42%)	8 (31%)	2 (8%)	1 (4%)	0 (0%)	2 (8%)

<sup>a</sup>Proportion computed as a percentage of all respondents ( $n = 1556$ ).

influenza. We have positioned our findings in relation to established literature to identify the following needs to be addressed.

### A need for HPAI-related information to come from trusted sources

There are numerous studies that show that veterinarians are seen as trustworthy.<sup>20–22</sup> As such, they could play a vital role in supporting HPAI-related compliance through open communication with different types of clients about the risks that the disease presents to their birds and to public health, providing answers to poultry keepers' questions and offering reassurance. Although they may not necessarily always appreciate the difficulties that small-scale keepers face in implementing the housing order,<sup>17</sup> they are nevertheless well placed to communicate information and guidance in a targeted manner to commercial and non-commercial clients as they understand how their 'needs and views are very different ...' (R8). This is especially so in relation to those who regard their birds as pets. Broader dissemination of information about HPAI along with easy-to-implement suggestions for improving biosecurity measures has been achieved by poultry specialists with a social media presence (e.g., the Surrey Poultry Vet), whose advice and videos are well received in online poultry-keeping groups.

### A need for greater confidence in treating birds

Despite their potential to provide advice and encourage compliance with HPAI-related regulations, survey respondents revealed how a lack of knowledge and confidence around HPAI and avian species more generally can present barriers to effective veterinarian–client communication. This is a recognised issue in the veterinary profession that needs to be addressed as a matter of urgency.<sup>8,9,23</sup> Respondents' confidence in seeing birds was lower the fewer birds they saw per year, and the fact that four specifically indicated confidence or competency-related concerns in relation to avian influenza suggests that diagnosis could be delayed, subsequently affecting disease control. Although the BVA has published guidance on dealing with birds during an avian influenza outbreak,<sup>23</sup> there seemed to be misunderstandings about when, where and how veterinarians can and should handle suspected avian influenza cases. Also, in a profession

renowned for staff shortages in the UK, it may be that during an avian influenza outbreak, practices do not believe it to be worth the risk to accept any avian species at all.<sup>24,25</sup> In either case, our findings indicate that the clarity and relevance of guidance for veterinarians could be improved, perhaps by tailoring it to different veterinary sectors. It is especially important to communicate that practices should continue to provide treatment (or referral if necessary) for pet poultry that do not present with suspected signs of HPAI, especially in emergency situations. This reflects the work of Kodilinye-Sims and Royden,<sup>9</sup> which reports veterinary practices refusing services such as emergency euthanasia. According to the Day One Competencies for veterinary surgeons,<sup>26</sup> basic first aid in all species (which includes euthanasia) is a necessary skill for all veterinarians, and those who are not confident in treating poultry must direct clients to someone who is, to avoid unnecessary suffering.

### A need for clearer guidance on handling and reporting suspected HPAI cases

Another area of confusion that would benefit from clearer guidance relates to the reporting procedures for suspected HPAI cases. Although most survey respondents gave appropriate answers to the question about where they would direct clients about a suspected avian influenza case, two said that they would bring them to the clinic, and one reported having received conflicting or inconsistent information on the correct procedures in relation to a wild bird. Having contacted the APHA as per the official guidance regarding when a notifiable disease is suspected,<sup>27</sup> they were surprised to be informed that they should ask the client to contact the Royal Society for the Prevention of Cruelty to Animals (RSPCA):

'Told client not to bring it in. Took details from them and passed on to apha (sic). Apha (sic) said actually to tell RSPCA (sic) and it is the client who needs to call them'. (R13)

The respondent went on to state:

'Very difficult to know what to do/who to phone when you phone apha (sic) who then call you to tell RSPCA and vice versa. Would be much happier seeing suffering birds myself with PPE as the cases we've



had people describe on the phone are all euthanasia cases pretty much'. (R13)

Without clear protocols, reporting is likely to become confusing, creating delays in diagnosis. Additional training and resources designed to increase veterinarian confidence in reporting suspected avian influenza in different groups of birds should therefore be clarified and made more widely available to first-opinion practices.

