

PESTICIDE POISONING OF ANIMALS 1999

A REPORT OF INVESTIGATIONS IN SCOTLAND

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CONTENTS

	Paragraphs
SUMMARY	
INTRODUCTION	1-6
INCIDENTS IN 1999	
Number of incidents in 1999	7-9
Vertebrate wildlife: mammals	10-15
Vertebrate wildlife: birds	16-28
Livestock	29
Companion animals	30-34
Beneficial insects	35
Suspected poisonous baits	36
INCIDENTS WHERE REGULATORY AND/OR ENFORCEMENT ACTION WAS CONSIDERED	
Approved use incidents	37-42
Misuse incidents	43-47
Abuse incidents	48-49
Veterinary use incidents	50
Unspecified use incidents	51-56
ENFORCEMENT ACTION	57-59
REFERENCES	
APPENDICES	
Appendix 1. Investigation procedures	
Appendix 2. Regions in Scotland used to classify incidents	
Appendix 3. Pesticide incidents occurring in 1999	

SUMMARY

The Wildlife Incident Investigation Scheme in Scotland investigates deaths of wildlife, including beneficial insects, pets and livestock, where there is strong evidence to indicate that pesticide poisoning may be involved.

The scheme, together with sister schemes throughout the United Kingdom, provide a means of post-registration surveillance of pesticide use, so that registration may be revised if necessary. They also provide a measure of the success of the pesticide registration process, and help in the verification and improvement of the risk assessments made in the registration of compounds. Incidents of approved use and of misuse can highlight problems with the approval conditions or the label instructions for a pesticide, and can provide valuable feedback into the regulatory process.

The scheme in Scotland also furnishes evidence that can be used by SERAD, or by the police, to enforce legislation on the use of pesticides, and in the protection of food, the environment, and animals.

There were 135 suspected incidents registered for investigation by the scheme in 1999. The causes were determined in 59 incidents, of which 41 (30.4% of those investigated) involved pesticide poisoning or exposure to pesticides. Reassuringly only three incidents arose from the approved use of pesticides. A further six incidents were attributed to misuse, often resulting from careless use of pesticide formulations.

Deliberate abuse of pesticides was identified in 18 incidents in 1999 compared to 35 in 1998. This represents 44% of pesticide incidents in 1999 compared to 67% in 1998. Whilst this reduction is welcome, there is no clear evidence to suggest a long term decline in the extent of abuse (Figure 2).

A further 13 poisoning incidents were attributed to unspecified use, where there was insufficient information available to positively identify the source of the poison.

Seventeen agricultural chemicals were identified in the pesticide poisoning incidents, including two compounds detected in samples seized by the enforcement authorities (Table 2). Investigation into a honeybee incident confirmed exposure to another pesticide by veterinary use, but did not establish the cause of the mortality.

INTRODUCTION

1. In the United Kingdom the impact of all pesticide uses on wildlife and other animals, including beneficial insects such as honeybees, is assessed before any approval is granted by the regulatory body. Where it is thought that an unacceptable risk would arise, restrictions on use may be imposed in the conditions of approval under the Control of Pesticides Regulations (COPR) 1986 (as amended) or the Plant Protection Products Regulations (1995), in order to protect wildlife and domestic animals.

2. The Scottish Wildlife Incident Investigation Scheme (WIIS) is one of four schemes, operating in the United Kingdom, which investigate possible pesticide poisoning of animals. This scheme is operated by the Scottish Agricultural Science Agency (SASA) on behalf of the Rural Affairs Department of the Scottish Executive (SERAD). The procedures for incident investigation are described in Appendix I.

3. Incidents confirmed as involving pesticides are assigned to one of four categories:

- **Approved use** of the product, according to the specified conditions of 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 subsequent investigation identifies the involvement of a pesticide formulated as a veterinary medicine. Such cases are investigated incidentally rather than deliberately, and may include abuse, misuse, approved use, or unspecified use of the relevant compounds.

4. 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 products, 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 used by the regulatory body for new and existing compounds.

5. The majority of this post-registration surveillance activity is funded by the agrochemical industry, under the Food and Environment Protection Act 1985 (FEPA). 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 investigations reveal contravention of this Act, or other legislation such as the Wildlife and Countryside Act 1981, then prosecution or other forms of enforcement may ensue. All activities carried out to enforce the legislation in Scotland are funded by SERAD.

6. SERAD is a partner in the Campaign against the Illegal Poisoning of Animals led by MAFF. The freephone number (0800 321600) is routed to SASA and provides ready access for incident notification. To prevent large numbers of dead animals being submitted and analysed, with the consequential impact on resources and finances, strict criteria are applied to potential incidents prior to acceptance. Incidents are only accepted where the use of pesticides may be implicated. Incidents are rejected for further analysis where they obviously involve trauma or disease. Unless there are special circumstances, substantial delays in the notification of incidents, or the unavailability of bodies or baits, may also lead to rejection.

INCIDENTS IN 1999

NUMBER OF INCIDENTS IN 1999

7. A total of 146 suspected poisoning incidents were notified to SASA in 1999 (167 in 1998). Eleven of these were rejected for investigation because the acceptance criteria were not met or because of post mortem evidence, leaving 135 incidents registered for onward investigation.

8. The cause of death or illness (including pesticides and non-agricultural chemicals, disease, starvation and trauma) was established in 59 incidents (43.7% of those registered). Pesticides were identified in 41 of these incidents (30.4% of those registered). In other incidents, either no residues were detected, or investigations were terminated because of insufficient information or lack of suitable tissue samples.

9. Only three incidents (7%) were attributed to the approved use of the pesticide involved, 6 (15%) involved some element of misuse, 18 (44%) were associated with abuse, one incident involved a pesticide formulated as a veterinary medicine, and the remaining 13 resulted from some kind of unspecified use (Figure 1). A breakdown of incidents by animal category is shown in Table 1. A listing of the pesticides involved, and other causes of death, is presented in Table 2.

