



# Pesticide Poisoning of Animals 1999:

Investigations of Suspected Incidents  
in the United Kingdom



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**A Report of the Environmental Panel  
of the Advisory Committee on Pesticides**

# **Pesticide Poisoning of Animals 1999: Investigations of Suspected Incidents in the United Kingdom.**

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of the Advisory Committee on Pesticides

**2000**

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# Preface

The collection and analysis of animal carcasses might appear somewhat gruesome but it is an essential part of the pesticide protection programme; the feedback loop that can signal possible problems with the anticipatory risk assessments used to inform the controls applied through legislation. The Wildlife Incident Investigation Scheme has for several years provided a structured approach to this: closing the loop between the intent to protect wildlife with information on field incidents. This is received by the Advisory Committee on Pesticides, through its Environmental Panel, and in principle could be used as a basis for a review of the outcome of specific assessments and/or to improve the process as a whole.

This report, which provides a careful and detailed analysis of carcasses collected in 1999, nevertheless brings good news; a sharp decline in the total number of incidents reported and, possibly more important, in the number of incidents that could be ascribed to pesticides. Incidents involving deliberate abuse dominate, but even these are down compared with previous years. Admittedly there was an increase in incidents arising from the approved use of pesticides as compared with 1998, but still the number was small and within the range recorded over previous years.

Of course the good news should not lead to complacency. It depends on a system that is necessarily limited: not all incidents are picked up; not all incidents that are picked up are in a state that they can be properly analysed; not all species are covered; only direct poisoning is considered. Nevertheless WIIS is such that it would undoubtedly register major problems, so that the trends are right should give us a measure of confidence in the system as a whole – and this is to be welcomed.

A handwritten signature in black ink, appearing to read 'P. Calow', with a long horizontal line extending from the end of the signature.

**PROF. P. CALOW**  
CHAIRMAN  
ENVIRONMENTAL PANEL



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# Summary

In the UK the Wildlife Incident Investigation Scheme investigates deaths of wildlife, including beneficial insects, pets and some livestock, where there is strong evidence to suggest that pesticide poisoning may be involved.

The Scheme provides an unique means of post-registration surveillance of pesticide use, so that registrations can be revised if necessary. In addition, it provides a measure of the success of the pesticide registration process, and helps in the verification and improvement of the risk assessments made in the registration of compounds. Evidence from the Scheme may also be used to enforce legislation on the use of pesticides and the protection of food, the environment and animals.

There were 453 suspected poisoning incidents registered by the Scheme in 1999. The causes were determined in 215 incidents of which 139 (31% of those registered) were pesticide poisoning. In the remaining incidents either sufficient information or suitable tissues were not available, and/or pesticide residues were not detected (see Table 1). Reassuringly, there were only ten incidents arising from the approved use of pesticides (see Figure 1) in 1999 (includes three bee incidents). This compares with five in 1998 (includes one bee incident). Proportionately, this is 7% of pesticide incidents reported in 1999 compared with 3% in 1998. Although this is an increase in number and proportion of approved use incidents, it is within the range seen in years prior to this (see Table 24).

The number of misuse incidents (see Figure 1), often the result of the careless use of pesticides, was 32 in 1999 (includes one bee incident). There were 49 incidents in 1998 (includes four bee incidents). This represents 23% of confirmed poisoning incidents in 1999, compared with 26% in 1998. The proportion of misuse incidents continues to be much higher than in previous years, when it was about 10% of poisoning incidents (see Table 24).

Deliberate abuse of pesticides was found in 61 incidents compared with 96 incidents in 1998 (includes one bee incident). This represents 45% of the pesticide incidents (see Figure 1), compared with 52% in 1998.

A further 34 poisoning incidents (24%) were attributed to unspecified use, including five bee incidents (see Figure 1). In 1998 there were 28 (15%) (includes six bee incidents), where there was insufficient information available to identify the source of the poisoning.

There were nine pesticide incidents involving bee deaths out of 28 incidents investigated (see Table 18), compared to 1998, where 12 pesticide incidents were confirmed out of 43 investigated. All pesticide incidents involved honeybees in 1998 and 1999.

There were two incidents where veterinary products were thought to be involved (see Figure 1).

As in previous years, all incidents arising from the approved use and the illegal use of pesticides were thoroughly investigated. These are reported in Part 1 of the report. Where appropriate and with sufficient evidence prosecutions were taken by MAFF and other agencies (see enforcement action) for the illegal abuse or misuse of pesticides. However, incidents of misuse or approved use can also highlight problems with the approval conditions or the label instructions for a pesticide and can provide valuable feedback into the regulatory process.

Of the 453 suspected poisoning incidents vertebrates were involved in 357 incidents; beneficial insects in 28; suspected baits and suspicious samples, where no poisoned animals were found, in 67 and there was one incident involving earthworms. These are reported in Part 2 of the report.



In England, 232 incidents were reported, of which 84 (36%) were found to be caused by pesticides; Scotland had 135 incidents registered, 40 (30%) were found to be caused by pesticides; Wales, 41 incidents were registered, nine (22%) were identified as pesticide poisonings; and in Northern Ireland, 45 incidents were reported, six (13%) identified as pesticide poisonings (see Table 2 and Figure 3).

The number of suspected poisoning incidents registered by the Scheme in 1999 can be compared with 1998. In 1998 there were 612 incidents registered, and the causes were determined in 326 of these (53% of those registered). In 1999 the number of incidents registered is lower than previous years, so the number of incidents resulting from pesticides is also lower, but this number is proportionately similar to previous years (see Table 3).

Twenty nine agricultural chemicals were identified in the pesticide poisoning incidents (see Table 4); thirty-eight compounds were found in 1998.

# Introduction

1. In the United Kingdom, before approval is granted for the use of pesticides, the impact on wildlife and other animals, including beneficial insects such as honeybees, has to be assessed. If it is thought that an unacceptable risk may arise, restrictions on use in order to protect wildlife and domestic animals may be imposed in the conditions of approval under the Control of Pesticides Regulations (COPR) 1986 (as amended) and the COPR (Northern Ireland) 1987 or Plant Protection Products Regulations 1995, as appropriate.
2. The results of the four schemes, which investigate possible pesticide poisoning, which operate in the United Kingdom under the Wildlife Incident Investigation Scheme (WIIS), are reported. Fish are not usually covered by the Scheme.
  - (1) The Ministry of Agriculture, Fisheries and Food (MAFF) and the National Assembly for Wales Agriculture Department (NAWAD) examine cases of suspected poisoning by agricultural chemicals that involve vertebrate wildlife (chiefly birds and mammals) and companion animals in England and Wales. Over the years this scheme has widened its scope and now is able to detect most of the pesticides thought likely to cause animal deaths (Hardy *et al.* 1986).
  - (2) MAFF and NAWAD investigate mortality of bees, usually reported by beekeepers, in England and Wales. This part of the WIIS has been in operation since 1981 (Fletcher *et al.* 1994b).
  - (3) In Scotland, the Scottish Executive for Rural Affairs Department (SERAD) operates a scheme covering incidents in all categories.
  - (4) In Northern Ireland, the Department of Agriculture and Rural Development (DARD) operates a scheme in the same way as SERAD. This scheme was introduced in 1992 in line with the existing schemes operating in Great Britain. Prior to that a scheme operated on an informal basis.
3. The majority of this post-registration surveillance work carried out by Government Departments is funded by the agrochemical industry, under the Food and Environmental Protection Act 1985 (FEPA).
4. During the reported year, incidents shown to involve pesticides were assigned to one of four categories:

**Approved use** of the product, according to the specified conditions for use;

**Misuse** of a product, by careless, accidental or wilful failure to adhere to the correct practice;

**Abuse** of a pesticide, in the form of deliberate, illegal attempts to poison animals;

**Unspecified use**, where the cause could not be assigned to one of the above categories.

There is also a category of Veterinary use, where there is known involvement of veterinary products in incidents. These are investigated incidentally rather than deliberately.

Veterinary incidents may include abuse, misuse, approved use or unspecified use of these compounds. Incidents suspected of involving veterinary medicines should be reported to

the Veterinary Medicines Directorate (Tel. 01923-338427) In addition, some reported animal deaths are subsequently found to be the result of causes unrelated to pesticide use, such as disease, starvation and trauma or other non-pesticide poisonings.

5. The results of investigations are reported to the Environmental Panel of the Advisory Committee on Pesticides (ACP). The information provided may result in a re-evaluation of the approvals previously granted to that product, or may affect the progress to full commercial use of products currently under provisional approval. Information from incidents assist in the validation and improvement of the risk assessment procedures for new and existing compounds.
6. In cases where there is evidence to indicate misuse or deliberate abuse of a pesticide, the results of investigations may also result in legal enforcement. Under FEPA and COPR, all aspects of pesticide advertisement, sale, supply, storage and use are fully regulated. If incidents reveal contravention of this Act, or of other legislation such as the Wildlife and Countryside Act 1981, Wildlife (Northern Ireland) Order 1985, Protection of Animals Act 1911, and the Welfare of Animals Act (Northern Ireland) 1972, then prosecution or other forms of enforcement may ensue. Any investigations carried out to enforce the legislation are paid for by the Home Departments.

Investigation procedures are described in Appendix 1.

## **The Campaign Against the Illegal Poisoning of Animals**

7. During 1999 interested Government Departments led by MAFF, continued the long-term Campaign Against the Illegal Poisoning of Animals. The Scheme is now becoming much more widely known and there has been much press and media coverage throughout the years. The provision of a freephone number (0800 321600) has had a continuing good response, allowing ready access to the Scheme.
8. To prevent large numbers of dead animals being submitted and analysed, with the consequences on financial and resource implications, strict criteria are applied to potential incidents prior to acceptance. Incidents are accepted if they involve the death of animals or beneficial insects and where the approved use, misuse or deliberate abuse of pesticides may be implicated. Incidents involving the presence of baits intended or likely to cause deaths of animals are also accepted. Incidents are rejected for further analyses where they obviously involve trauma or disease or are confirmed as doing so after veterinary examination. Unless there are special circumstances, substantial delay in notification of incidents or the unavailability of bodies or baits also leads to rejection.

# Part 1: Incidents in 1999

## Number of incidents in 1999

9. All incidents that were registered to WIIS, and which were investigated during 1999 are included in this report. There were 453 suspected poisoning incidents registered by the Scheme in 1999 (see Table 1). The cause of death or illness (including pesticides and non-agricultural chemicals, trauma, starvation and disease) was determined in 215 incidents (47% of those registered). In 139 of these incidents (31% of those registered) pesticide poisoning was identified. In the remaining incidents either sufficient information or suitable tissues were not available, and/or pesticide residues were not detected. Details of the animals and chemicals involved in all of the incidents reported to the Scheme are given in Part 3 of this report. For previous comparable data see Fletcher *et al.*, 1995, 1996, 1997, 1998 and 1999.
10. There were ten incidents of approved use, 32 of misuse, 61 of abuse and 34 of unspecified use, where the source of the compound remained unknown despite thorough field investigations. Additionally there were two incidents thought to involve veterinary products. Positive enforcement continued to be a priority in 1999 with prosecutions being taken against offenders following the investigation of incidents. These incidents together with any regulatory and /or enforcement activities are reported in Part 2 of this report.

**Table 1: Numbers of incidents investigated in 1999**

	Incidents investigated	Pesticide poisoning incidents	Other cause of death found
Vertebrate wildlife	204	57 (28%)	67 (33%)
Livestock	4	2 (50%)	0
Companion animals	149	48 (32%)	8 (5%)
Other	8	1 (13%)	0
Beneficial insects	28	9 (32%)	1 (4%)
Suspected baits and suspicious substances	67	22 (33%)	not applicable
<b>TOTAL *</b>	<b>453</b>	<b>139 (31%)</b>	<b>76 (17%)</b>

\* Animals from more than one category may be involved in a single incident



# Part 2: Incidents in 1999 where regulatory and/or enforcement action was considered

## Approved use incidents

### Introduction

11. Information from the WIIS on incidents suspected to have resulted from approved use is very important, and is fed into the pesticide regulatory process (see Fletcher and Grave 1992). Where significant concerns are highlighted, thorough consideration is given to the most appropriate action needed. If a suspected approved use incident arises, the approval holder is contacted as a matter of course, and is given the opportunity to comment. Useful feedback from the companies has been received. Farmers, growers and other members of the public are strongly encouraged to report any poisoning incident which may have resulted from the approved use of a pesticide to their local Farming and Rural Conservation Agency (FRCA) office or freephone 0800 321600.
12. There were seven incidents (including three bee incidents) reported to the Scheme in England and Wales and three in Scotland which resulted from the approved use of a compound. This compares with five incidents in the previous year of which one was a bee incident. Six different compounds were identified. This small number of incidents reported to the Scheme indicates that agricultural chemicals, if used in an approved manner, are apparently not causing major problems to wildlife or other animals.
13. Detailed summaries of the incidents appear below. Three of these incidents in England and three in Scotland involved rodenticides and indicate the need to check baiting points frequently and to ensure that bait stations are sufficiently robust to exclude non-target animals likely to be in the area. Further details regarding baiting procedures etc can be found in an HSE information sheet entitled 'Safe use of rodenticides on farms and holdings' (Agricultural Information Sheet No 31).
14. There were three incidents involving bees two of which were as a result of use of bendiocarb to control feral bees and wasps. This indicates a need to maintain vigilance where honeybee hives are near to treated colonies. The third incident involved bees overflying a field being treated with dimethoate. This emphasizes the need to be aware of bee activity other than foraging within the target crop when applying pesticides.

