Annual Report on Surveillance for Veterinary Residues in Food in the UK 2006

VETERINARY RESIDUES COMMITTEE

What is the Role of the Veterinary Residues Committee?

The Committee has its Terms of Reference, but what do these mean in practice? Why is there an independent Committee?

The Committee ensures that there is independent oversight into how the UK's surveillance for residues of veterinary medicines is carried out. We advise on, and question, the choices that are made and also the actions taken when residues are detected.

We can publicise where we think changes should be made, such as in the issue of funding for the Non-Statutory Surveillance Scheme. Of course we recognise it is for government to make the final choices. But, we are able to draw attention to issues we think need addressing and make sure these are publicised.

Having an independent Committee, with a wide range of expertise, means that government can draw on experience and intelligence it would not otherwise have. For example, the Committee can make recommendations, based on its knowledge of which substances are being used overseas.

We know food safety concerns many people. Our consumer representatives can help judge those issues that could cause particular concern. We can also think about how we can explain the issues simply, from a lay person's point of view, and put them into context.

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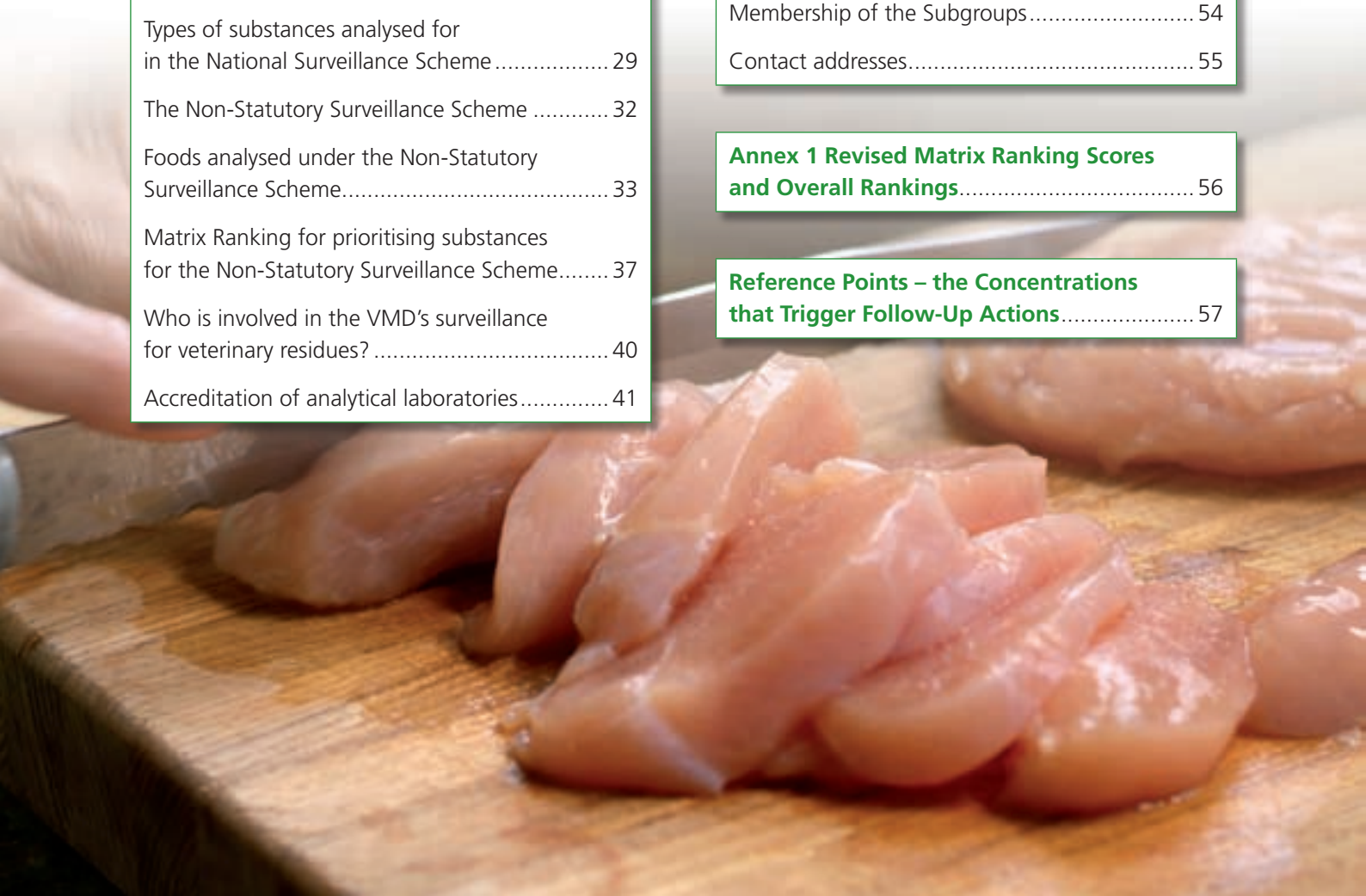


Chairman's Introduction

Dorothy Craig MBE, Chairman

In keeping with previous years, 2006 gave the Committee plenty to think about. There were developments in areas which the Committee has monitored for some time, and, as always, new issues came to the fore to challenge us.