Table 1: Number of incidents investigated in 1999

	Incidents Investigated	Pesticide poisoning incidents	Other cause of death found
Vertebrate wildlife	66	20 (30%)	17 (26%)
Livestock	1	1 (100%)	0
Companion animals	53	16 (30%)	1 (2%)
Captive animals	3*	1 (33%)	0
Beneficial insects	6	1 (17%)†	0
Suspected baits and suspicious substances	6‡	2 (33%)‡	not applicable
TOTAL	135	41 (30%)	18 (13%)

* Includes two incidents involving falconry birds and one involving a captive capercaillie.

† Fluvalinate detected, not cause of mortality.

‡ Includes two substances seized by enforcement bodies.

Table 2: Number of incidents involving individual pesticides in 1999 and species and/or bait involved (*excluding honeybees*)

Organophosphates		
chlorfenvinphos	1	buzzard
Carbamates		
bendiocarb	1	bait, kestrel
carbofuran	10	bait, buzzard, cat, golden eagle, polecat, raven
methiocarb	1	buzzard
Rodenticides		
brodifacoum	1	dog
bromadiolone	6	buzzard, fox, red kite
chlorophacinone	2	cat, dog
coumatetralyl	4	dog, fox, pig
difenacoum	2	dog
flocoumafen	1	dog
Herbicides		
dinoseb	1	dog
paraquat	1	dog
trifluralin	1	dog
Other compounds		
alphachloralose	7	bait, buzzard, cat, dog, red kite
cyanide	1	powders
metaldehyde	5	badger, dog
strychnine	1	bottles

There were single incidents involving flocoumafen and coumatetralyl, bromadiolone and chloralose, dinoseb and trifluralin, bromadiolone and coumatetralyl and one incident involving brodifacoum, chlorophacinone and difenacoum.

Cause of death other than pesticides

disease	2
starvation	6
trauma	9
unknown	67
not applicable	4
other	1

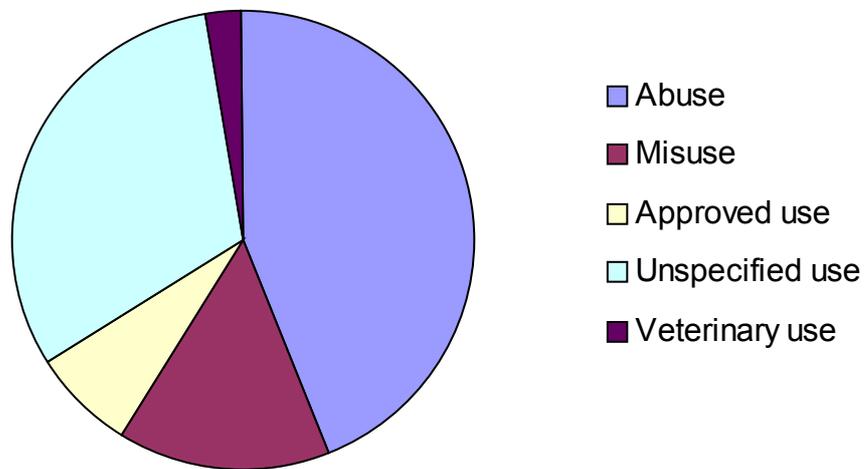


Figure 1. Pesticide Incidents in Scotland 1999

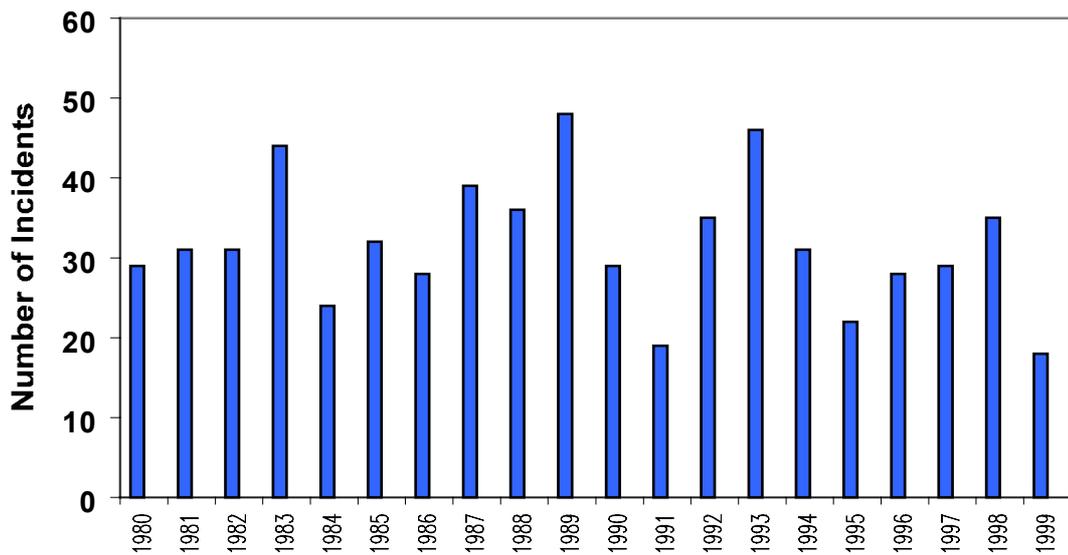


Figure 2. Abuse of Pesticides in Scotland

VERTEBRATE WILDLIFE: MAMMALS

10. A total of 15 incidents involving wild mammals was investigated. The cause of death was established in 8 incidents, with pesticide poisoning being confirmed in 5 of these (Table 3).

Badgers

11. A single incident was reported in which a badger was poisoned with metaldehyde at a site on the west side of Edinburgh. The source of the chemical was not established.

Bat

12. No cause of death was found in an incident involving 9 pipistrelle bats that were found dead in a loft space in a house in Fife.