### Incident summaries

15. A fox was found dead in a loose box in a farm outbuilding in Suffolk with blood around its nose and mouth. Rodenticide poisoning was suspected. Analysis confirmed 1.2 mg/kg of bromadiolone and *post mortem* examination showed widespread haemorrhaging of the lungs. It is likely that exposure to bromadiolone caused the death of this fox. Bromadiolone was used on the farm and all the baiting points were inspected and observed to be of an acceptable standard. It was assumed that the incident resulted from approved use of bromadiolone where the fox may have eaten poisoned rats.
16. Two grey squirrels were found dead in a public park in Dorset where rodenticide treatment was being carried out. The pest control operator contacted FRCA when one of the bait

- boxes was found with a chewed corner allowing access to the bait. Neither of the original squirrels were available for examination but a short while later a third dead squirrel was found and submitted for examination. *Post mortem* examination revealed marked haemorrhagic fluid in the thorax. Analysis for anticoagulants detected residues of bromadiolone in the liver sufficient to have caused death. This incident appeared to be the result of approved use but might have been avoided if bait boxes sufficiently robust to prevent access by squirrels had been used.
17. A dead sparrow was found at a haulage yard in Humberside where rodenticide treatment was being carried out. The bird had coloured grain in its mouth. It was reputed to be the fifth dead sparrow to have been found but none of the others were available for examination. Analysis of the liver confirmed residues of warfarin and difenacoum but autolysis was too advanced for detailed pathology. Inspection of the site showed that all bait boxes were being used correctly and that there was no spillage of bait. All boxes were tamper proof and most were empty. Some contained grain and one also contained wax blocks. Analysis of the grain showed that it contained bromadiolone and difenacoum and of the wax blocks that they contained bromadiolone. The site was claimed to be being treated only as a precaution as there were currently no rodents but was visited by pest control operatives every six weeks. It is likely that the sparrow died after accessing baited grain used as approved.
  18. During August three juvenile red kites died on the Black Isle in Scotland. The birds and their parents had been under observation and tracked, as part of the re-introduction programme in Scotland. There was clear evidence of haemorrhaging in the carcasses at *post mortem*, and analytical investigation revealed residues (0.2–0.24 mg/kg) of bromadiolone in the liver tissues from the juvenile birds. The territory hunted by the parent birds was well defined, and it was possible to identify the relevant agricultural holdings within it. Field investigation by SERAD Agricultural Staff focused on six properties. Rodenticides were, or had been, used on five of the holdings, but bromadiolone was the active ingredient employed in only one case. 'Slaymor' bait material had been laid along the walls of steading buildings in pipes or under boards laid at an angle against the walls. Normal practice was to burn or bury rat bodies that were found, however few bodies had been found after baiting. This incident appears to have resulted from approved use.
  19. A farmer in Aberdeenshire initiated an incident after finding three dead foxes on his land in November. *Post mortem* examination revealed haemothorax and haemorrhages into the intestinal tract. Analytical investigation identified residues of bromadiolone (0.75 and 0.96 mg/kg) and of coumatetralyl (0.04 and 0.16 mg/kg) in liver tissues from two of the animals. A subsequent field investigation by SERAD Agricultural Staff identified a piggery on an adjacent farm as the likely source of both rodenticides. 'Slaymor' bait and 'Racumin' tracking powder were regularly used around the piggery at certain times of the year. The formulations had been applied in compliance with the label recommendations, and there was no evidence to indicate that rat bodies were not being properly disposed of.
  20. A householder in Tayside, Scotland, sought veterinary care for her dog when it became ill following a pest control operation in her home. The animal was treated for exposure to anticoagulants and made a full recovery. A sample of bait material was submitted and difenacoum was identified as the active ingredient. A field investigation by SERAD Agricultural Staff confirmed that a pest control firm had been employed by the landlord to control mice in the house. The firm used a 'Sorexa Gel' formulation, and applied the bait on plastic trays which were placed next to the walls, but behind heavy furniture to prevent access by dogs or children. It appears that some of the bait may have been made available

when a wardrobe in an unoccupied room had been moved. The firm involved had taken basic precautions to meet the label requirement, but agreed to take additional precautions in future operations.

21. Two wild fallow deer were found dead near a field of oilseed rape in Herefordshire which had recently been treated with slug pellets containing methiocarb in September 1999. Residues of methiocarb were confirmed in the stomach contents of both deer and blue pellets were evident in the stomach of one of the deer when samples were taken in the field. Residues of methiocarb were significant and sufficient to suggest it was the cause of death. Both animals were too decomposed for detailed *post mortem* examination. Analysis also confirmed methiocarb in pellets found in the field. Test baiting under plastic sheeting had been carried out but no test baits were apparent at the time of the field visit. There were no obvious spillages and it appears that treatment of molluscicide was carried out according to approval.
22. Dead worker bees were found outside four working hives at an apiary in Cornwall. Three bulb fields, none of which contained flowering weeds, had been sprayed with dimethoate on the afternoon of the incident. A fourth field contained flowering weeds and had not been sprayed. Treated fields lay between the apiary and the field containing weeds. Analysis revealed residues of 0.01  $\mu\text{g}$  dimethoate/bee, which, taking into account decline of residues, is considered sufficient to have caused the death of the bees. The local bee liaison officer had been informed that treatment would take place during that week and the beekeeper had been contacted on the day of spraying. It is likely that bees had been exposed as they flew over the first field on which dimethoate was being used according to the conditions of approval.
23. A beekeeper noticed dead bees being thrown out of a hive and bees fighting on the flight board at an apiary in Suffolk. The apiary had only been moved to the site a week previously. This incident occurred in August when most crops had finished flowering. Field inspection found a sugar beet field with mayweed and two cereal fields locally which may have been sprayed. Analysis of pollen from the bees found possible rosebay willowherb, possible hollyhock and unidentified pollen. Analysis of the bees found no organophosphate but did find residues of bendiocarb sufficient to have caused death. Further field investigation revealed that treatment of feral bee colonies had been carried out with this compound recently in this area according to the conditions of approval. This seems to have been the likely source of bendiocarb.
24. About 2000 dead bees were found outside one colony in an apiary in Norfolk located in a walled garden. None of the other colonies were affected. It was August and there were no crops in flower. Pollen analysis revealed that the bees had been foraging on Compositae, Rosaceae and unidentified flowers. No organophosphate was detected but residues of bendiocarb were found in the bees at levels sufficient to indicate that this was the likely cause of death. Further field enquiries found that a wasps nest adjacent to a feral bee colony had been treated at a nearby house within the previous two weeks according to approval. It seems that this is the likely cause of the honeybee deaths.

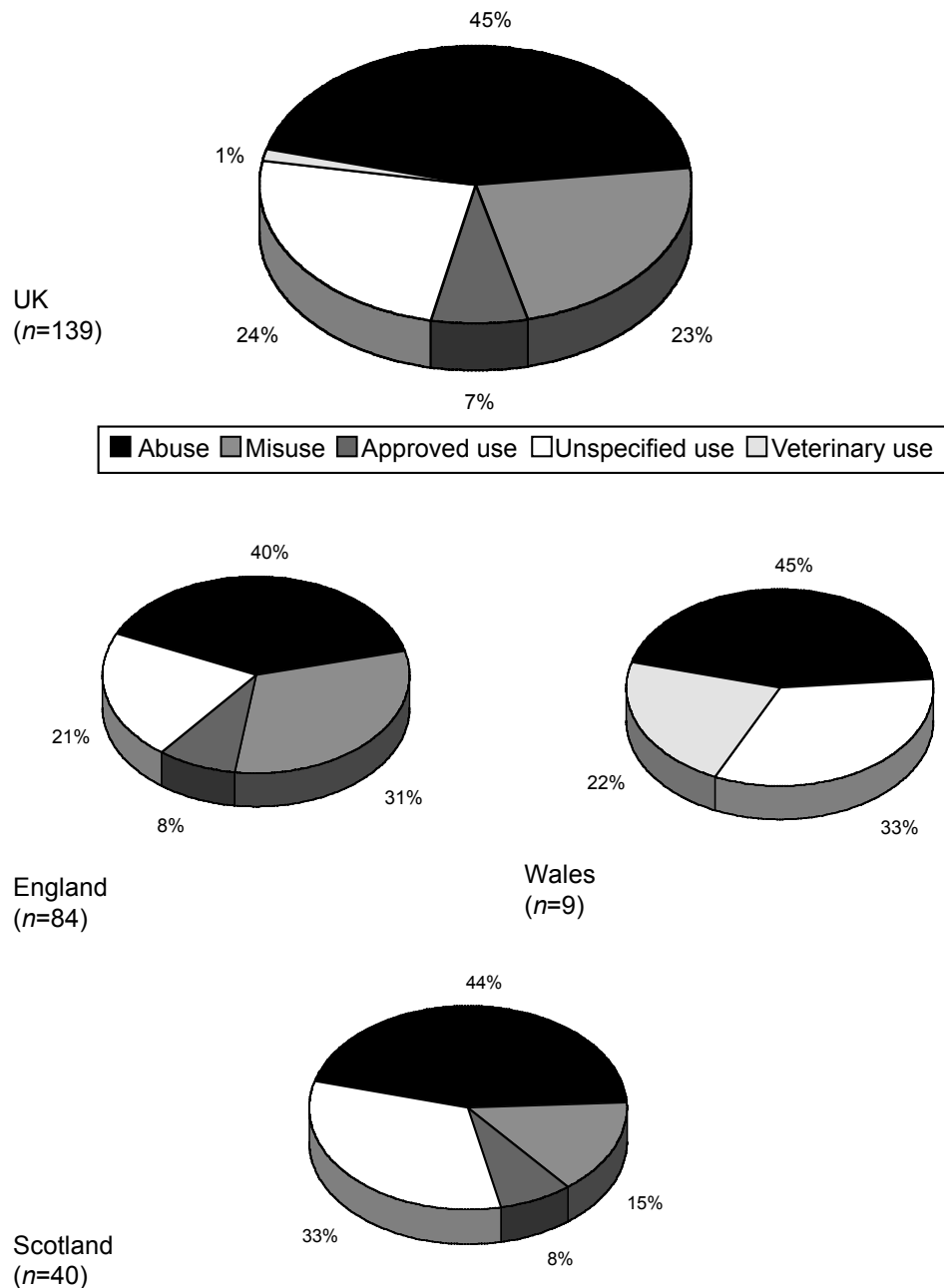
## Misuse incidents

25. A number of incidents was reported where misuse of pesticides was identified (see Figure 1). These result from poor storage, spillage, chemicals not being used in the approved manner (rodenticide baits being left uncovered, spraying of crops in full flower) or compounds being disposed of in an inappropriate way (Barnett and Fletcher, 1998).



Thus, the chemicals found in this category tend to be rodenticides, molluscicides, seed treatments and spray compounds used where honeybees are at risk. In 1999, there were 32 incidents, including one honeybee incident (23% in this category, involving 14 different compounds). In the previous year there were 49 incidents (26%, involving 21 compounds) and including four honeybee incidents.

**Figure 1: Proportion of all incidents by category of pesticide involvement in 1999**  
 (All pesticide incidents in Northern Ireland were abuse).

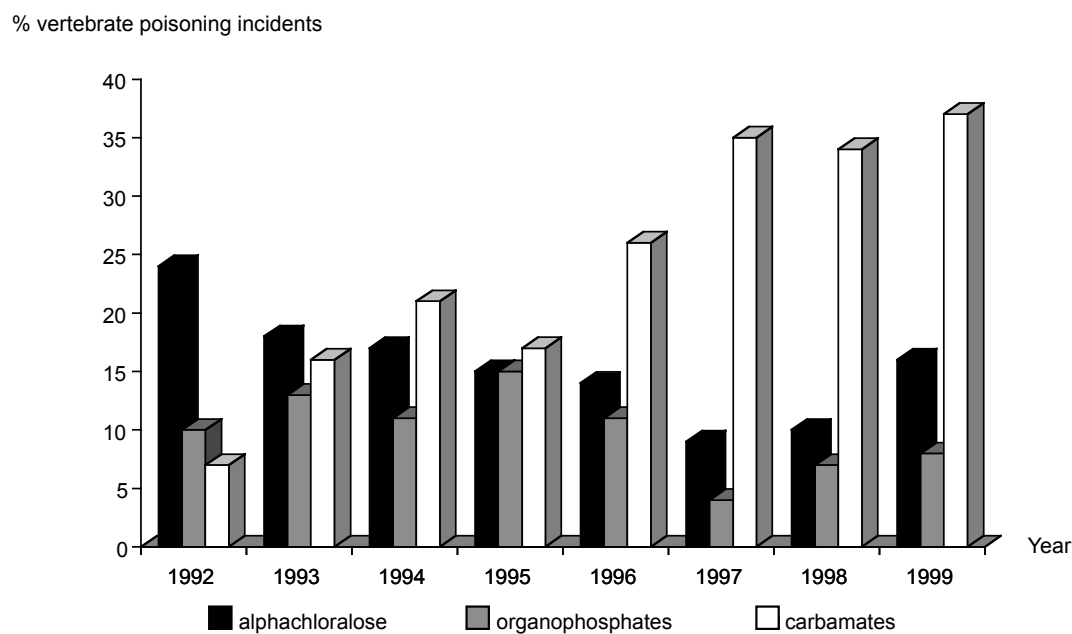


26. Many of the misuse incidents involved slug pellets, primarily uncleared spillages. There were seven incidents involving metaldehyde, five involved dogs and in the other two incidents, one involved 50 heifers and the other a spillage of pellets with no casualties found. Methiocarb poisoning of dogs occurred in one incident because of uncleared spillages. Potentially wild animals such as badgers and foxes, which are likely to find the pellets palatable, are equally at risk in such circumstances. Unfortunately the fact that they are likely to skulk in cover once affected, unlike dogs that are in close proximity to humans, will mean that they are less likely to be found and reported to the Scheme.
27. Uncovered rodenticide baits were found in 16 misuse incidents, involving seven different compounds. There were seven misuse incidents involving difenacoum, three bromadiolone, one warfarin and one coumatetralyl. There were four incidents involving more than one rodenticide, with single incidents involving: bromadiolone and difenacoum; bromadiolone, coumatetralyl and difenacoum; bromadiolone, coumatetralyl and warfarin; alphachloralose, brodifacoum, bromadiolone, chlorophacinone and difenacoum.
28. Gamma-HCH was found in two incidents, with dumped treated grain found in one incident and in the other it was used as a fumigant in a church where bats may have been roosting. There were single incidents of misuse of cyanide, cypermethrin, dinoseb, strychnine, trifluralin, petrol and diesel.
29. Bendiocarb was involved in one honeybee misuse incident.
30. Further information about these incidents can be found in Appendix 2.