## CONCLUSIONS

Although veterinarians are widely regarded as a trustworthy source of information and are the most frequent first port of call for small-scale poultry keepers in a suspected HPAI outbreak, many first-opinion GP veterinarians lack confidence in seeing and treating avian species and would not feel confident assessing an avian influenza case. This is a major concern given their trusted status among poultry keepers, as a lack of appropriate triage and reporting may delay diagnosis of this notifiable disease. Similarly, it must not become acceptable for avian influenza to be used as an excuse for veterinarians who lack confidence in seeing birds to refuse veterinary first aid to birds. As veterinarians of all disciplines will likely encounter backyard or pet poultry, game or wild birds at some point during their work, there is an urgent need for governing bodies to promote approaches that build confidence in dealing with these circumstances and for veterinary schools to expand their poultry-specific teaching.<sup>b</sup> In addition, clarification of the regulations on treating birds in veterinary practices when HPAI outbreak numbers are high is essential. As this study draws on the views of a relatively small group of self-selected survey respondents, future research could expand its scope and reach by obtaining a larger sample of responses by approaching veterinary associations plus corporate practice groups and by targeting separate surveys at first-opinion GP veterinarians and commercial poultry practices. It would also be valuable to better understand the barriers to engaging with HPAI among veterinarians who do not specialise in poultry, given the threat that it presents to human and animal lives.

## AUTHOR CONTRIBUTIONS

*Conceptualisation, formal analysis, investigation, writing—original draft, writing—review and editing, supervision, visualisation and funding acquisition:* Sarah Jewitt and Matthew Smallman-Raynor. *Conceptualisation, formal analysis, investigation, writing—original draft, writing—review and editing, supervision and visualisation:* Emma McClaughlin. *Conceptualisation, methodology, formal analysis,*

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## CONFLICT OF INTEREST STATEMENT

The authors declare they have no conflicts of interest.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

## ETHICS STATEMENT

Ethics permission was granted by the School of Veterinary Medicine and Science, University of Nottingham Committee for Animal Care and Research (Ref: 3523211209).


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## REFERENCES

1. Centre for Disease Control. Avian influenza overview September–December 2022. 2022. <https://www.ecdc.europa.eu/en/publications-data/avian-influenza-overview-september-december-2022#:~:text=Between%20October%202021%20and%20September,virus%20detections%20in%20wild%20birds>. Accessed 5 Dec 2023.
2. UK Government. Highly pathogenic avian influenza in Great Britain: evaluation and future actions. 2023. Available from:

<sup>b</sup> The Day One Competencies as laid out by RCVS<sup>25</sup> have no poultry-specific content. RCVS accreditation of veterinarian schools requires recording of avian/poultry caseloads seen and used for teaching, but there is no minimum requirement.