Table 3: Number of incidents involving wild mammals in 1999

	<i>Number of incidents investigated</i>	<i>Number (%) in which pesticide poisoning was identified</i>	<i>Number (%) in which another cause of death was identified</i>
Badger	1	1 (100%)	0
Bat	1	0	0
Fox	5	3 (60%)	0
Hare	1	0	0
Otter	2	0	1 (50%)
Polecat	1	1 (100%)	0
Squirrel	4	0	2 (50%)
TOTAL	15	5 (33%)	3 (20%)

Foxes

13. Five incidents involving foxes were reported during the period; anticoagulant rodenticides residues were detected in three. In one incident in Grampian residues of both bromadiolone and coumatetralyl were detected in two foxes. The field investigation confirmed that the rodenticide formulations “Slaymor” and “Racumin” were in use at a nearby pig farm. The formulations were being used in accordance with the label instructions and consequently the incident was categorised as an approved use incident. A further two incidents involving bromadiolone were investigated, one in Lothian and another in Tayside. The source of the chemical was not established in either case. A post mortem examination indicated that necrotic cellulitis was the likely cause of death in the fox from Tayside.

Polecat

14. Abuse of carbofuran was found to be responsible for the death of a polecat on an estate in Tayside.

Other mammals

15. Incidents involving otters (2), squirrels (4) and a hare were notified during the year. The death of an otter in Strathclyde resulted from starvation and disease was responsible for the death of single squirrels in two separate incidents in Tayside. The cause of death was not established for any of the other incidents.

VERTEBRATE WILDLIFE: BIRDS

Birds of Prey (including owls)

16. A total of 37 incidents involving birds of prey were notified. The cause of death was established in 25 (67%) incidents; with pesticide poisoning accounting for 13 (35%) of these (Table 4).

Table 4: Number of incidents involving wild birds in 1999

	<i>Number of incidents investigated</i>	<i>Number (%) in which pesticide poisoning was identified</i>	<i>Number (%) in which another cause of death was identified</i>
Birds of prey including owls	37	13 (35%)	12 (32%)
Wildfowl and waterbirds	2	0	1 (50%)
Gulls and waders	5	0	0
Pigeons and doves	1	0	0
Corvids	6	2 (33%)	1(17%)
Other birds	1	0	0
TOTAL	52	15 (29%)	14 (27%)

Buzzards

17. Common buzzards were involved in 18 incidents in 1999. The cause of death was established in 12 of the incidents, with 9 being attributed to pesticide poisoning. Deliberate abuse of pesticides accounted for 6 of these incidents; the chemicals involved were carbofuran (2) and chloralose (4). The 3 remaining pesticide incidents resulted from single instances of unspecified use of bromadiolone, chlorfenvinphos and methiocarb. In 2 of these cases the immediate cause of death was due to starvation and in the other death was attributed to trauma.

Eagles

18. Eagle deaths were notified in 3 incidents; pesticide poisoning was established as the cause of death in 2 incidents involving golden eagles and in the third, which involved a sea eagle, no cause of death was established. The poisoning incidents both resulted from the abuse of carbofuran, one occurred in Highland region, the other in Tayside.

19. The Tayside eagle had originally been found dead in October 1998 when the finder had thrown it into a ditch. It was not rediscovered until July 1999. The decomposing carcass was submitted for analysis, as it was believed to be a vital piece of evidence in a pending prosecution.

Red Kites

20. Pesticide poisoning was the cause of death in 2 out of the 3 incidents notified in 1999. Abuse of chloralose was responsible for one incident near Dunblane in February. A residue of bromadiolone was also found in liver tissue from this kite, indicating exposure to the chemical. In an incident on the Black Isle, in July, 3 juvenile birds died as a result of bromadiolone poisoning in a case that was attributed to approved use. In the third incident no cause of death was established.

Other Raptor Species

21. In 1999 six incidents involving sparrowhawks were notified to the scheme, of these death was associated with trauma in 3 cases and starvation in one incident. No cause of death was established for the other two cases. Residues of DDE, the persistent metabolite of the organochlorine pesticide DDT, detected in liver tissues ranged from 0 to 10.7 mgkg⁻¹.

22. Starvation was the cause of death in an incident involving a kestrel in Strathclyde. The death of a merlin in Border region was associated with trauma.

23. Five incidents involving owls (1 barn owl, 1 short-eared owl, 2 tawny owls and 1 other owl) were submitted for analysis; trauma was identified as the cause of death in 3 cases. Analysis of liver tissue from all of the owls failed to provide any evidence of exposure to anticoagulant rodenticides.

Wildfowl and Waterbirds

24. In 1999 there were two incidents involving wildfowl and waterbirds. In one incident a heron was found to have died from starvation in Tayside. In the other, three swans were found dead on a reservoir in Strathclyde. The cause of death was not established.

Gulls

25. There were five incidents involving gulls in 1999. No cause of death was established in any of the incidents.

Pigeons

26. Only one incident involving a pigeon was submitted during 1999. The suspicion that it had been the victim of chloralose poisoning was not confirmed.

Corvids

27. A total of 6 incidents involving ravens (2) and crows (4) were notified during 1999. Two abuse incidents on separate estates in Highland region resulted in the poisoning of two ravens with carbofuran. It is likely that enforcement action will be pursued in one of these cases. The cause of death was established in only one of the other four incidents. Approximately 16 crows were found dead in a field near Stirling. The post mortem examination revealed that trauma, associated with gun shot wounds, was responsible for their demise.

Other birds

28. The cause of death was not determined in an incident involving a dipper found dead in a garden in Strathclyde.

LIVESTOCK

29. Only one incident involving livestock was notified in 1999 (Table 5). Three pigs died at a piggery in Grampian as a result of a misuse incident involving coumatetralyl.

Table 5: Number of incidents involving livestock in 1999

	<i>Number of incidents investigated</i>	<i>Number (%) in which pesticide poisoning was identified</i>	<i>Number (%) in which another cause of death was identified</i>
Pig	1	1 (100%)	0
TOTAL	1	1 (100%)	0

COMPANION ANIMALS

30. Fifty five of the incidents registered in 1999 involved companion animals (Table 6). The cause of death was established in 18 (33%) of cases, with pesticide poisoning being responsible for 17 (31%) incidents and ethylene glycol poisoning being the cause in the one remaining case.