## Abuse incidents

31. As in previous years, a large number of incidents involved deliberate abuse of pesticides (see Figure 1). The number of poisoning incidents attributed to abuse was 61 (45% of pesticide incidents); 96 were found in 1998, which represented 52% of pesticide incidents. There were no incidents involving beneficial insects in this category (one in 1998).
32. Fifteen different compounds were involved in these incidents compared with 26 in the previous year. The three compounds found to be most abused were carbofuran (17; 28% of abuse incidents), alphachloralose (14; 23% of abuse incidents) and aldicarb (12; 20% of abuse incidents). Carbofuran and alphachloralose were the compounds most found in abuse incidents in the previous year. In 1998, carbofuran was involved in 30 (32%) of abuse incidents, alphachloralose 16 (17%) and aldicarb in 13 (14%).
33. There were six incidents (10%) involving the abuse of metaldehyde (one incident also involved alphachloralose). Incidents involving the abuse of mevinphos had been in decline (1998, 1 incident, 1997, 3 incidents, 1996, 11 incidents), but in 1999 there were four incidents (see Figure 2) involving this compound. One of these incidents also involved carbofuran. The other incidents involving an organophosphate compound were fenitrothion, and an incident where a sample of phorate was seized.

**Figure 2: Changing trends in the use of some pesticide classes in vertebrate incidents.**



34. Carbamate abuse incidents, other than aldicarb and carbofuran mentioned above, involved bendiocarb (two incidents), methiocarb (one incident) and an incident where a sample of oxamyl was seized. There were single incidents of organochlorine abuse involving gamma-HCH and another endosulfan.
35. There were four incidents of anticoagulant rodenticide abuse, compared to seven incidents in 1997 and 1998. These incidents involved warfarin (two incidents), bromadiolone and an incident with alphachloralose and bromadiolone present.
36. There was one incident involving the strychnine poisoning of a dog.

### Unspecified use incidents

37. In every year there is always a number of incidents where the source of the compound is unknown, despite detailed field investigations. Animals may take some time to die after exposure, especially with certain chemicals such as anticoagulant rodenticides, and in this time may travel some distance. In 1999, there were 34 incidents of unspecified use (24% of pesticide poisoning incidents), including five bee incidents; there were 28 in 1998 (15%) including six bee incidents. There were 16 different compounds detected in these incidents and there were 17 in the previous year.
38. Metaldehyde was implicated in two unspecified use incidents and methiocarb in a further one. Most are likely to have arisen from uncleared spillages of slug pellets or from the use of slug pellets to prepare poisonous baits. However, insufficient field information prevents them from being classified as misuse or abuse incidents.
39. Other unspecified use incidents involved alphachloralose (one incident involving dogs), carbofuran (two incidents, one involving a red kite and the other two little owls), chlorfenvinphos (one incident involving a buzzard), paraquat (three incidents, all involving dogs) and strychnine (one incident involving a dog).

40. There were five incidents involving honeybees where the source of the residues detected could not be determined. There were three incidents involving bendiocarb and there were single incidents involving the compounds dimethoate and fenitrothion.

## Anticoagulant rodenticides

41. There is increasing concern over the number of incidents involving anticoagulant rodenticides, particularly where birds of prey, mainly red kites, are killed. Therefore these incidents are being highlighted in this separate section. From previous WIIS data, it is very unlikely that these incidents are occurring due to abuse, so although they are classified as unspecified use, it is likely that rodent control operations, particularly those where label instructions are not strictly adhered to, are the cause. These compounds take some time to poison animals, as their mode of action is to delay the onset of symptoms so as to prevent the intended target species, rodents, from becoming bait shy. This combined with a large hunting area, makes it difficult to trace all sources of rodenticide use in an area. Birds of prey are almost certainly being poisoned via secondary poisoning ie. eating poisoned rodents and this emphasizes the need for thorough carcass searching during baiting operations. There have been some training initiatives undertaken by FRCA and advice leaflets produced by English Nature highlighting the risks to red kites within the release areas. There were 18 incidents involving these compounds (there were nine in 1998) during 1999. Seven of these incidents involved birds of prey, five incidents foxes and three incidents cats and three incidents dogs. In 1998 there were five unspecified use anticoagulant rodenticide incidents involving birds of prey. In both of these years there were also two incidents involving red kites where death was due to the abuse of a pesticide, but anticoagulant rodenticide residues were also detected in the livers of these birds.
42. There were three incidents involving red kites, three incidents with buzzards (one incident involved two birds) and a tawny owl incident (two birds involved). In four incidents (two buzzard, one red kite and one tawny owl) difenacoum was found at residues of 0.1-0.2mg/kg in the liver and in two of these incidents brodifacoum residues were also found at 0.04 and 0.35mg/kg (one buzzard incident and one red kite incident). Brodifacoum only (liver residue 0.3mg/kg) was found in another red kite incident. In one buzzard incident and a red kite incident residues of about 0.1mg/kg bromadiolone were found. Regionally there was one incident from Wales and one from Scotland and the rest were in England, particularly Oxfordshire and Berkshire, where three of the four incidents there involved red kites which were all from the reintroduction programme. Rodent control operations were identified in all these incidents and in three incidents the compounds used were the same as that found in the liver of the birds. However, there were also two incidents, where bromadiolone was reportedly used, but brodifacoum was found in the liver of the birds. This demonstrates the difficulty in establishing all sources of rodenticide use in an area and is why these incidents have been classified as unspecified use.
43. The other anticoagulant rodenticide incidents involved bromadiolone in four fox incidents and two incidents with cats (one also involved difenacoum). The remaining fox incident involved three foxes and coumatetralyl and there was a cat incident with chlorophacinone. In the three dog incidents one involved, coumatetralyl, one flocoumafen and one a mixture of chlorophacinone, brodifacoum and difenacoum.

## Enforcement action

44. Where the information collected on an incident indicates that serious breaches of pesticides legislation may have occurred, appropriate formal investigation and enforcement action may be taken.
45. The fines and costs imposed by the courts, together with the publicity such cases attract, are an incentive to use pesticides properly. Even where there is insufficient evidence to prosecute, the fact that a Government investigator has been seen to be enquiring about an incident is often sufficient to dissuade the culprit and others from re-offending. Government Departments remain committed to use all available enforcement methods to help stamp out illegal poisoning.
46. Many of the prosecutions taken this year have arisen from failure to follow the label instructions on pesticides. Pesticides approvals are designed to ensure that products are safe when used in accordance with label instructions and good practice. Failure to follow these can increase the risk of harm to non-target species.
47. In England, a total of 12 incidents involving the suspected poisoning of animals arising from misuse or abuse, were investigated by MAFF Investigation Officers. One prosecution arose from these cases in 1999, and the defendant was found guilty. Six cases are still to be resolved. All of the nine cases carried over from 1998 were resolved. There were eight prosecutions, with six cases producing verdicts of guilty. The following are brief summaries of the successful cases.
48. A farm manager pleaded guilty to failure to take all reasonable precautions to protect the health of human beings and creatures. A dog walked over farm land was seen eating something at a particular location. When the dog fell ill, containers of loose, unprotected difenacoum rodenticide bait were found: the dog died of difenacoum poisoning. The farm manager admitted that he had laid these baits. He was fined £500 and ordered to pay costs of £323.13.
49. A pest controller pleaded guilty to failure to follow the conditions of approval of a pesticide. He had used a pesticide containing difenacoum to control a squirrel infestation, on the advice of another pest controller. Difenacoum is approved for use to control rats and mice only. He was given a 12 month conditional discharge and ordered to pay £500 towards costs.
50. A flower-growing company was found guilty of using a pesticide whilst failing to comply with the conditions of approval. The company applied a pesticide containing dimethoate to a field containing flowering weeds, contrary to the statutory conditions of use for all dimethoate products. This resulted in the loss of a large number of honeybees that had foraged on the weeds. The beekeeper had not been warned of the treatment.
51. A pest controller pleaded guilty to two counts of failure to comply with the conditions of use of a pesticide in that he sprayed the pesticide directly onto animals and failed to wear the prescribed personal protective equipment during use. The pest controller had been employed to spray a house for fleas. He used a product containing bendiocarb, spraying it directly onto a cat and a dog: the cat died 20 minutes later. The pest controller was fined £400 on the first charge, given a conditional discharge on the second and ordered to pay £100 costs.
52. A farmer was found guilty of failure to comply with the conditions of use of a pesticide, in that spillages were not buried or removed, and of failure to take all reasonable precautions

- to protect the health of human beings and creatures. Two dogs walked along a potato field next to a narrow road became ill. One died and it was established this dog had been poisoned with metaldehyde. Spillages of slug pellets containing metaldehyde were found in the field.
53. A farming company pleaded guilty to failing to comply with the conditions of approval of a pesticide (spillages were not buried or removed) and of failure to take reasonable precautions to protect the health of creatures. A dog became ill shortly after being walked along farm land and having taken an interest in the farm waste tip. The dog recovered after veterinary treatment, but blood tests confirmed that it had been poisoned with metaldehyde. A quantity of slug pellets found at the waste tip was found to contain metaldehyde, and a bag for such slug pellets was also found. The company was fined £2000, ordered to pay £3683 in costs and a compensation order of £420 for veterinary expenses was also granted.
54. A pest control company were found guilty of seven counts relating to the use of two rodenticides, including: failure to take all reasonable precautions to protect the health of creatures; failure to follow the conditions of approval (they failed to prevent access to bait by non-target species); failure to search for and burn or bury all rodent bodies; and failure to clear the remains of bait and bait containers when treatment had ended. They were found not guilty on four similar counts. This case began with the report of the death of a dog that had been walked on farm land where rodenticide baits had been laid. The cause of death of the dog was not established; however evidence was found that baits had been placed inappropriately on the farm. In addition, the farm treatment records were incomplete and did not clearly indicate where individual baits were laid. Finally, baits had been left, unchecked, at the farm for some nine months. Evidence was presented that the company had good internal standard operating procedures and guidance and a comprehensive on-going training programme. However in this instance the company's procedures had not been followed in practice.
55. In Wales no incidents were referred to The National Assembly for Wales for consideration of further action. However, in two incidents, information was passed to the Police. A peregrine was found dead near its nest in a quarry in South Wales. Further analysis showed that death was due to aldicarb poisoning. The source of the poison was not located. In the second incident, a cat was poisoned with aldicarb. Both the cat owner and a neighbour were visited by the local police.
56. An incident in Cardiganshire that involved the poisoning of a red kite and at least 20 ravens with fenthion was given widespread publicity in the local Press and the media. The incident was also reported to the Veterinary Medicines Directorate.
57. A case that was carried over from 1998 was resolved. No prosecution arose from the case due to inconclusive forensic evidence.
58. In Scotland five cases arising from incidents accepted for investigation during 1999 have been referred for prosecution, only one case has been heard in court to date. Two gamekeepers were charged with breaches of various firearms regulations and with contraventions of the Control of Pesticides Regulations in respect of the storage of 'Cymag'. Both admitted failure to comply with a condition for the storage of the substance at the Selkirk Sheriff Court, and were admonished. The other cases remain to be resolved.

59. SERAD Agricultural Staff carried out 32 field investigations during 1999. Many of these were joint operations with the police, and some also involved RSPB Investigation Officers. Two incidents were referred to the police for further action, and the SSPCA took the lead in one field investigation.

# Part 3: Incidents in 1999: Species/Samples and the agricultural chemicals involved

## Species/Samples involved

60. A total of 453 incidents was investigated during 1999. The categories of animals (animals of more than one category may have been involved in a single incident) and suspected baits involved are listed in Table 1. 353 incidents involved vertebrates; 28 involved beneficial insects; four involved livestock; 67 were suspected baits and/or seized samples. There was one incident involving earthworms. The cause of death or illness (including pesticides and non-agricultural chemicals, trauma, starvation and disease) was established in 47% of all incidents. A further 45 (10%) were classed as 'not applicable', as they involved suspected baits where no dead animals were involved and analyses or further information failed to show the involvement of any pesticides. Pesticides were implicated in 139 (31%) of the incidents (compared with 185 (30%) in 1998); 28% of incidents involving vertebrate wildlife, 32% of those involving bees, 32% of companion animal incidents, 27% of other animal incidents, and 33% of suspected baits. A geographical breakdown of the data is shown in Table 2.