- [www.gov.uk/government/publications/highly-pathogenic-avian-influenza-in-great-britain-evaluation-and-future-actions/highly-pathogenic-avian-influenza-in-great-britain-evaluation-and-future-actions](https://www.gov.uk/government/publications/highly-pathogenic-avian-influenza-in-great-britain-evaluation-and-future-actions/highly-pathogenic-avian-influenza-in-great-britain-evaluation-and-future-actions). Accessed 18 Apr 2023.
3. Freath L, Pacey A, Gale P, Perrin L. Highly pathogenic avian influenza (HPAI) in the UK and Europe. Updated Outbreak Assessment #14. 2022. Available from: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1055942/hpai-europe-number14-14-feb-2022.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1055942/hpai-europe-number14-14-feb-2022.pdf). Accessed 12 Dec 2022.
  4. UK Government. Bird flu (avian influenza): latest situation in England. 2022. Available from: <https://www.gov.uk/government/news/bird-flu-avian-influenza-latest-situation-in-england>. Accessed 6 Dec 2022.
  5. Bavinck V, Bouma A, van Boven M. The role of backyard poultry flocks in the epidemic of highly pathogenic avian influenza virus (H7N7) in the Netherlands in 2003. *Prev Vet Med*. 2009;88:247–54.
  6. James J, Billington E, Warren C, De Sliva D, Di Genova C, Airey M, et al. Clade 2.3.4.4b H5N1 high pathogenicity avian influenza virus (HPAIV) from the 2021/22 epizootic is highly duck adapted and poorly adapted to chickens. *J Gen Virol*. 2023;104.
  7. Henzler DJ, Kradel DC, Davison S, Ziegler AF, Singletary D, DeBok P, et al. Epidemiology, production losses, and control measures associated with an outbreak of avian influenza subtype H7N2 in Pennsylvania (1996–98). *Avian Dis*. 2003;47:1022–36.
  8. Singleton DA, Ball C, Rennie C, Coxon C, Ganapathy K, Jones PH, et al. Backyard poultry cases in UK small animal practices: demographics, health conditions and pharmaceutical prescriptions. *Vet Rec*. 2021;188:e71.
  9. Kodilinye-Sims H, Royden A. We must improve our pet poultry services. *Vet Rec*. 2022;190(6):248–49.
  10. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res*. 2005;15(9):1277–88.
  11. UK Government. Bird flu (avian influenza): how to spot and report it in poultry or other captive birds. 2023. Available from: <https://www.gov.uk/guidance/avian-influenza-bird-flu>. Accessed 24 Aug 2023.
  12. McClaughlin E, Elliott S, Jewitt S, Smallman-Raynor M., Dunham S., Parnell T., Clark M., Tarlinton R. UK Flockdown: A survey of smallscale poultry keepers and their understanding of governmental guidance on Highly Pathogenic Avian Influenza (HPAI). *Preventive Veterinary Medicine*. <https://doi.org/10.1016/j.prevetmed.2024.106117>
  13. RCVS. Avian influenza: handling of possible cases in veterinary practices. 2006. Available from: <https://www.rcvs.org.uk/news-and-views/news/avian-influenza-handling-of-possible-cases-in-veterinary-prac/>. Accessed 25 Apr 2023.
  14. BVA. Avian influenza (AI) advice for vets dealing with wild birds and backyard poultry. 2021. Available from: <https://www.bva.co.uk/media/4388/ai-guidance-for-vets-2021-final.pdf>. Accessed 28 Apr 2023.
  15. Defra. Declaration of avian influenza prevention zone (England). 2021. a: Welsh Government. Avian influenza: prevention zone declared across Great Britain. Accessed 5 December 2023. Available from: <https://www.gov.wales/avianinfluenza-prevention-zone-declared-across-great-britain> b: Defra and APHA. Bird flu Latest situation: Chief Vet lifts Prevention Zone. 2022. Available from: <https://www.gov.uk/government/news/bird-flulatest-situation-avian-influenza-prevention-zone-declared-across-great-britain#full-publication-update-history>
  16. Defra. Declaration of avian influenza prevention zone—including housing measures (England). 2021. Available from: <https://assets.publishing.service.gov.uk/media/63bc1441d3bf7f263328b75f/amended-aipz-declaration-mandatory-biosecurity-housing-measures-england-from-090123.pdf>. Accessed 30 Nov 2023.
  17. Jewitt S, Smallman-Raynor M, McClaughlin E, Clark M, Dunham S, Elliot S, et al. Exploring the responses of smallscale poultry keepers to the risk of avian influenza in the United Kingdom, with recommendations for improved biosecurity messaging. *Heliyon*. 2022;9(9):e19211.
  18. Poortinga W, Bickerstaff K, Langford I, Niewöhner J, Pidgeon N. The British 2001 foot and mouth crisis: a comparative study of public risk perceptions, trust and beliefs about government policy in two communities. *Journal of Risk Research*. 2004;7(1):73–90. <https://doi.org/10.1080/1366987042000151205>
  19. BBC. Geronimo the alpaca killed as legal row ends. 2021. Available from: <https://www.bbc.co.uk/news/uk-england-bristol-58255378>. Accessed 2 Jan 2023.
  20. Svensson C, Lind N, Rayher KK, Bard AM, Emanuelson U. Trust, feasibility, and priorities influence Swedish dairy farmers' adherence and nonadherence to veterinary advice. *J Dairy Sci*. 2019;102(11):10360–68.
  21. Gates MC, Walker J, Zito S, Dale A. Cross-sectional survey of pet ownership, veterinary service utilisation, and pet-related expenditures in New Zealand. *N Z Vet J*. 2019;67(6):306–14.
  22. Brown BR. The dimensions of pet-owner loyalty and the relationship with communication, trust, commitment and perceived value. *Vet Sci*. 2018;5(4):95.
  23. Greening SS, Gates MC. Cross-sectional survey of barriers and opportunities for engaging backyard poultry producers and veterinarians in addressing poultry health. *N Z Vet J*. 2023;71(1):18–26.
  24. Burnell S. Vets and the 'pingdemic'. *Vet Rec*. 2021;189(3):125. <https://doi.org/10.1002/vetr.815>
  25. Loeb J. Vet exemption confirmed for test and trace. *Vet Rec*. 2020;187(4):132.
  26. RCVS. RCVS Day One Competences. 2023. Available from: <https://www.rcvs.org.uk/news-and-views/publications/rcvs-day-one-competences-feb-2022/>. Accessed 22 Apr 2023.
  27. APHA. Avian disease surveillance. 2023. Available from: <http://apha.defra.gov.uk/vet-gateway/surveillance/seg/avian.htm>. Accessed 28 Apr 2023.

## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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