Cats

31. Six of the 26 incidents in which cats were involved were found to have died as a result of poisoning; five associated with pesticides and one resulting from ingestion of an ethylene glycol containing product. Abuse of carbofuran (3) and chloralose (1) was

associated with 4 of the 5 pesticide incidents. In the fifth case a residue of the anticoagulant rodenticide, chlorphacinone was identified in liver tissue from a cat in Strathclyde. Three cats in the household were affected but only one died. The field investigation failed to establish the source of the chemical and the incident was assigned as resulting from some form of unspecified use.

Table 6: Number of incidents involving companion and other animals in 1999

	<i>Number of incidents investigated</i>	<i>Number (%) in which pesticide poisoning was identified</i>	<i>Number (%) in which another cause of death was identified</i>
Cats	26	5 (19%)	1 (4%)
Dogs	27	11 (41%)	0
Falconry birds	2	1 (50%)	0
TOTAL	55	17 (31%)	1 (2%)
Capercaillie (captive)	1	0	0

Dogs

32. Dogs were affected by pesticide poisoning in 11 of the 27 incidents reported to the scheme during the year. The misuse of pesticides was found to be the cause of three incidents. Two of these involved metaldehyde and the other incident, which occurred in Tayside, was associated with the poor storage of old formulations of dinoseb and trifluralin. One incident resulted from an approved use of a difenacoum formulation to control mice in a dwelling. The dog recovered after veterinary treatment. There was one incident of abuse of metaldehyde in Border region.

33. The other six cases were all attributed to some form of unspecified use. There were single incidents involving chloralose, coumatetralyl, metaldehyde and paraquat. The other two incidents were both associated with multiple anticoagulant rodenticides. One in Tayside involved coumatetralyl and flocoumafen, and the other at boarding/breeding kennels in Grampian, involved brodifacoum, chlorphacinone and difenacoum.

Other Animals

34. Two incidents involving falconry birds were reported during 1999. Abuse of bendiocarb was found to be the cause of one incident in which a kestrel died after eating part of a baited blackbird carcass. No cause was established for the death of a Harris hawk. No cause of death was found for a captive capercaillie from a country park in Tayside.

BENEFICIAL INSECTS

35. Six suspected honeybee poisoning incidents were accepted into the Scheme in 1999 (Table 7). A very low residue of the pyrethroid, fluvalinate was identified in one sample of bees from a hive that had been recently checked for Varroa. The residue was classified as resulting from a veterinary use of a pesticide, however the cause of the mortality was not established.

Table 7: Number of incidents involving beneficial insects in Scotland during 1999

Number of incidents reported:	6
Number of incidents where pesticides were detected and confirmed:	1*
Number of incidents attributed to pesticides:	0

* Fluvalinate was detected, but the incident was not attributed to pesticide poisoning

SUSPECTED POISONOUS BAITS

36. Four items were submitted for investigation as suspected poisonous baits during 1999. In each case there was no known animal casualties associated with the alleged baits. In all 4 cases the analytical investigation failed to reveal any evidence to substantiate the belief that the items, which included an egg, a piece of cooked chicken, the remains of a rabbit and the remains of a wood pigeon, had been prepared as potential poisonous baits.

INCIDENTS WHERE REGULATORY AND/OR ENFORCEMENT ACTION WAS CONSIDERED

APPROVED USE INCIDENTS

37. Information from incidents thought to have arisen from approved use is very important, and is fed back into the pesticide regulatory process¹. Where significant concerns are highlighted, thorough consideration is given to the need to adjust the approval status or conditions of use of the pesticide in question. If a specific product is identified in such incidents, then the approval holder is contacted and given the opportunity to comment and provide additional feedback from their experience with the product.

38. Three incidents investigated during 1999 were attributed to approved use of the products involved. All 3 involved anticoagulant rodenticide formulations; two were associated with the use of bromadiolone in agricultural premises, and the third with the use of difenacoum in a domestic household.

Incident Summaries

39. During August 3 juvenile red kites died on the Black Isle. 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 6 properties. Rodenticides were, or had been, used on 5 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.

40. Concerns about the potential impact of rodenticides on vulnerable red kite populations had been highlighted earlier in the year². A significant residue (0.25 mg/kg) of bromadiolone was identified in the liver tissue of a red kite that had clearly died from chloralose poisoning near Dunblane in February. The residue was of a magnitude where the onset of haemorrhagic symptoms might have been expected. Subsequent examination revealed residues of rodenticides in 4 out of 8 liver samples from red kites that had been submitted between 1996 and 1998. Again in 2 of these cases the residues were of a magnitude where the expression of haemorrhagic symptoms might have been expected, however both birds were obvious victims of the abuse of other pesticides.

41. A farmer in Aberdeenshire initiated an incident after finding 3 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.

42. A householder in Tayside 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 ‘Sorex 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. They also covered the costs of the veterinary treatment on the dog.

MISUSE INCIDENTS

43. Six incidents were reported where the misuse of pesticides was identified. These resulted from poor storage practices, spillages, formulations not being used in the approved manner, or improper disposal. The active ingredients involved were coumatetralyl, dinoseb and trifluralin, metaldehyde, sodium cyanide, and strychnine.

44. A dog died in January after gaining access to open bags of molluscicide pellets containing metaldehyde in a farm building. The dog was owned by a tenant occupying a property on an agricultural estate and had escaped from the direct supervision of its owner by jumping over a wall. The pellets, and cereal seed, had been left on a pallet in a shed after sowing operations had had to be abandoned due to bad weather in the preceding December. Another dog died from metaldehyde poisoning in March. An investigation by the SSPCA indicated that the cause of the incident was probably related to the unduly heavy application of an amateur formulation in the garden of a property adjacent to that of the pet owner.