**Table 2: Incidents investigated by country in 1999 (% pesticide as cause)**

	England	Wales	Scotland	N.Ireland
Vertebrate wildlife	94 (31%)	29 (21%)	66 (30%)	14 (14%)
Livestock	2 (50%)	0	1 (100%)	1
Companion animals	64 (43%)	8 (13%)	55 (31%)	22 (14%)
Other	5 (20%)	1 (0%)	1 (0%)	1 (0%)
Beneficial insects	19 (37%)	3 (67%)	6 (0%)	0
Suspected baits and suspicious substances	52 (37%)	2 (0%)	6 (33%)	7 (14%)
<b>TOTAL *</b>	<b>232 (36%)</b>	<b>41 (22%)</b>	<b>135 (30%)</b>	<b>45 (13%)</b>

\* Animals from more than one category may be involved in a single incident

61. A comparison of the number of poisoning incidents for each category of animal from 1993 to 1999 is shown in Table 3.



**Table 3: Number of incidents in which pesticides were identified as a likely cause of poisoning 1993-1999**

	1993	1994	1995	1996	1997	1998	1999
Vertebrate wildlife	91	76	62	77	54	49	57
Livestock	2	3	2	2	1	4	2
Companion animals	85	101	91	97	86	90	48
Exotic species	0	0	0	0	0	2	0
Fish	0	0	0	2	0	0	0
Earthworms	0	0	0	0	0	1	1
Beneficial insects	22	20	33	8	15	12	9
Suspected baits and suspicious substances	20	16	28	29	32	29	22
<b>TOTAL *</b>	<b>212</b>	<b>211</b>	<b>208</b>	<b>204</b>	<b>185</b>	<b>185</b>	<b>139</b>

\* Animals from more than one category may be involved in a single incident

62. A list of the pesticides detected, including those involving beneficial insect incidents, is shown in Table 4, which also lists the species involved and the presence of compounds in seized samples. In addition low-level residues of pesticides are sometimes detected in tissues of animals, but these residues are not thought to have been involved in the death of the animal and probably reflect sub-lethal exposure to particular compounds.

**Table 4: Numbers of incidents\* involving individual pesticides in 1999 and species and/or bait involved**

<b>Organochlorine compounds</b>		
DDT and metabolites	2	sparrowhawk, Barbastrelle bat
endosulfan	1	badger
gamma-HCH	3	dog, bait, grain, sample
<b>Organophosphorus compounds</b>		
chlorfenvinphos	1	buzzard
dimethoate	2	honeybees
fenitrothion	2	honeybees, grain
fenthion (veterinary product)	2	buzzard, raven, red kite, fox, bait
mevinphos	4	crow, hen harrier, magpie, raven, starling, fox, cat, bait
phorate	1	seized sample
<b>Carbamate compounds</b>		
aldicarb	12	buzzard, peregrine, red kite, badger, cat, dog, bait, seized sample
bendiocarb	8	kestrel, honeybee, bait
carbofuran	19	buzzard, golden eagle, hen harrier, kestrel, little owl, raven, red kite, polecat, cat, dog, bait
methiocarb	4	buzzard, fallow deer, dog, pellets
oxamyl	1	seized sample
<b>Rodenticides</b>		
brodifacoum	5	buzzard, red kite, dog, grain
bromadiolone	21	buzzard, red kite, fox, grey squirrel, cat, dog, grain
chlorophacinone	3	cat, dog, seized sample
coumatetralyl	7	fox, pig, dog, grain
difenacoum	19	buzzard, house sparrow, red kite, tawny owl, fox, cat, dog, grain, seized sample
flocoumafen	1	dog
warfarin	5	house sparrow, dog, grain
<p>In addition to the above, some residues of these compounds were detected and were considered to be background levels, eg., brodifacoum and difenacoum residues in incidents involving red kites.</p>		
<b>Pyrethroid compounds</b>		
cypermethrin	1	earthworm
<p>In addition small residues of fluvalinate were detected in four honeybee incidents. These were probably associated with varroa mite treatments.</p>		
<b>Herbicides</b>		
dinoseb	1	dog
paraquat	3	dog
trifluralin	1	dog

**Table 4: Numbers of incidents\* involving individual pesticides in 1999 and species and/or bait involved (continued)**

<b>Other compounds</b>			
alphachloralose	16	buzzard, crow, feral pigeon, grey heron, kestrel, red kite, wood mouse, cat, dog, bait	
cyanide	1	powder	
metalddehyde	15	buzzard, crow, badger, badger sett, cat dog, heifers, bait, spilt pellets	
strychnine	3	dog, bottle	
petrol/diesel	1	mole	
<b>Causes of death other than pesticides</b>			
disease	32	ethanol	1
starvation	11	paracetamol	1
trauma	30	ethylene glycol	1
unknown	194	not applicable	44

\* Some incidents will involve more than one pesticide, see later sections and Appendix 2.

63. Appendix 2 lists all the incidents involving agricultural chemicals from throughout the United Kingdom where poisoning was confirmed.

## Vertebrate wildlife: Mammals

64. A total of 54 incidents involving wild mammals was investigated and the cause of incident established in 37 (69%) of which 17 (31%) involved pesticides (see Table 5). Table 6 shows the number and percentage of pesticide poisonings for the past seven years.

**Table 5: Numbers of incidents involving wild mammals in 1999**

		<b>Number of incidents investigated*</b>	<b>Number (%) in which pesticide poisoning was identified</b>	<b>Number (%) in which an other cause of death was identified</b>
<b>Badger</b>	England	8	2(25%)	6 (75%)
	Wales	1	0	1 (100%)
	Scotland	1	1 (100%)	0
		<b>10</b>	<b>3 (30%)</b>	<b>7 (70%)</b>
<b>Bat</b>	England	2	0	0
	Scotland	1	0	0
		<b>3</b>	<b>0</b>	<b>0</b>
<b>Deer</b>	England	2	1 (50%)	0
<b>Fox</b>	England	17	6 (35%)	7 (41%)
	Wales	2	1 (50%)	1 (50%)
	Scotland	5	3 (60%)	0
		<b>24</b>	<b>10 (42%)</b>	<b>8 (33%)</b>

**Table 5: Numbers of incidents involving wild mammals in 1999 (continued)**

		Number of incidents investigated*	Number (%) in which pesticide poisoning was identified	Number (%) in which an other cause of death was identified
<b>Hare and rabbit</b>	Scotland	1	0	0
	N. Ireland	1	0	1 (100%)
		<b>2</b>	<b>0</b>	<b>1 (50%)</b>
<b>Hedgehog</b>	England	1	0	0
<b>Otter</b>	Scotland	2	0	1 (50%)
	Wales	1	0	1 (100%)
		<b>3</b>	<b>0</b>	<b>2 (67%)</b>
<b>Mole</b>	England	2	1 (50%)	0
<b>Polecat</b>	Scotland	1	1 (100%)	0
<b>Squirrel</b>	England	1	1 (100%)	0
	Scotland	4	0	2 (50%)
	N. Ireland	1	0	0
		<b>6</b>	<b>1 (17%)</b>	<b>2 (33%)</b>
<b>TOTAL *</b>	England	33	11 (33%)	13 (39%)
	Wales	4	1 (25%)	3 (75%)
	Scotland	15	5 (33%)	3 (20%)
	N. Ireland	2	0	1 (50%)
		<b>54</b>	<b>17 (31%)</b>	<b>20 (37%)</b>

\* Mammals from more than one category may be involved in a single incident

**Table 6: Incidents involving wildlife mammals 1993–1999**

	1993	1994	1995	1996	1997	1998	1999
Incidents investigated	158	156	104	77	85	68	54
Pesticide incidents	19%	11%	13%	26%	19%	12%	31%

## Badgers

65. There were ten incidents involving badgers submitted to the Scheme and the cause of death was established in all these incidents, with pesticide poisoning confirmed in three incidents. A badger was poisoned with metaldehyde, but no source for the chemical was established. In the other two incidents one involved aldicarb and the other endosulfan. In both these incidents the size of the residue or the history of incidents in the area suggested abuse of the compounds.
66. As in previous years, there were some incidents that involved the laying of poisoned baits outside badger setts (see other sections).

## Foxes

67. As in previous years, there are always a large number of incidents involving foxes reported to the Scheme, particularly as they are considered a pest species and are often the target for

illegal poisoning. Table 7 shows the number and percentage of pesticide poisonings for the past seven years.

**Table 7: Incidents involving foxes 1993–1999**

	1993	1994	1995	1996	1997	1998	1999
Incidents investigated	64	57	54	41	33	27	24
Pesticide incidents	25%	18%	17%	34%	33%	15%	42%

68. There were 24 incidents involving foxes investigated in 1999. The cause of the incident was established in 18 (75%) incidents with agricultural chemicals found to be involved in ten (42%). In an approved use incident bromadiolone and coumatetralyl were detected in two foxes and these compounds were in use at a nearby pig farm. Bromadiolone was involved in another approved use incident where the rodent control treatment was undertaken to a satisfactory standard, but a fox was exposed, presumably from eating rats. In an incident with two foxes bromadiolone was detected and small residues of coumatetralyl and difenacoum. The rodenticide treatment on the farm associated with this incident was unsatisfactory, with exposed baiting points. In four incidents residues of bromadiolone were detected, and in one incident a residue of coumatetralyl was detected, but the source of these chemicals was not established. Two incidents also involved other species and the abuse of organophosphate compounds; fenthion in one incident and mevinphos in the other.

## Squirrels

69. There were six incidents involving squirrels notified in 1999. The cause of the incident was established in three incidents with agricultural chemicals only found in one incident. This involved the approved use of bromadiolone in a parkland area, although proper bait boxes were in use, one was found to have been gnawed and three squirrels may have gained access to the bait.

## Hare and Rabbits

70. An incident in Scotland involving a hare was notified in 1999, but no cause of death was established. There was an incident involving rabbits in Northern Ireland where the cause of death was due to a viral infection.

## Other mammals

71. The other mammal incidents reported include; three bat incidents, two deer incidents, one hedgehog incident, three otter incidents, two mole incidents and one polecat incident. The cause of death was established in one fallow deer incident, which involved the approved use of methiocarb, a mole incident occurred when petrol and diesel was used as a repellent and the polecat incident was due to the abuse of carbofuran. In two of the otter incidents a natural cause of death was identified.

## Vertebrate wildlife: Birds

72. A total of 151 incidents involving wild birds was notified to the scheme in 1999. The cause of the incident was established in 89 (59%) and pesticides were involved in 43 (28%) (see Table 8). Table 9 shows the number and percentage of pesticide poisonings for the past seven years.

**Table 8: Number of incidents involving wild birds in 1999**

		<b>Number of incidents investigated*</b>	<b>Number (%) in which pesticide poisoning was identified</b>	<b>Number (%) in which an other cause of death was identified</b>
<b>Birds of prey including owls</b>	England	38	13 (34%)	11 (29%)
	Wales	21	6 (29%)	7 (33%)
	Scotland	37	13 (35%)	12 (32%)
	N. Ireland	2	1 (50%)	0
		<b>98</b>	<b>33 (34%)</b>	<b>30 (31%)</b>
<b>Wildfowl and waterbirds</b>	England	3	1 (33%)	0
	Scotland	2	0	1 (50%)
	N. Ireland	5	0	0
		<b>10</b>	<b>1 (10%)</b>	<b>1 (10%)</b>
<b>Gulls and waders</b>	England	2	0	1 (50%)
	Scotland	5	0	0
	N. Ireland	1	0	0
		<b>8</b>	<b>0</b>	<b>1 (13%)</b>
<b>Pigeon and doves</b>	England	4	0	2 (50%)
	Wales	1	0	1 (100%)
	Scotland	1	0	0
	N. Ireland	1	1 (100%)	0
		<b>7</b>	<b>1 (14%)</b>	<b>3 (43%)</b>
<b>Corvids</b>	England	8	5 (63%)	3 (37%)
	Wales	4	1 (25%)	1 (25%)
	Scotland	6	2 (33%)	1 (17%)
	N. Ireland	1	1 (100%)	0
		<b>19</b>	<b>9 (47%)</b>	<b>5 (26%)</b>
<b>Gamebirds</b>	England	1	0	0
	N. Ireland	1	0	1
		<b>2</b>	<b>0</b>	<b>1 (50%)</b>
<b>Other birds</b>	England	5	1 (20%)	3 (60%)
	Wales	1	0	1 (100%)
	Scotland	1	0	0
	N. Ireland	2	0	1 (50%)
		<b>9</b>	<b>1 (11%)</b>	<b>4 (44%)</b>
<b>TOTAL*</b>	England	59	20 (34%)	19 (32%)
	Wales	28	6 (21%)	11 (39%)
	Scotland	52	15 (29%)	14 (27%)
	N. Ireland	12	2 (17%)	2 (17%)
		<b>151</b>	<b>43 (28%)</b>	<b>46 (30%)</b>

\* Birds from more than one category may be involved in a single incident

**Table 9: Incidents involving wild birds 1993–1999**

	1993	1994	1995	1996	1997	1998	1999
Incidents investigated	263	267	232	199	155	192	151
Pesticide incidents	26%	24%	22%	30%	26%	22%	28%

### Birds of prey (including owls)

73. There were 98 incidents involving birds of prey (see Table 8 and 10) investigated and of these the cause of the incident was established in 63 (64%); 33 incidents (34%) were identified as involving pesticide poisoning. Table 11 shows the number and percentage of pesticide poisonings for the past seven years.