I'll start with a matter of concern to the Committee. Surveillance continued to detect metabolites of banned nitrofurans in warm water crustaceans from several Asian countries, now at a noticeably high level for four consecutive years. The Committee will be recommending that the Government takes this up with the European Commission.

Following intelligence, crystal violet and its metabolite, leucocrystal violet were included in the national and imports surveillance programmes for farmed fish. Crystal violet is from the same family of dyes as malachite green, and the Committee considered it prudent to add it to the programmes to monitor whether producers are switching from malachite green. There was early success, when a salmon sample from Chile tested non-compliant for crystal violet.

The continued presence in imports of these and other substances banned in the EU remains of great concern to the Committee, and was used to support the Committee's business case for substantially increased funding for imports surveillance. This was sent to the Chief Executives of the VMD and the FSA. It was received sympathetically and acknowledged as a very sound case for extra funding – however they were not hopeful that new resources will become available in the current financial climate. The Committee will keep up the pressure in this area of increasing concern to consumers.

On the domestic front, I mentioned last year that comparing the nicarbazin residues from broiler liver and muscle from the same birds showed that the concentrations of this food contaminant in muscle are very much lower than in liver. Further comparison work in 2006 has confirmed this. The Committee supports the continued use of liver for testing to establish whether nicarbazin is being used properly, but believes that these results reinforce the message to consumers that any concentrations in chicken muscle are very small. The VRC continues to support the initiative facilitated by the FSA, involving the industry and VMD to reduce residues.

Looking ahead, 2007 promises to be another busy year. We will be holding our Open Meeting in Belfast on 31 October. We feel that it is time that the VRC moved out of London to meet our stakeholders and hope to meet some of you there.

We also expect our new website to be up and running with a fresh, informative and easy to access look. Do give us feedback on it.

It may seem a long way off, but the tenure of several Committee Members will finish at the end of 2008. A recruitment exercise for their posts will start towards the end of 2007 – might you be interested? I hope we will have many applicants interested in serving on the VRC – a Committee which is fulfilling a vital role and which I am proud to chair.

With best wishes,

Dorothy Craig

Key Results and Actions Taken on Residues in 2006

Summary for the National Surveillance Scheme

In the National Surveillance Scheme (NSS), 34,089 samples were collected and 38,257 analyses were carried out. These revealed 101 residues in excess of statutory or other limits (see Reference Points inside rear cover). Of these, 50 residues were likely to have occurred from the use of veterinary medicinal products (VMPs). Other residues detected included natural hormones and environmental contaminants. Comparative figures for 2003 to 2006 are in Table 1.

Each sample in the National Surveillance Scheme is tested for a specific substance or a small range of substances.

Table 1 Analyses and positive samples in the NSS from 2003-2006

Year	No of analyses	Samples at or above Reference Points	Positives from veterinary medicinal products
2003	35,399	137	89
2004	39,475	137	75
2005	37,067	120	55
2006	38,257	101	50

Usually when residues were detected above the relevant Reference Point, a follow-up investigation was carried out on the farm of origin. These investigations tried to determine the cause of the residues and gave advice to farmers on how to avoid such residues in the future. However, the Committee agreed that in the case of nicarbazin residues in broiler liver, for residues below 1000 µg/kg, it would be sufficient to write to the farms of origin.

Summaries of the follow-up investigations are supplied to the Committee. These are available on the VRC website, for example, as Meeting Papers VRC/06/17, VRC/06/29 and VRC/06/46.

The results presented later in this report are mainly those for samples taken in the calendar year 2006. However, for completeness, some of the results for follow-up samples taken in 2005 have been included.

Overall, the results of the National Surveillance Scheme indicated that the UK authorised uses of VMPs did not result in residues of human health concern.

Overall, the results of the NSS indicated that the UK authorised uses of VMPs did not result in residues of consumer health concern.

However, residues of substances **not** authorised for use in food-producing animals were detected in the survey. Two samples were found to contain residues of phenylbutazone. Additionally, malachite green residues were detected in one sample of farmed trout. While the incidence of such residues remains low, the Committee sees any use of unauthorised substances in food-producing animals as unacceptable. The VRC supports the strong action taken by the VMD to ensure destruction of the affected trout and will support continued vigilance against all unauthorised substances.