45. Two dogs from an agricultural holding were presented for veterinary treatment in March suffering from acute vomiting, hypersalivation and pyrexia. One of the animals subsequently died. Post mortem examination revealed nothing significant, the small intestinal content consisted of a runny brown liquid. Vomited material from the second dog consisted of plant material and yellow/light brown soft particles. Analytical investigation identified high concentrations of two herbicide active ingredients, dinoseb and trifluralin, in both the vomitus and small intestinal content. The property was currently being employed for commercial flower production, and only a limited range of pesticides were in use. No trifluralin containing formulations were held, and dinoseb had been subject to a regulatory withdrawal between 1986-88. Further investigation by SERAD Agricultural Staff identified a building where the previous owner was believed to have stored chemicals awaiting disposal. A sample of material from the floor of this building was found to contain high concentrations of both trifluralin and dinoseb. It appears that the dogs must have ingested some of the contaminated soil from the old storage site.

46. Three weaner pigs died at a farm in March. Post mortem examination findings included haemarthrosis and fascial haemorrhages. Analytical investigation identified residues (1.0 - 1.1 mg/kg) of coumatetralyl in the liver tissues from the animals. A field investigation by SERAD Agricultural Staff established that 'Racumin' tracking powder had been applied by a farm worker to a small beam above a feed hopper. The worker was not familiar with the task, and it appears that a quantity of the powder had accidentally been knocked off the beam into the feed hopper. The farm no longer uses the tracking powder and employs a professional pest control company.

47. Two other incidents attributed to misuse arose from police and SSPCA investigations respectively. In an investigation related to the persecution of wild birds, old stocks of 'Cymag' were discovered stored inappropriately in unlocked premises. In the other case, several bottles containing traces of strychnine were found at the entrance to a rabbit hole.

ABUSE INCIDENTS

48. The deliberate abuse of pesticides to poison animals continued to make up the majority of confirmed pesticide incidents. The number of such incidents in 1999 was 18 (44% of pesticide incidents), which was the lowest annual total in the period from 1980. Regrettably, inspection of the annual data in Figure 2 provides little confidence that the problem is actually diminishing on a long term basis.

49. Only 4 compounds were identified in abuse incidents in 1999 compared to 6 in 1998 and 8 in 1997. As in recent years (Figure 3) carbofuran (10, 56% of abuse incidents) and chloralose (6, 33% of abuse incidents) were the most frequently abused pesticides. The increasing abuse of carbamate insecticides, and in particular of carbofuran, has been a feature of the pattern of abuse in Scotland since the late 1980s¹. Single incidents involved the abuse of bendiocarb and of metaldehyde respectively.

VETERINARY USE INCIDENTS

50. Investigations into a honeybee mortality in April identified a residue (0.053 mg/kg, 0.005 µg/bee) of fluvalinate in a sample of the bees. Field information indicated that the hive had been treated with 'Apistan', to control Varroa, for three days prior to the mortality. The residues detected appear to fall well within the range that might be expected after this type of treatment, and to be below that at which any kind of mortality might be anticipated. Exposure to fluvalinate was confirmed, however the cause of the mortality was not established. There was no further follow up action in respect of this incident.

UNSPECIFIED USE INCIDENTS

51. Each year there are always a few confirmed pesticide incidents where, despite detailed field investigations, the source of the compound cannot be definitely established. Animal bodies may be found in locations remote from the point of exposure in circumstances where the onset of toxic symptoms is delayed. In 1999 a total of 13 incidents (32% of all pesticide incidents) fell into this category. This represents a much higher proportion than that observed in the years 1995-98, when the proportion ranged from 10 to 12 %.

52. Seven of the incidents attributed to unspecified use were associated with anticoagulant rodenticides. The mode of action of such products is to delay the onset of symptoms so as to prevent rodent target species from developing bait shyness. The active ingredients involved included brodifacoum, bromadiolone, chlorophacinone, coumatetralyl, difenacoum and flocoumafen. A working farm dog died from anticoagulant poisoning in February. Chemical analysis identified a residue (10.6 mg/kg) of flocoumafen in a sample of blood serum from the animal. Field information established that the only rodenticide in use on the property was 'Racumin' (coumatetralyl). A dog died from coumatetralyl poisoning in March. Several dogs at a kennel became ill in July, presenting symptoms including bloody diarrhoea. Despite veterinary treatment for anticoagulant poisoning, one of the animals died. Residues of chlorophacinone (0.1mg/kg), brodifacoum (0.03 mg/kg), and difenacoum (0.03 mg/kg)

were identified in the liver tissue of the animal that died. In other incidents three cats died from coumatetralyl poisoning, and residues of bromadiolone were identified in tissues from foxes in two separate incidents. Finally a residue (0.11 mg/kg) of bromadiolone was identified in tissue from a buzzard. In the latter case the immediate cause of death was believed to have been trauma.

53. Metaldehyde poisoning was the cause of death in two incidents involving a badger and a dog respectively. Chloralose poisoning resulted in the death of a dog, and another dog died of paraquat poisoning. Finally traces of chlorfenvinphos and of methiocarb were detected in separate buzzards. The magnitude of the residues confirmed exposure but did not necessarily indicate the cause of death.

54. As in the past, most of the incidents classified as arising from unspecified use were more likely to have resulted from circumstances closely related to normal agricultural practice in the field, some most probably reflecting approved use, others varying degrees of misuse. An insight to the problems associated with the poisoning of non-target animals can be obtained by excluding data relating to abuse (Hunter 1995). When this approach was applied to incident data for Scotland for the period 1995-99 anticoagulant rodenticides were associated as the cause of 46% of vertebrate poisoning incidents (Figure 4). Molluscicide poisoning accounted for a further 24% of incidents, with the remaining incidents being associated with insecticides (13%), vertebrate pest control agents (11%), and herbicides (6%).