**Table 10: Number of incidents involving birds of prey (excluding owls) in 1999**

		Number of incidents investigated*	Number (%) in which pesticide poisoning was identified	Number (%) in which an other cause of death was identified
<b>Buzzard</b>	England	11	4 (36%)	3 (27%)
	Wales	9	3 (33%)	4 (44%)
	Scotland	18	9 (50%)	3 (17%)
	N. Ireland	2	1 (50%)	0
		<b>40</b>	<b>17 (43%)</b>	<b>10 (25%)</b>
<b>Red kite</b>	England	10	5 (50%)	1 (10%)
	Wales	8	2 (25%)	3 (38%)
	Scotland	3	2 (67%)	0
		<b>21</b>	<b>9 (43%)</b>	<b>4 (19%)</b>
<b>Eagle</b>	Scotland	3	2 (67%)	0
<b>Peregrine</b>	England	3	0	1 (33%)
	Wales	3	1 (33%)	0
		<b>6</b>	<b>1 (17%)</b>	<b>1 (17%)</b>
<b>Hen harrier</b>	England	1	1 (100%)	0
<b>Sparrowhawk</b>	England	5	0	2 (40%)
	Scotland	6	0	4 (67%)
		<b>11</b>	<b>0</b>	<b>6 (55%)</b>
<b>Kestrel</b>	England	2	2 (100%)	0
	Scotland	1	0	1 (100%)
		3	2 (67%)	1 (33%)
<b>Merlin</b>	Scotland	1	0	1 (100%)

**Table 11: Incidents involving birds of prey (including owls) 1993–1999**

	1993	1994	1995	1996	1997	1998	1999
Incidents investigated	140	134	131	122	84	97	98
Pesticide incidents	24%	28%	24%	34%	25%	30%	34%

## Common buzzards

74. There were 40 reported incidents involving common buzzards in 1999 and of these the cause of the incident was established in 27 (68%), with 17 (43%) poisoning incidents.
75. There were eleven abuse incidents, seven of these involved alphachloralose (one incident also involved metaldehyde), three carbofuran and one aldicarb. In five incidents the source of the compounds identified was not established. Anticoagulant rodenticides were identified in three incidents; one involving bromadiolone, one involving difenacoum and the other brodifacoum and difenacoum. A further two incidents involved chlorfenvinphos and methiocarb. There was one incident involving the veterinary compound, fenthion.

## Eagles

76. Three incidents involving eagles were submitted. Golden eagles were involved in two incidents and these birds died as a result of pesticide poisoning from the abuse of carbofuran. No cause of death was found for a sea eagle.

## Red kites

77. There were 21 incidents involving red kites reported to the Scheme, some of which were introduced birds. The causes of the incidents were identified in 13 of these incidents (62%). Nine (43%) involved pesticide poisoning. The abuse of agricultural chemicals was found to be involved in three incidents; one with alphachloralose, one with carbofuran and one with aldicarb. In addition, the abuse of the veterinary pesticide fenthion was suspected in one incident from Wales. There was one incident involving carbofuran where the source of the compound was uncertain.
78. Anticoagulant rodenticide poisoning was confirmed as the primary cause of death in four separate incidents involving red kites. In three of these incidents the source of the anticoagulant rodenticides involved was uncertain (brodifacoum was found in two incidents, one incident also involved difenacoum and bromadiolone in one incident). In the other incident from Scotland three juvenile birds were involved and rodenticide treatments with bromadiolone were ongoing and the incident was attributed to approved use. It should also be noted that there were at least four more incidents where anticoagulant rodenticides were detected in liver tissue from red kites, but the cause of death was either uncertain (one incident), due to traumatic injury (one incident), or due to exposure to another pesticide (two incidents).

## Peregrine falcons

79. Six incidents involving peregrine falcons were reported to the Scheme. There was one pesticide poisoning incident involving the abuse of aldicarb.

## Hen harriers

80. A hen harrier was involved in one incident during the reporting period. One bird was found to be a victim of the abuse of mevinphos and other birds involved in the incident were found to contain carbofuran.



## Owls

81. Thirteen incidents involving owls were notified in 1999, seven from England (three involving barn owls, three tawny owls and one little owl), a barn owl from Wales and five from Scotland (one barn owl, one short-eared owl, two tawny owls and one other unspecified owls). The cause of death of the birds was identified in nine of the incidents, two of which were due to poisoning. Difenacoum residues were confirmed in tissues from two tawny owls and although there had been some difenacoum use in the area the source of this residue was not certain. In another incident carbofuran residues were found in a little owl, but no source for the compound was established.

## Other raptor species

82. Other species of raptor were submitted as possible pesticide incidents. These included eleven incidents involving sparrowhawks, three incidents kestrels and one incident a merlin. The cause of death was determined in six of the sparrowhawk incidents, and the merlin, but none involved poisoning. However, background residues of DDE, the persistent organochlorine metabolite of DDT, were detected in some liver tissue from the sparrowhawks.
83. Poisoning was established as a cause of death in two incidents involving five kestrels. Two kestrels died following the abuse of alphachloralose and in the other incident three kestrels died from the abuse of carbofuran.

## Wildfowl and water birds

84. In 1999 there were ten incidents investigated by the Scheme that involved wildfowl and water birds. The cause was identified in two of these incidents, one of which involved pesticide poisoning. Five herons were found poisoned following the abuse of alphachloralose in England. The other species involved in incidents include; swans (four incidents), mallard (two incidents), heron (one incident), muscovy duck (one incident) and gosling (one incident).

## Gulls and waders

85. There were eight incidents involving gulls and waders in 1999. The cause was established in only one incident where about a hundred black-headed gulls died from disease.

## Pigeons and doves

86. There were seven incidents involving pigeons and doves reported in 1999; the cause of the incidents was found in four with one being attributed to pesticide poisoning. This incident involved the abuse of alphachloralose.

## Corvids

87. This group of birds is often the target of deliberate pesticide poisoning as they are considered by some to be pests. In 1999 there were 19 incidents reported; the cause of incidents was found in 14, with nine of these attributed to pesticide poisoning. Nearly all the incidents were attributed to abuse of the compound except one incident involving the veterinary compound fenthion. Table 12 shows the number and percentage of pesticide poisonings for the past seven years.

**Table 12: Incidents involving corvids 1993–1999**

	1993	1994	1995	1996	1997	1998	1999
Incidents investigated	40	39	29	30	22	26	19
Pesticide incidents	60%	33%	28%	57%	41%	15%	47%

88. Carbofuran was found in four incidents (two from Scotland and two from England) involving raven deaths. In one incident a hen harrier was also found which contained mevinphos. Deliberate abuse of alphachloralose was found in two incidents involving crows and one of these incidents (from Northern Ireland) also involved metaldehyde and a buzzard. In England, two ravens and an incident involving four magpies, three crows and a fox were poisoned following the abuse of mevinphos. An incident in Wales involved 22 ravens and the veterinary compound fenthion, which is likely to have been abused.

### Gamebirds

89. There were two incidents notified in this category in 1999. The cause of death was determined in one incident and this did not involve poisoning.

### Other birds

90. This category includes passerines (mainly garden birds) and other birds not dealt with in earlier sections. There were nine incidents reported, the cause of the incident was determined in five of these, with one resulting from pesticide poisoning.
91. A rodenticide treatment appeared to have been undertaken in an approved manner. However, residues of warfarin and difenacoum were detected in a house sparrow.

### Wildlife: Others

92. There were three fish incidents, two frog incidents and an earthworm incident notified in 1999. Only the earthworm incident involved the possible poisoning by agricultural chemicals. The incident was attributed to misuse as numerous dead earthworms were found in puddles of spray formulation which contained cypermethrin and had been spilt on a farm track.

### Livestock

93. Livestock are not normally included in the Scheme, but if there are other environmental samples associated with the incident they may be accepted. There were four incidents involving livestock reported to the Scheme in 1999 (see Table 13). The cause was determined in two incidents which both involved the misuse of pesticides.

**Table 13: Number of incidents involving livestock in 1999**

		Number of incidents investigated	Number in which pesticide poisoning was identified	Number in which an other cause of death was identified
<b>Cattle</b>	England	1	1 (100%)	0
	N. Ireland	1	0	0
<b>Pig</b>	Scotland	1	1 (100%)	0
<b>Poultry</b>	England	1	0	0
<b>TOTAL</b>	England	2	1 (50%)	0
	Scotland	1	1 (100%)	0
	N. Ireland	1	0	0
		4	2 (50%)	0

94. Three pigs in a piggery died from exposure to coumatetralyl. In another incident several heifers were ill and two died following the suspected exposure to metaldehyde, as the animals had access to a split sack of pellets left in the area they were grazing.

## Companion animals

95. There were 149 incidents involving companion animals reported to the Scheme in 1999 (see Table 14). The cause of the incident was established in 56 (38%), with pesticides implicated in 48 (32%). Table 15 shows the number and percentage of pesticide poisonings for the past seven years.

**Table 14: Number of incidents involving companion and exotic and other animals in 1999**

		Number of incidents investigated*	Number (%) in which pesticide poisoning was identified	Number (%) in which an other cause of death was identified
<b>Cat</b>	England	23	8 (35%)	1 (4%)
	Wales	3	1 (33%)	1 (33%)
	Scotland	26	5 (19%)	1 (4%)
	N. Ireland	6	0	0
		<b>58</b>	<b>14 (24%)</b>	<b>3 (5%)</b>
<b>Dog</b>	England	42	20 (48%)	2 (5%)
	Wales	4	0	2 (50%)
	Scotland	27	11 (41%)	0
	N. Ireland	16	3 (19%)	1 (6%)
		<b>89</b>	<b>34 (38%)</b>	<b>5 (6%)</b>
<b>Horse</b>	England	1	0	0
	Wales	1	0	0
		<b>2</b>	<b>0</b>	<b>0</b>
<b>Falconry bird</b>	Scotland	2	1 (50%)	0

**Table 14: Number of incidents involving companion and exotic and other animals in 1999 (continued)**

		Number of incidents investigated*	Number (%) in which pesticide poisoning was identified	Number (%) in which an other cause of death was identified
<b>TOTAL*</b>	England	64	27 (42%)	3 (5%)
	Wales	8	1 (13%)	3 (38%)
	Scotland	55	17 (31%)	1 (2%)
	N. Ireland	22	3 (14%)	1 (5%)
		<b>149</b>	<b>48 (32%)</b>	<b>8 (5%)</b>
<b>Caged Birds</b>	Scotland	1	0	0
	N. Ireland	1	0	0
<b>Fish</b>		<b>2</b>	<b>0</b>	<b>0</b>
	England	2	0	0
	Wales	1	0	0
<b>Earthworm</b>		<b>3</b>	<b>0</b>	<b>0</b>
	England	1	1 (100%)	0
<b>Frog</b>	England	2	0	0

\* Animals from more than one category may be involved in a single incident

**Table 15: Incidents involving companion animals 1993–1999**

	1993	1994	1995	1996	1997	1998	1999
Incidents investigated	239	313	271	275	253	235	149
Pesticide incidents	36%	49%	34%	35%	34%	38%	32%

## Cats

96. There were 58 incidents involving cats investigated by the Scheme. The cause of the incident was established in 17 (29%). Pesticides were implicated in 14 (24%), with over 27 individuals being poisoned. Table 16 shows the number and percentage of pesticide poisonings for the past seven years.

**Table 16: Incidents involving cats 1993–1999**

	1993	1994	1995	1996	1997	1998	1999
Incidents investigated	101	125	90	112	110	91	58
Pesticide incidents	35%	41%	33%	38%	37%	38%	24%

97. Pesticide abuse accounted for 12 incidents, four incidents involved aldicarb, four carbofuran, two alphachloralose, one metaldehyde and one mevinphos. In several of these incidents baits were also found.
98. Two incidents were attributed to unspecified use because the source of the anticoagulant rodenticides found could not be determined. One incident involved chlorophacinone and the other bromadiolone and difenacoum.

99. Ethylene glycol (anti-freeze) poisoning was found in one incident.

## Dogs

100. The Scheme registered 89 incidents involving dogs during 1999. The cause of the incident was determined in 39 (44%), with pesticides implicated in 34 (38%). Over 43 dogs were found to have been poisoned. Table 17 shows the number and percentage of pesticide poisonings for the past seven years.

**Table 17: Incidents involving dogs 1993–1999**

	1993	1994	1995	1996	1997	1998	1999
Incidents investigated	145	183	170	163	138	149	89
Pesticide incidents	39%	28%	39%	35%	33%	40%	38%

101. The misuse of pesticides was found in 13 incidents. The spillage or poor storage of slug pellets accounted for six misuse incidents, five involving metaldehyde and one methiocarb. Anticoagulant rodenticide bait which was accessible to the dogs accounted for six incidents; four involving difenacoum, one difenacoum and bromadiolone and one bromadiolone. The remaining incident involved the poor storage of dinoseb and trifluralin.
102. There were 11 incidents involving the abuse of pesticides. There were five incidents involving the abuse of carbamate compounds, four involving aldicarb and one carbofuran. In addition the other abuse incidents involved metaldehyde (two incidents), warfarin (two incidents) and single incidents of gamma-HCH and of strychnine.
103. There was one incident thought to have arisen after the approved use of the anticoagulant rodenticide, difenacoum. In addition to the above there were a further nine incidents that involved dogs where the sources of the compounds were not apparent. Three involved paraquat poisoning, three anticoagulant rodenticides (one incident coumatetralyl, one coumatetralyl and flocoumafen and one brodifacoum, chlorophacinone and difenacoum) and single incidents each of strychnine, alphachloralose and metaldehyde.

## Other companion animals

104. There were four incidents involving other companion animals. Two involved horses and two falconry birds. Pesticide poisoning was found to be the cause of death in one incident where a kestrel died after eating a blackbird bait laced with bendiocarb.