The results of the UK's surveillance for residues of veterinary medicines and other substances are sent to the European Commission. It examines the results of all Member States and publishes collated results for the European Union on its website: http://ec.europa.eu/food/food/chemicalsafety/residues/control_en.htm

Summary for the Non-Statutory Surveillance Scheme

In the Non-Statutory Surveillance Scheme, a total of 1,482 samples were collected and 5,030 analyses completed in the rolling programme and a brand-name survey.

A total of 34 residues were detected at concentrations above the relevant statutory or other limits in the Non-Statutory Surveillance Scheme.

A total of 34 residues were detected at concentrations above the relevant statutory or other limits (Reference Points). Of particular concern to the Committee was the number of warm-water crustacean samples that tested positive for nitrofuran residues. The Committee strongly supports actions to protect consumers from such residues.

Where imported produce was found to contain residues that are illegal in the UK, Defra's Chief Veterinary Officer wrote to her opposite number in the country of origin. In all cases, she asked to be kept informed of any action that was taken to prevent such residues in future. The Food Standards Agency (FSA) was also informed of such results, so it could organise product recalls, where appropriate. The FSA informs the European Commission, which can issue a Rapid Alert informing other Member States.

Residues of possible health concern

Three residues of possible health concern were detected in UK produce, while 29 were detected in imported produce. These residues are listed below and more information is given in the detailed results sections.

More information is give in the results section on pages 6 and 13.

UK Produce:

- malachite green and leucomalachite green residues were detected in 1 of 105 farmed trout samples tested (0.95%)
- phenylbutazone residues were detected in 1 of 275 cattle plasma samples tested (0.36%)
- phenylbutazone residues were detected in 1 of 49 horse plasma samples tested.

Imported Produce:

- crystal violet residues were detected in 1 of 300 samples of farmed fish tested (0.33%)
- leucomalachite green residues were detected in 1 of 300 samples of farmed fish tested (0.33%)
- nitrofuran residues were detected in 2 of 300 samples of farmed fish tested (0.67%)
- nitrofuran residues were detected in 19 of 246 warm-water crustaceans tested under the rolling programme (8.9%):
  - AOZ residues (3-amino-2-oxazolidinone) were found in 3 samples
  - SEM residues (semicarbazide hydrochloride) were detected in 16 samples
- nitrofuran residues were detected in 3 of 102 warm-water prawn samples tested in a brand-name survey (2.9%).

Percentages are only quoted where over 100 samples had been analysed for the particular matrix/analyte combination.

Results in Detail

National Surveillance Scheme 2006 – Residues at or above the Reference Point (see inside back cover)

Sample	Analysed for	Number of samples analysed	Reference Point (µg/kg)	Samples at or above the Reference Point	
				Number found	Concentration (µg/kg)
Egg	**Ionophores**	249			
	Lasalocid		150 (MRL) [a]	4	190, 260, 270, 360
Egg	**Nicarbazin**	221	25 (LOQ)	1	40
Egg	**Antimicrobials**	276			
	Chlortetracycline		200 (MRL)	1	380
Trout muscle	**Malachite Green/ leucomalachite green**	105	2 (MRPL sum of both substances)		
	Malachite Green			1	1 [b]
	Leucomalachite Green			1	500 [b]
Trout muscle	**Cadmium**	6	50 (MRL)	1	60
Partridge muscle	**Lead**	8	10000 (UK Limit)	1	16000
Milk	**Antimicrobials**	681			
	Penicillin G		4 (MRL)	1	10
Milk	**Aflatoxin**	105			
	Aflatoxin M1		0.05 (MRL)	1	>0.05
Broiler liver	**Nicarbazin**	305	200 (JECFA MRL)	26	210, 220, 230, 230, 240, 250, 250, 260, 280, 330, 350, 350, 380, 400, 400, 480, 490, 680, 690, 780, 880, 920, 980, 1700, 2000, 3100
Broiler muscle	**Nicarbazin**	62	200 (MRL)	1	210
Broiler liver	**Benzimidazoles**	130			
	Oxfendazole		10 (LOQ)	2	13, 15
Duck muscle	**Antimicrobials**	26			
	Chlortetracycline		100 (MRL)	1	150
Hen liver	**Cadmium**	3	500 (MRL)	1	640
Calf kidney	**Antimicrobials**	199			
	Oxytetracycline		600 (MRL)	1	1380
	Chlortetracycline		600 (MRL)	2	1670, 2235
Cattle kidney	**Cadmium**	89	1000 (MRL)	4	1320, 1570, 1610, 1980
Cattle plasma	**Phenylbutazone**	275	0.11 (LOQ)	1	1.3
Cattle serum	**Progesterone**	373	0.5 (Action Level)	17	0.5, 0.5, 0.6, 0.6, 0.7, 0.7, 0.7, 0.8, 0.8, 0.9, 0.9, 1, 1, 1, 2, 2, 3
Cattle urine	**Nortestosterone**	615	0.5/5.0 [c] (Action Level)	2	5.8, 10 [d]
Cattle urine	**Progesterone**	51	0.5 (Action Level)	3	0.6, 1.2, 2.1