55. It is not surprising that anticoagulant rodenticides featured so prominently, since they are designed specifically to poison small mammals and many of the common bait formulations are potentially attractive to non-target animals. The most common animal casualty in confirmed incidents of this type was the dog. However the persistence of such compounds in tissues of dead animals gives rise to another route for exposure, that of secondary poisoning. Work at the Institute of Terrestrial Ecology has demonstrated an increasing frequency of low level residues in barn owls³ Now there appears to be grounds for concern in relation to red kites and perhaps other birds of prey as well as certain wild mammals.

56. Molluscicides are usually bran-based formulations which can be attractive to many animals, particularly dogs and livestock. A high proportion (73%) of confirmed molluscicide incidents was caused by exposure to metaldehyde. Although a few incidents may have been caused by circumstances close to approved use, the majority were likely to have been caused by uncleared spillages or poor storage practice.

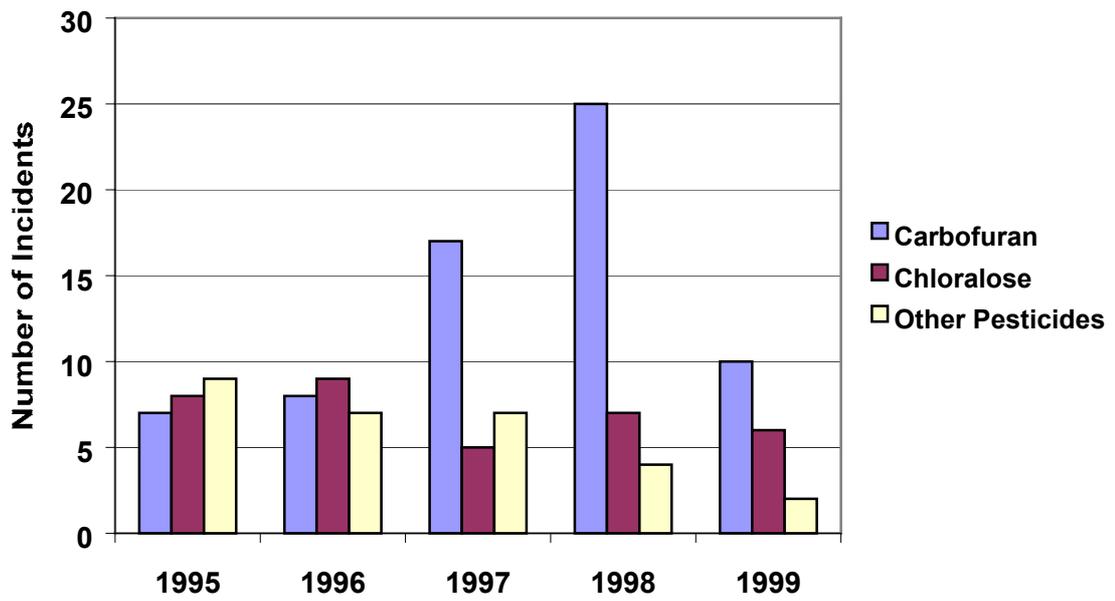


Figure 3. Pesticides Abused in Scotland

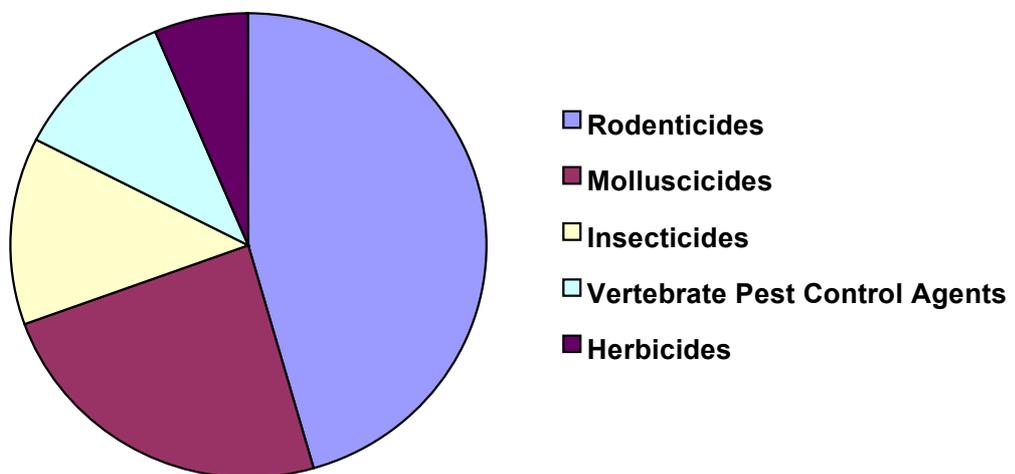


Figure 4. Pesticides Identified in Non-Abuse Incidents 1995-1999 (*Data exclude honeybees*)

ENFORCEMENT ACTION

57. Positive enforcement action continues to be a priority as a measure to counteract pesticide abuse. SERAD officials frequently work in partnership with wildlife liaison officers from the various police forces, as well as staff from other organisations. Where possible, cases are referred to the Procurator Fiscal Service for prosecution. In circumstances where there is insufficient evidence to support prosecution, the fact that an investigation has been seen to take place may act as a deterrent to re-offending. Where poisoning or the risk of poisoning arises from misuse, and enforcement action is not possible or appropriate, those involved receive advice on how to employ better practice.

58. 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.

REFERENCES

1. K Hunter, 'The Poisoning of Non-target Animals', in Pesticides-Developments, Impacts, and Controls, p74-86, Ed G A Best and A D Ruthven, The Royal Society of Chemistry, 1995
2. E A Sharp and K Hunter, Occurrence of Second Generation Anticoagulant Rodenticide Residues in Red Kites in Scotland, Information Paper issued by Scottish Agricultural Science Agency, July 1999

APPENDIX 1.