## Exotic species

105. In each year a few incidents are reported which involve the suspected pesticide poisoning of caged birds (see Table 14). In 1999 there were two such incidents and a cause was not found for either incident.

## Beneficial insects

106. There were 28 suspected beneficial insect poisoning incidents investigated during 1999 (see Table 18), with 19 incidents reported from England, three incidents reported from Wales and six incidents reported from Scotland (no analyses were carried out in one of the incidents from Scotland). All of the incidents involved honeybees. Pesticides were implicated in nine of these incidents (32%), seven occurred in England and two Wales.



**Table 20: Pesticides detected in beneficial insect incidents in the UK during 1999**

Month	Location	Number of colonies in apiary	Number of colonies affected	Pesticide involved	Level detected ( $\mu\text{g}/\text{bee}$ )
March	Lincolnshire	8	1	fluvalinate	0.05
April	Kent	90	50	dimethoate	0.023
April	Central	unknown	1	fluvalinate	0.005
May	Cornwall	8	4	dimethoate	0.01
June	West Midlands	6	1	bendiocarb	0.41
July	Cambridgeshire	1	1	bendiocarb	0.18
July	Somerset	2	1	bendiocarb	0.18
July	Suffolk	5	3	bendiocarb	0.15
July	Powys	1	1	bendiocarb	0.086
August	Norfolk	11	1	bendiocarb	0.012
August	West Glamorgan	7	7	fenitrothion	0.19
August	Norfolk	11	1	fluvalinate	0.006
September	Norfolk	7	1	fluvalinate	0.0001

110. The incidents where pesticides were detected and confirmed are also summarised in Appendix 2. There were three approved use incidents and one misuse incident. The approved use incidents involved dimethoate and two incidents with bendiocarb. The misuse incident also involved bendiocarb (see paragraphs below). In the five remaining incidents the source of the pesticide identified has not been established despite thorough field investigations. However, it is likely that in three of these incidents, which involved bendiocarb, they were due to honeybees robbing bendiocarb treated comb, which had not been sealed off adequately during a feral bee control treatment.
111. A total of eight colonies has been affected in the six bendiocarb poisoning incidents. The likely source of the pesticide in all these incidents is from feral bee control treatments. In three incidents there were feral bee control treatments undertaken in the area, two of these treatments appeared to be correct, but the other one was not. In an incident in Norfolk about two thousand dead bees were found outside one hive and the sample tested had a residue of 0.012  $\mu\text{g}$  bendiocarb per bee. A wasp nest in the gable end of a nearby house had been treated with bendiocarb and appropriate precautions were taken. In Suffolk three out of five colonies at an apiary were affected and analysis revealed a residue of 0.15  $\mu\text{g}$  bendiocarb per bee. Feral bee treatments using bendiocarb had been undertaken in the area prior to the incident and these were thought to be according to the label instructions. In the incident in Cambridgeshire no attempt was made to adequately seal off a treated colony, so it was vulnerable to robbing out by other honeybees. The feral colony was located high up in the flat roof of a building and had been treated with a spray lance, applying the pesticide in gaps between the brickwork and the soffit. White powder could be seen on the brickwork and there were dead honeybees on the ground below. The honeybees found dead in front of the hive were submitted for tests and revealed a residue of 0.18  $\mu\text{g}$  bendiocarb per bee. The bees in all these incidents are considered to have died from pesticide poisoning. The other incidents occurred in West Midlands, Somerset and Powys (all with one colony affected). The residues detected on the submitted honeybees ranged from 0.086-0.41  $\mu\text{g}$  bendiocarb per bee. Therefore all these honeybee mortalities were thought to be due to pesticide poisoning. No further evidence to establish the source of the pesticide was found despite thorough field investigations. This type of incident is usually associated with feral

bee control treatments using bendiocarb, although intentional abuse of this pesticide is also possible. Beekeepers report these incidents as they find significant numbers of dead honeybees on the ground outside of the hive. They may also see dead honeybees being thrown out of the hive, or honeybees whirling around on their backs, or with their tongues extended, or returning honeybees fighting on the flight board.

112. Two beekeepers with a total of 98 colonies in their apiaries, had 54 colonies affected by dimethoate. In the approved use incident in Cornwall four colonies had dead honeybees outside of the hives. The apiary is located in a bulb growing area where some fields had been sprayed with dimethoate to control narcissus fly. A misuse incident occurred at this apiary last year and the farm involved was successfully prosecuted for spraying dimethoate in the presence of flowering weeds. This year the farm sprayed a number of fields again and the local spray liaison officer had been informed, but precise dates were not given due to the large area involved. None of the sprayed fields contained flowering weeds, but there was an unsprayed field with many flowering weeds present beyond the sprayed areas. It is thought that the honeybees were affected by flying through sprayed fields to the area of flowering weeds. A residue of 0.01  $\mu\text{g}$  dimethoate per bee was detected and confirmed, so given the likely residue losses before analysis it is considered likely that these honeybees died from pesticide poisoning. In Kent, a very large number of hives were affected which were part of the National Pollination Scheme. All the affected hives were within a 37 acre block of cherry trees. The spraying operation in the orchard, which did not include dimethoate, had been in use for a number of years and had not caused any problems. The honeybees examined had a residue of 0.023  $\mu\text{g}$  dimethoate per bee confirmed, so given the likely residue losses before analysis it is probable that these honeybees died from pesticide poisoning.
113. In West Glamorgan, Wales all seven colonies in an apiary were found with bees dead outside the hive entrances. The beekeeper was uncertain as to what crops the bees had been foraging as the apiary is in a suburban area. The honeybees examined were found to contain residues of 0.19  $\mu\text{g}$  fenitrothion per bee and therefore this compound was considered to be the cause of poisoning in these bees. A present the source of the fenitrothion has not been established.
114. In Scotland a hive was treated with fluvalinate strips for three days to check for varroa. The beekeeper was concerned that there were a number of dead bees found on top of the varroa floor, which had not been there at the start of the test. Laboratory analyses have confirmed a residue of 0.005  $\mu\text{g}$  fluvalinate per bee. In Lincolnshire a beekeeper found dead and dying honeybees outside a hive. The honeybees analysed were confirmed to contain 0.05  $\mu\text{g}$  fluvalinate per bee only. Examination of the hive revealed four fluvalinate strips that had not been removed after a two week treatment for varroa in early November 1998. There were two incidents in Norfolk where residues were detected. In one, a residue of 0.006  $\mu\text{g}$  fluvalinate per bee was detected and in the other 0.0001  $\mu\text{g}$  per bee. Although the residues in all these incidents confirm exposure to the compound, they are below the range that might be associated with any toxic effects.

## Suspected poisoned baits and suspicious samples

115. Each year a number of suspected baits and suspicious samples are submitted for pesticide residue investigation, even though no dead animals have been found nor poisoning known to have occurred. There were 67 such samples notified to the Scheme in 1999. Pesticides were detected in 22 of these (33%). Table 21 shows the number of possible baits and suspicious samples submitted and the percentage in which pesticides were detected for the



past seven years. There were thirteen incidents of misuse, eight of abuse and one unspecified use where the source could not be determined. There was also an incident with paracetamol placed in baits at a badger sett.

**Table 21: Incidents involving possible baits and suspicious samples 1993–1999**

	1993	1994	1995	1996	1997	1998	1999
Incidents investigated	58	57	72	63	66	62	67
Pesticide incidents	34%	28%	39%	46%	48%	47%	33%

116. The misuse of compounds included eight incidents with exposed rodenticide baits. There were three incidents involving difenacoum and two incidents involving bromadiolone. In addition there were single incidents with warfarin and a mixture of bromadiolone, coumatetralyl and warfarin and another with a mixture of alphachloralose, bromadiolone, difenacoum, chlorophacinone and brodifacoum. The remaining five misuse incidents involved one incident where gamma-HCH was used as a fumigant when bats may have been present and spillages with gamma-HCH and another with metaldehyde. The other two incidents involve the improper storage of cyanide and of strychnine.
117. Of the eight deliberate abuse incidents, metaldehyde was confirmed in two incidents with pellets incorporated into baits and left outside of badger setts. The other incidents involved poisoned baits intended for birds or other animals and the compounds found in these incidents are: aldicarb, alphachloralose, bendiocarb, bromadiolone, fenitrothion and methiocarb.
118. No source for the bromadiolone found in a rat was established as there were no known rodenticide treatments in the area.

## Agricultural chemicals

119. The chemicals found in the 130 vertebrate (also including the one earthworm incident) and bait incidents are listed in Table 4. Details of these incidents are also given in Appendix 2. Agricultural chemicals involved in beneficial insect incidents can also be found in Table 4 and Appendix 2 and above in the section involving this category.
120. A total of 27 different compounds was implicated from all incidents (except beneficial insect incidents) submitted during 1999 (34 in 1998). There were 21 different chemicals from England (29 in 1998), 17 from Scotland (14 in 1998), four from Wales (seven in 1998) and four from Northern Ireland (five in 1998). In addition, some small non-significant residues were also detected. Table 22 shows the number of different pesticides implicated in all incidents (except beneficial insect incidents) in the past seven years.

**Table 22: The number of different pesticides implicated in all incidents (excludes beneficial insects) 1993–1999**

	1993	1994	1995	1996	1997	1998	1999
Number of compounds	32	35	36	29	26	34	27

## Other causes of death

121. There were 75 vertebrate incidents where the cause was determined as other than pesticide poisoning. This represents 21% of vertebrate incidents (excluding those just involving baits). This compares with 139 (27%) in the previous year. It should be noted that disease, starvation or trauma victims are not usually sent for analyses (see Appendix 1). However, it is possible that a sub-lethal exposure to a pesticide contributed to death, apparently by natural causes. Within the remit of the Scheme it is not possible to monitor sub-lethal effects, but if pesticides are strongly implicated in an incident, tissues may still be sent for analyses.



# Part 4: Conclusions

## Number of incidents

122. In 1999, of the 453 incidents registered, pesticide involvement was found in 31% and other causes of death (non-agricultural chemicals, disease, starvation, etc.) were identified in 17% (see Table 1, Figure 3). In addition, there were 45 incidents reported that were found to be not applicable (baits which were not laced with a pesticide and no dead animals found). Since 1994 there has been a general decline in the numbers of incidents reported (see Table 23). The total number of pesticide incidents has remained about the same over most of this time, although a small drop of nearly 20 incidents occurred between 1996 and 1997. However, in 1999 there has been a sharp decrease of nearly 160 incidents in the numbers reported and a significant drop of nearly 50 in the number of pesticide incidents.

**Table 23: Number of incidents reported to the Scheme 1994–1999 and number (%) pesticide incidents identified**

Year	1994	1995	1996	1997	1998	1999
<b>England</b>						
No. of incidents reported	454	433	354	333	334	232
No. pesticide incidents (%)	136 (30%)	151 (35%)	128 (36%)	118 (35%)	108 (32%)	84 (36%)
<b>Scotland</b>						
No. of incidents reported	200	160	160	144	167	135
No. pesticide incidents (%)	42 (21%)	33 (20%)	34 (21%)	36 (25%)	52 (31%)	40 (30%)
<b>Wales</b>						
No. of incidents reported	66	58	58	51	32	41
No. pesticide incidents (%)	11 (17%)	5 (9%)	24 (41%)	13 (25%)	9 (28%)	9 (22%)
<b>Northern Ireland</b>						
No. of incidents reported	115	84	79	79	79	45
No. pesticide incidents (%)	22 (19%)	19 (23%)	18 (23%)	19 (24%)	16 (20%)	6 (13%)
<b>Total</b>						
No. of incidents reported	835	735	651	607	612	453
No. pesticide incidents (%)	211 (25%)	208 (28%)	204 (31%)	185 (30%)	185 (30%)	139 (31%)

123. Regionally, the number of incidents accepted in England when compared to the previous year has declined by 100 incidents and 24 pesticide incidents, continuing the reduction in the number of incidents since 1994. However, the proportion of pesticide incidents has always remained about the same, between 30% and 36%. In Wales the number of incidents accepted has increased slightly to 40 from 32, but overall from 1994 the number has declined. The number and proportion of pesticide incidents from Wales is variable, but since 1997 has been more consistent with an average of ten (25%) incidents. Incidents accepted from Scotland increased by 16% in 1998, but in 1999 the decline in numbers has continued with 32 fewer incidents compared to last year. There has also been a reduction in the number of pesticide incidents, but the proportion has remained similar, particularly during the last three years where it is between 25% and 31%. In Northern Ireland the number of incidents accepted has nearly halved and the number of pesticide incidents has more than halved. The proportion of pesticide incidents is the lowest to date at 13%, compared to the highest value of 24% during 1997.

- 124.** The percentages of categories of pesticide use resulting in poisoning are shown in Figure 1. There were ten incidents involving the approved use of pesticides. This represents 7% of pesticide incidents reported. This small number of incidents indicates that agricultural chemicals, if used in an approved manner, are apparently not causing major problems to wildlife and other animals. However, the scheme relies on the incidents being found and reported and it is possible that incidents, particularly those involving small vertebrates, are not reported.
- 125.** There were 32 incidents arising from the misuse of agricultural chemicals (23% of pesticide poisoning incidents). These resulted from poor storage, spillage, chemicals not being used in the approved manner or compounds being disposed of in an inappropriate way. This continues the significant increase in the proportion of these incidents, which was first noted in 1998. In 1997, there were only 23 misuse incidents representing 12% of poisoning incidents and about this proportion (+/- 2%) has consistently been reported since 1994.
- 126.** As in previous years, incidents involving deliberate abuse dominated those in which pesticides were implicated; there were 61 incidents arising from abuse (45%). However, the number of abuse incidents has dropped by nearly a half when compared to 1997. It is also the first time that the proportion of abuse incidents has been less than 50%, compared to nearly 70% in 1997. Additionally there were 34 (24%) incidents where the cause of the poisoning could not be identified. In 1999, there were two incidents reported that probably arose from veterinary compounds. All these poisoning incidents can be found in Appendix 2. Regulatory and/or enforcement action was taken as appropriate and 1999 saw growing co-operation between authorities resulting in successful prosecutions.