Sample	Analysed for	Number of samples analysed	Reference Point (µg/kg)	Samples at or above the Reference Point	
				Number found	Concentration (µg/kg)
Cattle urine	**Testosterone**	62	0.4 (Action Level)	1	1.9
Cattle urine	**Zeranol**	342	1 (Action Level)	2	3.6, 7
Horse plasma	**Phenylbutazone**	49	5 (LOQ)	1	25
Pig kidney	**Antimicrobials**	796			
	Chlortetracycline		600 (MRL)	3	750, 1390, 3750
Pig kidney	**Sulphonamides**	799			
	Sulphadiazine		100 (MRL)	2	260, 260
Sheep kidney	**Cadmium**	47	1000 (MRL)	1	1210
Sheep kidney	**Lead**	47	500 (MRL)	2	840, 10070
Sheep liver	**Avermectins**	550			
	Ivermectin		100 (MRL)	1	180
Sheep urine	**Nortestosterone**	161	0.5 (Action Level)	16	0.6, 0.6, 0.6, 0.6, 0.9, 0.9, 1, 1, 1, 1, 1.3, 1.3, 1.4, 1.6, 2, 2

a = MRL in force from September 2006.
b = One sample contained residues of both malachite green and leucomalachite green.
c = The Action Level for nortestosterone was 0.5 µg/kg for males and 5.0 µg/kg for females.
d = Animal was found to be a pregnant female.

Follow-up samples taken as part of investigations into residues detected under the National Surveillance Scheme

Follow-up samples from the 2005 programme[1]

Sample	Analysed for	Number of samples analysed	Reference Point (µg/kg)	Samples at or above the Reference Point	
				Number found	Concentration (µg/kg)
Broiler feed	**Nicarbazin**	10	100 (LOQ)	1	1060
Eggs – caged	**Chlortetracycline**	2	200 (MRL)	0	
Eggs – caged	**Nicarbazin**	6	50 (LOQ)	0	
Eggs – free range	**Ionophores**	4	50 (LOQ)	0	
Eggs – free range	**Sulphonamides**	1	50 (LOQ)	0	
Eggs – perchery	**Ionophores**	2			
	Lasalocid		50 (LOQ)	1	290
Hen feed	**Nicarbazin**	6	500 (LOQ)	0	
Hen feed	**Sulphonamides**	3	50 (LOQ) [e]	0	
Hen water	**Sulphonamides**	3	50 (LOQ) [e]	0	
Milk	**Lead**	1	20 (MRL)	0	

Sample	Analysed for	Number of samples analysed	Reference Point (µg/kg)	Samples at or above the Reference Point	
				Number found	Concentration (µg/kg)
Salmon muscle	**Malachite green/ leucomalachite green** Leucomalachite green	2	2 (MRPL, sum of both substances)	1	7
Trout muscle	**Malachite green/ leucomalachite green** Leucomalachite green	9	2 (MRPL, sum of both substances)	7	6, 6, 7, 8, 9, 17, 89
Cattle serum	**Progesterone**	70	0.5 (Action Level)	2	1.7, 3.0
Cattle urine	**Nortestosterone**	4	0.5/5 [f] (Action Level)	0	
Sheep eyeball	**Nitrofurazone**	5	1 (LOQ)	0	
Sheep feed	**Nitrofurazone**	5	1 (MRPL)	0	
Sheep kidney	**Semicarbazide**	5	1 (MRPL)	0	
Sheep serum and urine [g]	**Nortestosterone**	53	0.5 (Action Level)	0	

1 This table includes all of the follow-up samples of the 2005 National Surveillance Programme. Some of these results were available when the 2005 VRC Annual Report was published and were included in that report. We considered it would be helpful to include all of the follow-up results in one table for ease of reference – even though there is an element of duplication with last year's report.

e = There are authorised sulphonamide products that can be used in poultry. These are not authorised for use in laying hens whose eggs are going for human consumption. Residues were found in eggs, so samples of feed and water were taken to see if sulphonamides were present.

f = The Action Level for nortestosterone was 0.5 µg/kg for males and 5.0 µg/kg for females

g = The normal matrix used for nortestosterone analysis is serum. But this is difficult to obtain from animals in the field, so 40 of the samples were of sheep urine.