INVESTIGATION PROCEDURES

The investigation of suspected pesticide poisoning incidents relies on a scheme which allows members of the public and interested organisations to submit carcasses, suspected baits or other samples for pesticide analysis. The Wildlife Incident Investigation Scheme is operated in Scotland by the Chemistry Section at SASA, on behalf of SERAD. Agricultural Staff in the area offices of SERAD located throughout Scotland, provide support when necessary for field investigations, and also act as an additional point for notification of incidents.

A number of environmental and animal welfare organisations, such as RSPB or SSPCA, play an active role in some incident investigations. These bodies act not only by assisting members of the public to notify incidents, but also by screening out inappropriate cases prior to notification.

The SAC Veterinary Investigation Service acts in partnership with the scheme, in forwarding relevant samples to SASA from potential incidents notified indirectly via its laboratories, and by screening out incidents that are unlikely to involve pesticides. The Lasswade Veterinary Laboratory (VLA) is used to provide specialist pathological support to SASA on wild animals, and also furnishes an additional route into the scheme. The post mortem examinations undertaken by these laboratories may identify disease, trauma, starvation or other causes of death, eliminating the need for expensive analytical investigation.

As well as investigating incidents involving wildlife, the scheme covers suspected poisoning of livestock, companion animals, and honeybees. Incidents may be rejected if they fall outwith the remit of the scheme, or if other acceptance criteria are not met.

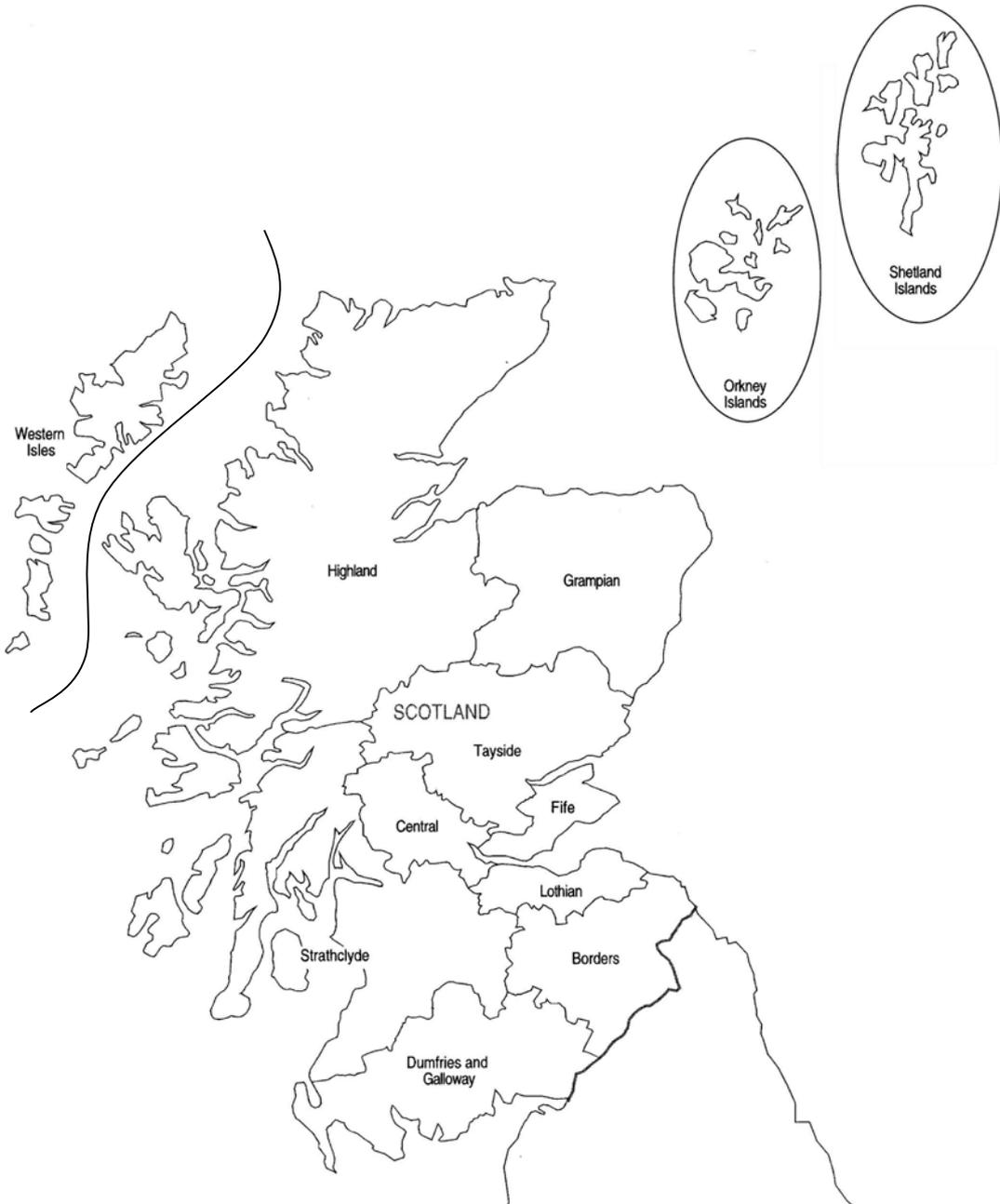
SASA makes use of analytical techniques and equipment capable of identifying low levels of pesticides considered to present a possible hazard to vertebrates or beneficial insects. Two multi-residue methods are used for carbamate, organochlorine, organophosphorus, and pyrethroid compounds, and for anticoagulant rodenticides. These are supplemented by compound specific analytical methods for chloralose, metaldehyde, paraquat, strychnine and other compounds. Wherever possible residues are confirmed using an alternative analytical technique.

Field investigations are normally only triggered by SASA following the identification of a specific pesticide as the likely cause of poisoning. However field investigations may be initiated following either notification, or after post-mortem examination, if sufficient evidence of pesticide involvement is available.

Analytical results, post-mortem findings, and the field investigation report are collated and interpreted by SASA to assess the probable cause of the incident, and whether any residues detected contributed to the death or illness of the animal involved. Mortality is generally attributed to a pesticide if residues of a chemical or its derivatives are found at 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.