## Vertebrate incidents

- 127.** Of the 425 vertebrate related incidents reported (including an earthworm incident), 130 involved agricultural chemicals (31%). There were only seven incidents (5%) arising from approved use (see Table 24). Incidents arising from misuse, amounted to 31 (24%), continuing the increase in the proportion of these incidents, when compared to 1997 and before when there were 21 (12%) incidents. Abuse of pesticides (61 incidents) accounted for 47% of all vertebrate related pesticide incidents, a figure that until 1997 had been steadily rising, but now shows a decline. Unspecified use incidents at 29 (22%) are similar in number to 1998 when it was 22 (13%), but the proportion has increased slightly to a level reported in 1993-1995. There were two incidents involving pesticides formulated as veterinary medicine products during 1999. These were found as our multi-residue methods will also detect veterinary organophosphate or carbamate compounds.

**Table 24: Numbers of vertebrate related incidents and category of use 1993–1999**

	1993	1994	1995	1996	1997	1998	1999
<b>Number of pesticide poisoning incidents</b>	<b>190</b>	<b>191</b>	<b>175</b>	<b>196</b>	<b>170</b>	<b>173</b>	<b>130</b>
<b>Abuse</b>	105 (55%)	115 (60%)	112 (64%)	136 (69%)	125 (74%)	95 (55%)	61 (47%)
<b>Misuse</b>	22 (12%)	21 (11%)	21 (12%)	19 (10%)	21 (12%)	45 (26%)	31 (24%)
<b>Approved use</b>	14 (7%)	12 (6%)	5 (3%)	11 (6%)	3 (2%)	4 (2%)	7 (5%)
<b>Unspecified use</b>	41 (22%)	39 (20%)	32 (18%)	26 (13%)	21 (12%)	22 (13%)	29 (22%)
<b>Veterinary compounds</b>	8 (4%)	4 (2%)	5 (3%)	4 (2%)	0	7 (4%)	2 (2%)

128. Figure 2 shows the relative percentages of carbamate and organophosphorus compounds and alphachloralose found to be involved in incidents over the past few years. Again carbamate compounds dominate those found, many of which arise from abuse of these compounds. There is also a small upward trend in incidents involving organophosphates and alphachloralose, but this is not above numbers found in earlier years. It should also be noted that the proportion of pesticide incidents involving mammals has increased significantly on last year and is the highest figure reported since 1993 (see Table 6). Most of this increase is due to an increase in the proportion of pesticide incidents involving foxes.

## Beneficial insect incidents

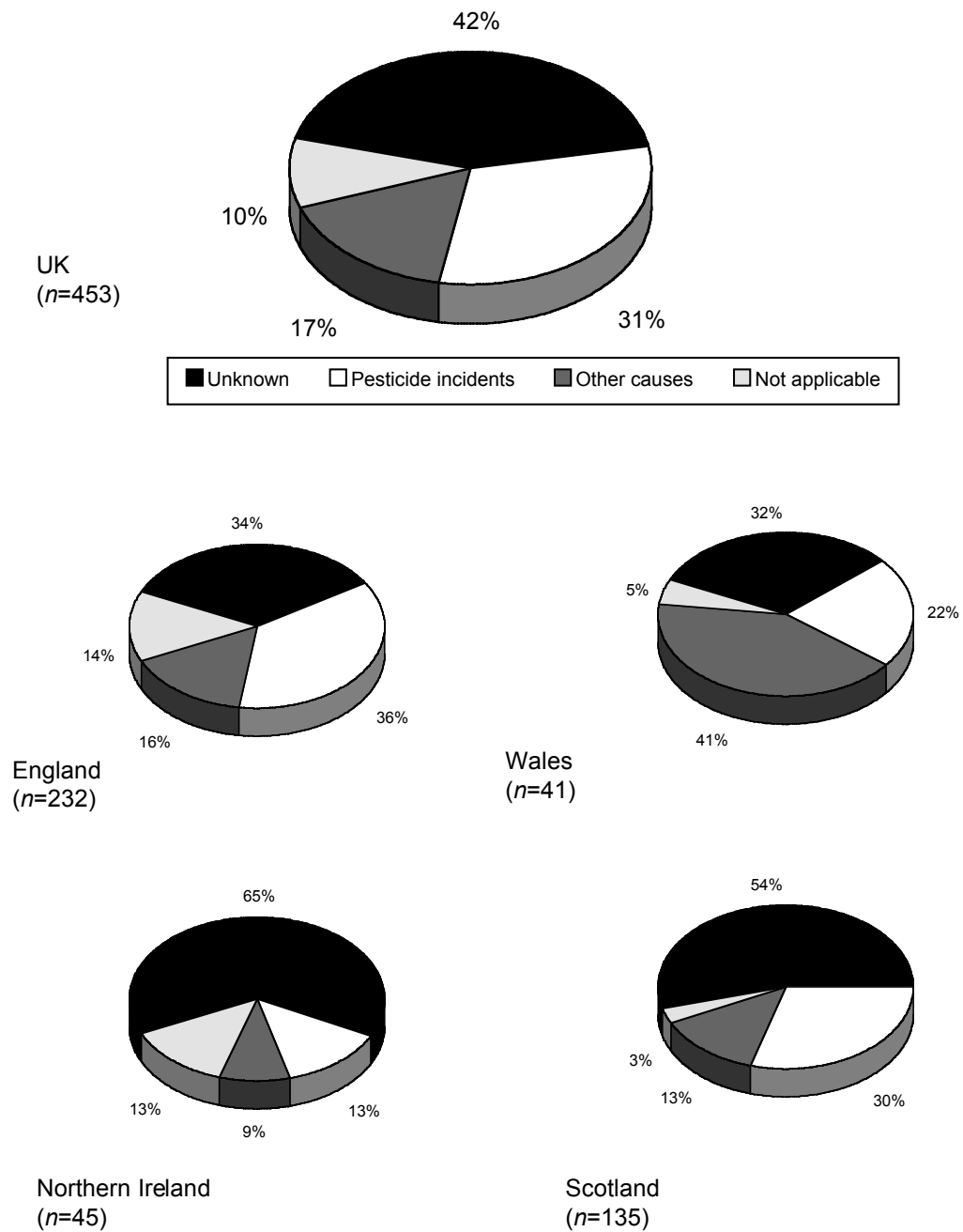
129. There were fewer incidents reported involving beneficial insects this year compared to previous years (see Table 19). However, the proportion of pesticide poisoning has increased slightly, from 28% to 32%. There were three incidents arising from approved use, one misuse incident and five where the origin of the pesticides was not established. These incidents have been detailed in previous sections, but of note this year is a recurrence in the number of bendiocarb incidents.
130. The number of colonies found to be affected by pesticides during 1999 was 69 (see Table 18). This is an increase on the previous year, when 58 colonies were affected and from more (12) poisoning incidents. Reviews of pesticide poisoning of beneficial insects over past years can be found in Barnett *et al.*, 1997, Fletcher *et al.*, 1994a and Greig-Smith *et al.*, 1994.

## Unknown causes of incidents

131. There is always a number of incidents reported where the cause remains unknown. This may be due to several factors, such as, insufficient or inappropriate tissues for analysis, an absence of disease diagnosis, poisoning by non-agricultural chemicals, or the absence of the appropriate analytical method for a particular compound. In 194 (42%) of incidents reported, the cause of the incident was not established (see Figure 3). This compares with 252 (41%) in 1998.

132. In addition, there were 44 incidents (10%) which were classified as not applicable (see Figure 3), a small increase when compared with 34 (5%) in the previous year. These are suspected baits or suspicious substances where there are no dead or poisoned animals found. These are often found to be food placed for animals or birds or discarded food items.

**Figure 3: Proportion of reported incidents in 1999 by cause of incident.**



## Seasonal distribution

133. The seasonal distribution of incidents can be seen in Appendix 2. Incidents of abuse occur throughout the year, although during February to May and again in October there are more abuse incidents occurring (seven to ten incidents per month compared to one to five incidents per month at other times of the year).

## Regional distribution

134. The distribution of abuse incidents is found throughout counties and regions of the UK with certain areas having proportionately more incidents of abuse than are found elsewhere (see Appendix 2).

## Publications

Appendix 3 gives a list of publications that have arisen from work carried out by the Scheme and its findings. In addition to these, the results of the Scheme have been widely used in several publications.





# Acknowledgements

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# Appendix 1

## Investigation procedures

The investigation of potential wildlife poisoning incidents depends on a scheme which allows members of the public and interested organisations to submit carcasses or suspected baits for pesticide analysis. In England and Wales, this is organised on a regional basis with the relevant Farming and Rural Conservation Agency (FRCA) wildlife officer deciding, in consultation with others if necessary, whether an investigation should be started. This permits the screening-out of incidents which may not involve pesticides.

In England and Wales, after acceptance of an incident, the carcasses are taken to a local Veterinary Investigation Centre (VIC) where a post-mortem examination is undertaken. This may result in bacteriological or virological tests to determine whether disease contributed to the deaths.

A field visit may be made by an FRCA wildlife officer to gather information to help in identifying the cause of the incident. A further visit may be required in non-abuse incidents in order to obtain more information, for example to interview relevant contacts not previously available or to follow up the results of analyses.

Incidents may be rejected if they are outside the remit of the Scheme, for example if poisoning is thought to have involved non-agricultural chemicals or pollutants. If the field inquiry or the post-mortem identifies the cause of death as other than possible pesticide involvement, then tissues are not sent for analysis.

The field inquiry report, post-mortem findings and relevant tissues from casualties are forwarded to the Wildlife Incident Unit (WIU) at the Central Science Laboratory, Sand Hutton, York, where chemical and other analyses of the tissues are carried out.

The results are collated and interpreted by WIU to assess the probable cause of the incident and whether any residues detected contributed to the death or illness of the animal. Mortality is generally attributed to a pesticide if residues of a chemical or its derivatives are found above levels considered to represent lethal exposure. In some cases, the presence of residues in association with typical post-mortem findings may be used to determine mortality. Wherever possible, residues found are confirmed using an alternative analytical technique.

Honeybee deaths in England and Wales are investigated in a similar way. Samples of dead bees are passed by beekeepers to the National Bee Unit of the Central Science Laboratory at Sand Hutton, York to enable disease screening and other investigations to be carried out. Field visits are made by FRCA wildlife officers to gather relevant information. Bee samples are forwarded for residue analysis to the WIU, where reports of the incidents are also collated. There are experimental data, resulting from laboratory dosing of honeybees with pesticides, which can be used to assist in assessing the significance of residues in the insects.

The Scottish scheme is similar to those in England and Wales and covers wildlife, companion animals, livestock and beneficial insects. Samples are sent to the Scottish Agricultural Science Agency (SASA) in Edinburgh for investigation. Veterinary support is provided by the Veterinary Investigation Laboratories of the Scottish Agricultural College and by Lasswade Veterinary Laboratory. Field investigations by Scottish Executive for Rural Affairs Department (SERAD) staff are normally only undertaken when pesticide poisoning has been confirmed unless there is clear evidence of deliberate abuse or misuse of a pesticide.

The Northern Ireland scheme is similar to the Scottish scheme. Samples are sent to specified analytical and veterinary laboratories in Northern Ireland. As with the Scottish scheme field investigations are normally only carried out when pesticide poisoning has been found. Investigations are usually carried out by the Health and Safety Executive Northern Ireland. The abuse and misuse of pesticides affecting wildlife may also contravene the provisions of the Wildlife (Northern Ireland) Order 1985 which is enforced by the Royal Ulster Constabulary (RUC) supported by the Countryside and Wildlife Branch of the Department of the Environment (Northern Ireland).

Where an incident is to be investigated for use in legal proceedings, evidence is gathered by the MAFF Investigation Section, in collaboration with the Pesticides Safety Directorate, who rely on information collected by the FRCA wildlife officers. SERAD staff in Scotland and the RUC, DARD staff and others in Northern Ireland carry out a similar role. Veterinary and analytical findings may also be used in evidence. The HSE and local authorities also have a regulatory role under FEPA and local liaison takes place between the departments to co-ordinate enforcement action. The police may also investigate cases.

All the schemes make use of analytical techniques and equipment capable of identifying low levels of residues of approved pesticides that are considered to present a possible hazard to vertebrates or beneficial insects. Multi-residue methods are used for the detection of organochlorine, organophosphate, some carbamate and pyrethroid compounds and for anticoagulant rodenticides. These are supplemented by specific analyses for strychnine, alphachloralose, metaldehyde, paraquat and some other compounds.