Follow-up samples from the 2006 programme

Sample	Analysed for	Number of samples analysed	Reference Point (µg/kg)	Samples at or above the Reference Point	
				Number found	Concentration (µg/kg)
Eggs – caged	**Antimicrobials**	1	Various	0	
Eggs – free range	**Ionophores**	3	150 (MRL)	0	
Eggs – free range	**Nicarbazin**	2	25 (LOQ)	0	
Hen feed	**Ionophores** Lasalocid	8	150 (MRL)	1	300
Hen feed	**Nicarbazin**	1	500 (LOQ)	0	
Hen feed	**Sulphonamides**	2	50 (LOQ) [h]	0	
Salmon muscle	**Malachite green/ leucomalachite green** Leucomalachite green	2	2 (MRPL, sum of both substances)	2	1, 2
Trout muscle	**Malachite green/ leucomalachite green** Leucomalachite green	2	2 (MRPL, sum of both substances)	2	100, 200
Milk	**Aflatoxins**	1	0.05 (LOQ)	0	
Milk	**Antimicrobials**	2	Various	0	
Milk	**Cephalosporins**	1	Various (<70)	0	
Milk	**Quinolones**	1	Various (<50)	0	
Broiler liver	**Nicarbazin**	1	200 (MRL)	1	1400
Broiler feed	**Nicarbazin**	1	500 (Action Level)	0	
Cattle serum	**Oestradiol**	11	0.04 (Action Level)	0	
Cattle serum	**Progesterone**	36	0.5 (Action Level)	7	0.5, 0.5, 0.5, 0.6, 0.8, 1.0, 1.4

h = There are authorised sulphonamide products that could be used in poultry, but they should not be used in laying hens whose eggs are going for human consumption. Residues were found in eggs, so samples of feed and water were taken to see if sulphonamides were present.

Percentages are only quoted where over 100 samples had been analysed for the particular matrix/analyte combination.

National Surveillance Scheme 2006 – residues at or above the Reference Point

Eggs

- Lasalocid residues were detected in 4 of 249 samples tested as part of an ionophore screen (1.61%). These were at concentrations between 190 and 360 µg/kg.
- Nicarbazin residues were detected in 1 of 221 samples tested (0.45%). This was at a concentration of 40 µg/kg.
- Chlortetracycline residues were detected in 1 of 276 samples tested as part of an antimicrobial screen (0.36%). This was at a concentration of 380 µg/kg.

Farmed fish

- Malachite green and leucomalachite green residues were detected in 1 of 105 trout muscle samples tested (0.95%). This one sample contained 1 µg/kg of malachite green and 500 µg/kg of leucomalachite green.

Malachite green is not an authorised veterinary medicine and may not be used in food-producing animals. UK expert committees have concluded that both malachite green and leucomalachite green should be regarded as *in vivo* mutagens and that it would be prudent to regard leucomalachite green as a genotoxic carcinogen (http://www.advisorybodies.doh.gov.uk/com/malachit.htm). This conclusion was based on assessment of long-term toxicity studies carried out in the USA.

The Centre for Environment, Fisheries and Aquaculture Science (Cefas) carried out a follow-up investigation. This showed that there were also some salmon being raised on the site. Samples of both salmon and trout were taken for analysis.

Some of these follow-up samples were also found to contain residues. Leucomalachite green residues were found in 2 of 2 trout muscle samples. These were at concentrations of 100 and 200 µg/kg. Low concentrations of leucomalachite green residues were also detected in 2 of 2 salmon muscle samples. Neither sample contained in excess of the MRPL of 2 µg/kg.

The site operators indicated that the trout were for restocking angling lakes and their understanding was that if caught, the fish were normally released. This is unusual with trout, which are normally caught to be eaten. The VMD considered that it would not be possible to exclude the possibility that some trout would be eaten, so required all of the trout to be destroyed.

The salmon being raised on the site were very small and were for release to the wild. They would not return to the river for some years and it was concluded that the low concentrations of leucomalachite green present would have depleted before the salmon returned to the river and might be caught by anglers.

- Cadmium residues were detected in 1 of 6 trout muscle samples tested. This was at a concentration of 60 µg/kg.

Game

- Lead residues were detected in 1 of 8 partridge muscle samples tested. This was at a concentration of 16,000 µg/kg. The contamination was likely to be the result of lead fragments from the bird having been shot.

Honey

- No residues were detected at concentrations above the relevant Action Levels.

Milk

- Penicillin G residues were detected in 1 of 681 samples tested in an antimicrobial screen (0.15%). This was at a concentration of 10 µg/kg.
- Aflatoxin residues were detected in 1 of 105 samples tested (0.95%). This was at a concentration greater than 0.05 µg/kg.