The results of investigations are presented annually as part of a U.K. report published by the Environmental Panel of the Advisory Committee on Pesticides. The regulatory body, Pesticides Safety Directorate, is able to assess relevant incident information for any implications for the approval status of a particular pesticide or family of pesticides. Where legal proceedings are used as part of enforcement action, the evidence gathered by SASA, and by SERAD Agricultural Staff, is presented in reports to the Procurator Fiscal Service. Police forces are active partners in countering pesticide abuse, and frequently take the lead in investigations and presentation of such cases to the Procurator Fiscal.

APPENDIX 2. REGIONS IN SCOTLAND USED TO CLASSIFY INCIDENTS



APPENDIX 3. PESTICIDE INCIDENTS OCCURRING IN 1999

Incident No.	Date	Location	Species	Pesticide	Conclusion	Enforcement Action	Comments
99004	Jan	Ballater, Grampian	2 Dogs	Chloralose	Unspecified-use	RAD investigation	Dogs survived
99006	Feb	Pitlochry, Tayside	Dog	Flocoumafen	Unspecified-use	RAD investigation	
99008	Feb	Perth, Tayside	Dog	Metaldehyde	Misuse	RAD and SSPCA investigation	Poor storage practice
99010	Feb	Carnoustie, Tayside	Fox	Bromadiolone	Unspecified-use		
99015	Feb	Kilbirnie, Strathclyde	2 Cats	Carbofuran	Abuse	RAD investigation	
99018	Feb	Stirling, Central	Kestrel and Bait	Bendiocarb	Abuse	RAD investigation	Blackbird bait used. No specific lead
99020	Feb	Dunblane, Central	Red Kite	Chloralose and Bromadiolone	Abuse	RAD, RSPB and police investigation	Gamekeeper charged
99024	Mar	Heriot, Border	Poisons etc.	Cyanide	Misuse	Police	Improper storage
99027	Mar	Abernyte, Dundee, Tayside	Dog	Coumatetralyl	Unspecified-use	RAD investigation	
99028	Mar	Broxburn, West Lothian	Fox	Bromadiolone	Unspecified-use		
99030	Mar	Laurencekirk, Kincardineshire	3 Pigs	Coumatetralyl	Misuse	RAD investigation	
99031	Mar	Errol, Tayside	Dog	Dinoseb and Trifluralin	Misuse	RAD investigation	Poor storage of old chemicals.

99035	Mar	Edradyne Est, Aberfeldy, Tayside	Buzzard	Carbofuran	Abuse	Police investigation	
99037	Mar	Strathmilgo, Fife	Dog	Metaldehyde	Misuse	Police/SSPCA	Amateur product?
99039	Apr	Kilmarnock, Strathclyde	Cat	Carbofuran	Abuse	RAD investigation	
99041	Apr	Kippen Davie, Dunblane, Central	Buzzard and Bait	Chloralose	Abuse	Police investigation	Related to 99020
99042	Apr	Tarbrax, Lothian	Buzzard and Rook	Chloralose	Abuse	RAD and SSPCA investigation	
99046	Apr	Ellon, Grampian	Dog	Paraquat	Unspecified-use	RAD investigation	
99047	Apr	Edradyne Est, Aberfeldy, Tayside	Polecat	Carbofuran	Abuse	Police investigation	
99056	Apr	Inverness, Highland	Raven	Carbofuran	Abuse	RAD and police investigation	
99060	May	Braco, Tayside	Buzzard	Chloralose	Abuse	RAD and police investigation	
99061	May	Edinburgh, Lothian	Badger	Metaldehyde	Unspecified-use	RAD investigation	
99063	May	Leven, Fife	~9 Cats	Carbofuran	Abuse	Police and SSPCA	
99069	Jun	Near Blair Atholl, Highland	2 Golden Eagles and Bait	Carbofuran	Abuse	RAD	
99072	Jul	Gifford, Lothian	Glass Bottles	Strychnine	Misuse	RAD, police and SSPCA	Improper disposal
99079	Jul	Glenalmond Est, Tayside	Golden Eagle	Carbofuran	Abuse	Police	

99080	Jul	Near Aberlour, Grampian	Buzzard	Carbofuran	Abuse	RAD and police investigation	
99082	Jul	Black Isle, Highland	3 Red Kites	Bromadiolone	Approved Use	RAD and RSPB investigation	
99085	Jul	Methlick, Grampian	Dog	Various Rodenticides	Unspecified-use	RAD investigation	
99089	Aug	Strathkinnes, Fife	Buzzard	Chlorfenvinphos	Unspecified-use		
99090	Aug	By Cupar, Fife	Buzzard	Methiocarb	Unspecified-use		
99096	Sep	Castle Douglas, Dumfries & Galloway	Cat	Chloralose	Abuse	RAD investigation	Cat recovered
99110	Oct	Burnside Est, Forfar, Tayside	2 Buzzards and Bait	Chloralose	Abuse	Police	Referred to PF
99118	Nov	Insch, Grampian	2 Foxes	Bromadiolone and Coumatetralyl	Approved Use	RAD investigation	
99120	Oct	Morvich Est, Rogart, Sutherland	Raven	Carbofuran	Abuse	RAD and police investigation	Intention to refer to PF
99122	Nov	Milnathort, Tayside	Dog	Difenacoum	Approved use	RAD investigation	Dog recovered after veterinary treatment
99125	Nov	Jedforest, Border	Dog	Metaldehyde	Abuse	RAD and police investigation	
99129	Nov	Tweedsmuir, Border	2 Dogs	Metaldehyde	Unspecified-use	RAD and police investigation	
99132	Nov	Dingwall, Highland	Buzzard	Bromadiolone	Unspecified-use		
99134	Dec	Barrhead, Strathclyde	3 Cats	Chlorophacinone	Unspecified-use	RAD investigation	