# Appendix 2

## Pesticide incidents occurring in 1999

Month	County	Number and Species	Chemical	Cause	Comments
January	Buckinghamshire	red kite	aldicarb	abuse	Brodifacoum and difenacoum also detected in this bird.
January	Devon	dog, pellets	metalddehyde	misuse	* Small spillage of pellets from a punctured sack.
January	East Sussex	2 dogs, pellets	methiocarb	misuse	Spillage of slug pellets on cereal stubble.
January	Lancashire	cat	aldicarb	abuse	
January	Norfolk	2 cats	bromadiolone/ difenacoum	unspecified	
January	Norfolk	dog	difenacoum	misuse	* Poor storage of difenacoum bait.
January	North Yorkshire	dog, pellets	metalddehyde	misuse	Spillage of slug pellets left when a sack fell off a trailer.
January	West Sussex	fox	bromadiolone	unspecified	
January	Grampian	2 dogs	alphachloralose	unspecified	SERAD investigation, dogs survived.
January	Tyrone	dog	warfarin	abuse	
February	Hampshire	dog, bait	gamma-HCH	abuse	Bird remains used as a bait.
February	Humberside	dog, bait	aldicarb	abuse	Bread bait used.
February	Lincolnshire	dog, grain	bromadiolone/ difenacoum	misuse	Exposed baits which also contained difenacoum.
February	Lincolnshire	5 cats, bait	mevinphos	abuse	Rabbit carcase used as a bait.
February	Suffolk	2 foxes, grain	bromadiolone/ difenacoum coumatetralyl	misuse	Small residues of difenacoum and coumatetralyl also noted.
February	Suffolk	sample	gamma-HCH	misuse	Dead bats reported, but none available for tests.

Month	County	Number and Species	Chemical	Cause	Comments
February	Suffolk	fox	bromadiolone	approved	Baiting points were to an acceptable standard.
February	Tyne & Wear	2 cats	carbofuran	abuse	* Dog seen eating wax blocks.
February	Wiltshire	dog	difenacoum	misuse	SERAD investigation, blackbird bait used.
February	Central	kestrel, bait	bendiocarb	abuse	SERAD, RSPB and police investigation.
February	Central	red kite	alphachloralose/ bromadiolone	abuse	Gamekeeper charged.
February	Strathclyde	2 cats	carbofuran	abuse	SERAD investigation.
February	Tayside	dog	flocoumafen	unspecified	SERAD investigation.
February	Tayside	dog	metaldehyde	misuse	SERAD and SSPCA investigation. Poor storage practice.
February	Tayside	fox	bromadiolone	unspecified	
February	Tyrone	dog	strychnine	abuse	
March	Berkshire	red kite	bromadiolone	unspecified	Bromadiolone used in the area.
March	County Durham	2 ravens	mevinphos	abuse	
March	Devon	badger sett, bait	metaldehyde	abuse	Peanuts, fat and slug pellets left at a badger sett.
March	Lincolnshire	honeybee	fluvalinate	unknown	Small confirmed residue and not the cause of death of the bees.
March	Norfolk	mole	petrol/diesel	misuse	* Petrol and diesel used as a mole repellent.
March	Norfolk	grain	bromadiolone	misuse	Exposed baits and too much bait used.
March	Norfolk	samples	bromadiolone/warfarin/ coumatetralyl	misuse	Too much bait used at baiting points.
March	North Yorkshire	buzzard	alphachloralose	abuse	
March	Oxfordshire	red kite	brodifacoum	unspecified	Farms in area reportedly using bromadiolone.
March	Suffolk	badger	aldicarb	abuse	
March	West Sussex	grain	bromadiolone	misuse	Baiting points left uncovered.
March	Dyfed	2 buzzards	difenacoum	unspecified	Local authority had undertaken treatments with difenacoum in the area.

Month	County	Number and Species	Chemical	Cause	Comments
March	Mid Glamorgan	peregrine	aldicarb	abuse	
March	Border	poisons etc.	cyanide	misuse	Police investigation. Improper storage.
March	Fife	dog	metaldehyde	misuse	Police/SSPCA. Amateur product.
March	Kincardineshire	3 pigs	coumatetralyl	misuse	SERAD investigation.
March	Tayside	dog	coumatetralyl	unspecified	SERAD investigation.
March	Tayside	dog	dinoseb/ trifluralin	misuse	SERAD investigation Poor storage of old chemicals.
March	Tayside	buzzard	carbofuran	abuse	Police investigation.
March	West Lothian	fox	bromadiolone	unspecified	
March	Antrim	10 feral pigeons	alphachloralose	abuse	Others seen walking the streets with a drunken appearance.
March	Down	bait	alphachloralose	abuse	Skin laced with powder, from live pigeon tethered near a peregrine falcon nest.
April	Berkshire	buzzard	brodifacoum / difenacoum	unspecified	
April	Cleveland	badger sett, bait	metaldehyde	abuse	Slug pellets mixed with dog food.
April	Cumbria	raven	carbofuran	abuse	
April	Hereford and Worcester	sample	difenacoum	misuse	* Inadequately protected baiting points around a field near a footpath.
April	Kent	honeybee	dimethoate	unspecified	Source unknown, but probably spray treatment of oilseed rape.
April	Kent	red kite	carbofuran	unspecified	
April	Kent	grain	gamma-HCH	misuse	Seed found dumped in woodland.
April	Norfolk	2 dogs	aldicarb	abuse	
April	Oxfordshire	red kite	brodifacoum / difenacoum	unspecified	Bromadiolone used in area.
April	Suffolk	samples, woodmouse	alphachloralose / chlorophacinone / bromadiolone / difenacoum / brodifacoum	misuse	
April	Dyfed	buzzard, fox, 22 ravens	fenthion	veterinary	Abuse suspected.
April	Dyfed	red kite	fenthion	veterinary	Abuse suspected.



Month	County	Number and Species	Chemical	Cause	Comments
April	Central	honeybee	fluvalinate	unknown	Small confirmed residue and not the cause of death of the bees.
April	Central	buzzard	alphachloralose	abuse	Police investigation, bait found.
April	Grampian	dog	paraquat	unspecified	SERAD investigation.
April	Highland	raven	carbofuran	abuse	SERAD and police investigation.
April	Lothian	buzzard, rook	alphachloralose	abuse	SERAD and SSPCA investigation.
April	Strathclyde	cat	carbofuran	abuse	SERAD investigation.
April	Tayside	polecat	carbofuran	abuse	Police investigation.
April	Down	4 buzzards, 3 crows, bait	alphachloralose/ metaldehyde	abuse	All found dead within 10 metres of suspect bait.
May	Cornwall	honeybee	dimethoate	approved	Dimethoate applied to bulb field, and bees were probably exposed whilst flying to an untreated bulb field with flowering weeds present.
May	Cumbria	2 buzzards, bait	carbofuran	abuse	Rabbit carcass used as a bait.
May	Cumbria	hen harrier, raven, bait	carbofuran/ mevinphos	abuse	Starlings appeared to be used as poisoned baits.
May	Lancashire	5 grey heron	alphachloralose	abuse	Carcases removed from a freezer.
May	Merseyside	buzzard, 2 kestrels	alphachloralose	abuse	Bait boxes not secured or covered.
May	Norfolk	2 dogs, grain	bromadiolone	misuse	
May	South Yorkshire	2 dogs	aldicarb	abuse	
May	South Yorkshire	3 dogs	paraquat	unspecified	
May	Suffolk	6 cats	metaldehyde	abuse	*Diagnosed by private vet who treated the cats.
May	Dyfed	cat	aldicarb	abuse	
May	Fife	9 cats	carbofuran	abuse	Police and SSPCA.
May	Lothian	badger	metaldehyde	unspecified	SERAD investigation.
May	Tayside	buzzard	alphachloralose	abuse	SERAD and police investigation.

Month	County	Number and Species	Chemical	Cause	Comments
May	Tyrone	dog	warfarin	abuse	Interthoracic haemorrhage in 11 week old dog.
June	Dorset	3 grey squirrels	bromadiolone	approved	Proper bait boxes used.
June	Norfolk	2 tawny owls	difenacoum	unspecified	Widespread use of difenacoum in area.
June	North Yorkshire	crow, bait	alphachloralose	abuse	Possible use of eggs as bait.
June	Northamptonshire	2 little owls, grain	carbofuran	unspecified	Misuse of bromadiolone also occurring at this location.
June	West Midlands	honeybee	bendiocarb	unspecified	Suspected feral bee treatment, but none were identified in the area.
June	West Sussex	2 dogs	strychnine	unspecified	
June	Highland	2 golden eagles	carbofuran	abuse	SERAD investigation. Bait recovered.
July	Avon	badger	endosulfan	abuse	
July	Cambridgeshire	honeybee	bendiocarb	misuse	Feral bee treatment where treated comb was not sealed off.
July	Leicestershire	meat bait	bendiocarb	abuse	
July	Norfolk	3 kestrels, bait	carbofuran	abuse	Pheasant bait used. Various samples also seized. Identified as carbofuran, phorate, difenacoum, chlorophacinone, oxamyl and aldicarb.
July	Oxfordshire	sample	metalddehyde	misuse	Slug pellets applied to a footpath.
July	Somerset	honeybee	bendiocarb	unspecified	Suspected feral bee treatment, but none were identified in the area.
July	Suffolk	honeybee	bendiocarb	approved	Feral bee treatment followed label instructions.
July	Powys	honeybee	bendiocarb	unspecified	Suspected feral bee treatment, but none were identified in the area.
July	Grampian	buzzard	carbofuran	abuse	SERAD and police investigation.
July	Grampian	dog	chlorophacinone/ brodifacoum / difenacoum	unspecified	SERAD investigation.

Month	County	Number and Species	Chemical	Cause	Comments
July	Highland	3 red kites	bromadiolone	approved	SERAD and RSPB investigation.
July	Lothian	glass bottles	strychnine	misuse	SERAD, police and SSPCA investigations. Improper disposal.
July	Tayside	golden eagle	carbofuran	abuse	Police investigation.
August	Essex	sample	fenitrothion	abuse	Seed treated with insecticide.
August	Norfolk	honeybee	bendiocarb	approved	Treatment followed label instructions.
August	Norfolk	honeybee	fluvalinate	unknown	Small confirmed residue and not the cause of death of the bees.
August	West Glamorgan	honeybee	fenitrothion	unspecified	Source unknown, suburban area.
August	Fife	buzzard	chlorfenvinphos	unspecified	
August	Fife	buzzard	methiocarb	unspecified	
September	Greater Manchester	2 dogs	difenacoum	misuse	Exposed baits.
September	Hereford and Worcester	2 fallow deer, pellets	methiocarb	approved	Recent application of methiocarb with no evidence of spillages.
September	Humberside	house sparrow, grain	warfarin / difenacoum	approved	Bromadiolone also detected in a sample of grain, appeared to be an approved treatment.
September	Norfolk	grain	difenacoum	misuse	Exposed baits.
September	Norfolk	3 dogs, bait	metaldehyde	abuse	Pile of slug pellets left in a garden.
September	Norfolk	honeybee	fluvalinate	unknown	Small confirmed residue and not the cause of death of the bees.
September	Oxfordshire	dog, pellets	metaldehyde	misuse	
September	Powys	red kite	carbofuran	abuse	
September	Dumfries & Galloway	cat	alphachloralose	abuse	SERAD investigation, cat recovered.
October	County Durham	2 cats	aldicarb	abuse	
October	Devon	pigeon carcass	aldicarb	abuse	Peregrines were the suspected target.
October	Greater London	bait, hedgehog	methiocarb	abuse	Pigeons were the suspected target.
October	Leicestershire	fox, 3 crows, 4 magpies	mevinphos	abuse	
October	Lincolnshire	50 heifers	metaldehyde	misuse	* Open bag of slug pellets to which cows had access.

Month	County	Number and Species	Chemical	Cause	Comments
October	Northumberland	dog, bait	carbofuran	abuse	Rabbit carcase used as a bait and carbofuran kept in an unlabelled container.
October	West Midlands	3 foxes	coumatetralyl	unspecified	
October	Wiltshire	sample	warfarin	misuse	Improper storage.
October	Sutherland	raven	carbofuran	abuse	SERAD and police investigation. Intention to refer to Procurator Fiscal.
October	Tayside	2 buzzards	alphachloralose	abuse	Police investigation. Referred to Procurator Fiscal. Bait found.
November	Cambridgeshire	fox	bromadiolone	unspecified	
November	Greater Manchester	2 cats, bait	alphachloralose	abuse	Meat used as a bait.
November	Hampshire	earthworms, sample	cypermethrin	misuse	Spillage of chemical onto farm track.
November	North Yorkshire	rat, cat	bromadiolone	unspecified	Kitten, suspected exposure but no known treatments in the area.
November	Tyne & Wear	grain	bromadiolone	abuse	Pigeons were the suspected target.
November	Powys	buzzard, bait	aldicarb	abuse	Pheasant suspected bait.
November	Border	dog	metalddehyde	abuse	SERAD and police investigation.
November	Border	2 dogs	metalddehyde	unspecified	SERAD and police investigation.
November	Grampian	2 foxes	bromadiolone/coumatetralyl	approved	SERAD investigation.
November	Highland	buzzard	bromadiolone	unspecified	
November	Tayside	dog	difenacoum	approved	SERAD investigation. Dog recovered after veterinary treatment.
December	Norfolk	dog, grain	difenacoum	misuse	Unsecured bait stations disturbed by dog.
December	Northamptonshire	grain	difenacoum	misuse	* Exposed baits in a garden.
December	Somerset	cat, dog	aldicarb	abuse	
December	Suffolk	dog	paraquat	unspecified	
December	Strathclyde	3 cats	chlorophacinone	unspecified	SERAD investigation.

\* Incidents where samples were not available for analysis, but information gathered during enquiries into the incident suggests the involvement of the pesticide.



# Appendix 3

## Major WIIS publications

(in chronological order since 1976)

- Hamilton, G.A., Hunter, K., Ritchie, A.S., Ruthven A.D., Brown P.M. and Stanley P.I., 1976. Poisoning of wild geese by carbophenothion-treated winter wheat. *Pestic. Sci.* **7**:175-183.
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