Poultry

- Nicarbazin residues were detected in 26 of 305 broiler liver samples tested (8.8%). These were at concentrations between 210 and 3,100 µg/kg.
- Nicarbazin residues were detected in 1 of 62 broiler muscle samples tested. This was at a concentration of 210 µg/kg.
- Oxfendazole residues were detected in 2 of 130 broiler liver samples tested (1.54%). These were at concentrations of 13 and 15 µg/kg.
- Chlortetracycline residues were detected in 1 of 26 duck muscle samples tested as part of an antimicrobial screen. This was at a concentration of 150 µg/kg.
- Cadmium residues were detected in 1 of 3 hen liver samples tested. This was at a concentration of 640 µg/kg.

Red meat

- Antimicrobial residues were detected in 3 of 199 calf kidney samples tested (1.51%):
  - oxytetracycline residues were detected in 1 of 199 calf kidney samples tested (0.5%). This was at a concentration of 1,380 µg/kg.
  - chlortetracycline residues were detected in 2 of 199 calf kidney samples tested (1.01%). These were at concentrations of 1,670 and 2,235 µg/kg.
- Cadmium residues were detected in 4 of 89 cattle kidney samples tested. These were at concentrations between 1,320 and 1,980 µg/kg.
- Phenylbutazone residues were detected in 1 of 275 cattle plasma samples tested (0.36%). This was at a concentration of 1.3 µg/kg.

Phenylbutazone may not be used in cattle. This is because it can, in rare cases, cause serious blood disorders in humans, such as aplastic anaemia. Phenlybutazone is authorised for use in horses that are not intended for human consumption. It is used in horses to treat musculoskeletal disorders, such as rheumatoid and arthritic diseases.

Aplastic anaemia is a condition where the bone marrow does not produce sufficient new cells to replenish blood cells.

Hormones such as nortestosterone and progesterone occur naturally and so detection in the surveillance scheme is not proof of illegal administration.

The cause of the residues could not be determined. The follow-up investigation found that the medicines records on the farm were up-to-date, but there was no record of treatment of this bovine with phenylbutazone.

- Progesterone residues were detected in 17 of 373 cattle serum samples tested (4.56%). These were at concentrations between 0.5 and 3 µg/kg.
- Nortestosterone residues were detected in 2 of 615 cattle urine samples tested (0.33%). These were at concentrations of 5.8 and 10 µg/kg.
- Progesterone residues were detected in 3 of 51 cattle urine samples tested. These were at concentrations of 0.6, 1.2 and 2.1 µg/kg.
- Testosterone residues were detected in 1 of 62 cattle urine samples tested. This was at a concentration of 1.9 µg/kg.
- Zeranol residues were detected in 2 of 342 cattle urine samples tested (0.58%). These were at concentrations of 3.6 and 7 µg/kg.

Some strains of fusarium moulds can produce zeranol. Laboratory tests of the zeranol residues indicated that fungal contamination of cattle feed was the most likely cause of the residues.

- Phenylbutazone residues were detected in 1 of 49 horse plasma samples tested. This was at a concentration of 25 µg/kg.

Phenylbutazone can be used in horses to treat musculoskeletal disorders as mentioned above. But horses treated should not then enter the food chain. This is for the reasons given above.

A pony on the premises had recently been treated with phenylbutazone. Other horses had also previously been treated. The owners were adamant that the sampled animal had not had access to feed containing phenylbutazone. Passports for all the other horses on the premises have been returned to Defra so the database can be updated to show they must not go for human consumption.

- Chlortetracycline residues were detected in 3 of 796 pig kidney samples tested as part of an antimicrobial screen (0.38%). These were at concentrations of 750, 1,390 and 3,750 µg/kg.
- Sulphadiazine residues were detected in 2 of 799 pig kidney samples tested as part of an antimicrobial screen (0.25%). These were both at a concentration of 260 µg/kg.
- Cadmium residues were detected in 1 of 47 sheep kidney samples tested. This was at a concentration of 1,210 µg/kg.
- Lead residues were detected in 2 of 47 sheep kidney samples tested. These were at concentrations of 840 and 10,070 µg/kg.
- Ivermectin residues were detected in 1 of 550 sheep liver samples tested as part of an avermectin screen (0.18%). This was at a concentration of 180 µg/kg.
- Nortestosterone residues were detected in 16 of 161 sheep urine samples tested (9.93%). These were at concentrations between 0.6 and 2 µg/kg.

Non-Statutory Surveillance Scheme – residues at or above the Reference Point (see inside back cover)

Sample	Analysed for	Number of samples analysed	Reference Point (µg/kg)	Samples at or above the Reference Point	
				Number found	Concentration (µg/kg)
Rolling Programme					
Imported warm-water crustaceans	**Antimicrobials**	237	50 – 300		
	Tetracycline		100 (MRL)	1	230
	Nitrofurans	246			
	AOZ		1 (MRPL)	3	1.5, 1.7, 22
	SEM		1 (MRPL)	16	1, 1.2, 2.2, 2.3, 2.9, 3.0, 3.0, 3.3, 3.9, 4.6, 5.5, 5.9, 6.2, 6.3, 7.4, 7.5
Imported farmed fish	**Antimicrobials**	165	50 – 300		
	Oxytetracycline		100 (MRL)	1	110
	Crystal violet/ leucocrystal violet	300	0.5 (Action Level)		
	Crystal violet			1	1.8
	Malachite green/ leucomalachite green	300	2 (MRPL, sum of both substances)		
	Leucomalachite green			1	26
	Fluoroquinolones/ quinolones	300	30-600		
	Enrofloxacin		100 (MRL)	1	830
	Nitrofurans	300			
	AMOZ		1 (MRPL)	1	1.5
	AOZ		1 (MRPL)	1	1.4
Imported honey	**1,4-dichlorobenzene**	104	10 (Action Level)	2	19, 44
	Macrolides	104	2 (Action Level)		
	Lincomycin			1	10
	Tylosin			2	2.0, 2.1
Brand-Name Survey					
Imported warm-water prawns	**Nitrofurans**	102			
	AOZ		1 (MRPL)	2	1.1 [i], 14
	SEM		1 (MRPL)	2	1.6 [i], 1.6

AMOZ = 3-amino-5-morpholinomethyl-2-oxazolidinone.
AOZ = 3-amino-2-oxazolidinone.
SEM = Semicarbazide hydrochloride.
i = Residues of both AOZ and SEM were found in a single sample.

Rolling programme

Imported farmed warm-water crustaceans

- Tetracycline residues were detected in 1 of 237 samples tested in a screen of antimicrobial substances (0.42%). This was at a concentration of 230 µg/kg. The sample was from Sri Lanka. The Food Standards Agency (FSA) was informed and the European Commission issued a Rapid Alert.
- Nitrofuran residues were detected in 19 of 246 samples tested under the rolling programme (8.9%):
  - AOZ residues (3-amino-2-oxazolidinone) were found in 3 samples at concentrations of 1.5, 1.7 and 22 µg/kg (1.2%).
  - SEM residues (semicarbazide hydrochloride) were detected in 16 samples at concentrations between 1 and 7.5 µg/kg (6.5%).

The samples containing AOZ residues were from India. The samples containing SEM residues were from Bangladesh (11), India (3), Malaysia (1) and Thailand (1). The results were reported to the FSA and the European Commission issued Rapid Alerts. The alerts detailed where product recalls had been carried out, where products had been sent onto another country or where all stock had already been sold.

Nitrofurans were previously used as authorised veterinary medicines to treat some infections in farm animals. In 1995, they were banned in the EU and in foods imported into the EU. This was because of the likelihood of an increased risk of cancer if foods containing their residues were eaten over a long period. Nitrofurans are in Annex IV of Council Regulation 2377/90/EC, because no safe concentration can be set.

Imported farmed fish

- Oxytetracycline residues were detected in 1 of 165 samples tested in a screen of antimicrobial substances (0.61%), at a concentration of 110 µg/kg.

This was in a sample of tilapia from Thailand. Oxytetracycline is not authorised for use in farmed fish, so no residues should be present. The FSA was informed and the Commission issued a Rapid Alert. However, toxicological advice was that consumption of fish with such residues would not result in exceeding the Acceptable Daily Intake (ADI). Therefore, we would not expect any adverse health effects.

- Crystal violet residues were detected in 1 of 300 samples tested (0.33%). This was at a concentration of 1.8 µg/kg.

Crystal violet is of the same family of dyes as malachite green. It is, therefore, prudent to expect it may pose similar risks to malachite green. (See malachite green below.) Crystal violet was included in the surveillance as it was detected in produce imported into another Member State.

This sample, which was of salmon, was initially produced in Chile. It was then exported to Thailand for processing onto skewers and then re-exported to the UK. The retailer removed the product from sale and the brand owner carried out a product recall as a precautionary measure.

- Leucomalachite green residues were detected in 1 of 300 samples tested (0.33%). This was at a concentration of 26 µg/kg.

The sample was of catfish from Thailand. The FSA was informed and the remaining stock was withdrawn. A small amount was unaccounted for. The FSA informed the European Commission, which issued a Rapid Alert.

Malachite green is banned for use in food-producing species in the EU and in food imported into the EU. UK expert committees have concluded that both malachite green and leucomalachite green should be regarded as *in vivo* mutagens and it would be prudent to regard leucomalachite green as a genotoxic carcinogen (http://www.advisorybodies.doh.gov.uk/com/malachit.htm). This conclusion was based on assessment of long-term toxicity studies carried out in the USA.

- Enrofloxacin residues were detected in 1 of 300 samples tested in a fluoroquinolone/quinolone screen (0.33%). This was at a concentration of 830 µg/kg. At the concentration detected, toxicological advice was that any risk to consumers was likely to be very small. The FSA was informed and it advised that action should be taken to remove the sample from the food chain. The FSA also informed the European Commission, which issued a Rapid Alert.
- Nitrofuran residues were detected in 2 of 300 samples tested (0.67%):
  - AMOZ residues (3-amino-5-morpholinomethyl-2-oxazolidinone) were detected in one sample at a concentration of 1.5 µg/kg (0.33%).
  - AOZ residues (3-amino-2-oxazolidinone) were detected in one sample at a concentration of 1.4 µg/kg (0.33%).

One sample was of sea bass from Greece (AMOZ). All stock had been sold, so no further action was taken. The other sample was of tilapia imported from China (AOZ). The importer withdrew its stock from sale. As mentioned above, nitrofurans are banned in the EU and in foods imported into the EU. The results were reported to the FSA, which informed the European Commission, which issued a Rapid Alert in respect of the sea bass.

Imported honey

- 1,4-dichlorobenzene residues were found in 2 of 104 samples tested (1.9%). These were at concentrations of 19 and 44 µg/kg.

1,4-dichlorobenzene is not authorised as a veterinary medicine and so residues should not be present in honey. One sample was labelled as produced in New Zealand and Australia. Subsequent investigations found that the contaminated part of the sample had originated in Australia. The exporter has taken steps to ensure that future shipments are tested prior to export.

The second sample was from New Zealand. The New Zealand authorities have reported that they are developing a test for 1,4-dichlorobenzene. All exporters must now source their honey only from producers that have signed a declaration that they have not used 1,4-dichlorobenzene.

- Residues were detected in 3 of 104 samples tested (2.88%) in a multi-residue macrolide method:
  - lincomycin residues were detected in 1 sample at a concentration of 10 µg/kg (0.96%).
  - tylosin residues were detected in 2 samples at concentrations of 2 and 2.1 µg/kg (1.9%).

Lincomycin is not a macrolide antibiotic, but is detected by the multi-residue method. It is an antibiotic derived from *Streptomyces lincolnensis*.

The sample containing lincomycin came from China, while the samples containing tylosin came from Argentina. Neither the lincomycin nor the tylosin residues were considered to be a risk to consumer health at the concentrations detected. Therefore, no product recall was instituted, but the Commission issued Rapid Alerts for information.

Brand-name survey of imported warm-water prawns

- Nitrofuran residues were detected in 3 of 102 warm-water prawn samples tested (2.9%).

One sample contained both AOZ (3-amino-2-oxazolidinone) and SEM (semicarbazide hydrochloride) at concentrations of 1.1 and 1.6 µg/kg respectively. This sample was from Thailand. The product was withdrawn and existing stocks destroyed. The Thai authorities have reported that they have taken action against the producer.

Of the other two samples, one contained AOZ residues at concentration of 14 µg/kg and the other, SEM at a concentration of 1.6 µg/kg. These came from Thailand and India. The wholesalers and the companies buying from them were contacted over the residues and remaining stocks were removed from sale.

A full report on the brand-name survey is available on the VRC website – www.vet-residues-committee.gov.uk.

As noted above, nitrofurans are banned in the EU and in foods imported into the EU. The FSA was informed and the Commission issued Rapid Alerts.

Industry data

The VRC has been keen to see surveillance data from other sources. It helps to get a more complete picture of the incidence of residues and what substances are being detected. The VRC was happy to receive results from two retailers and hopes that others will respond to its request for such data in future.

Retailer 1

<RL in the table indicates there was no detectable residue in the sample

Sample	Analysed for	Number of samples	Reporting limit (RL) (µg/kg)	Result (µg/kg)
Hen eggs	**Antimicrobial screen**	2	tetracyclines 600 ß-lactams 10 sulphonamides 100	<RL
	Lasalocid	2	20	<RL
	Nicarbazin	2	25	<RL
Quail eggs	**Lasalocid**	1	20	<RL
Hog casings	**Chloramphenicol**	1	0.3	<RL
	Nitrofurans	1	1	<RL
Honey	**Antimicrobial screen**	4	tetracyclines 50 ß-lactams 10 sulphonamides 50	<RL
	Chloramphenicol	4	0.3	<RL
	Nitrofurans	4	1	<RL
	Streptomycin	4	20	<RL

Sample	Analysed for	Number of samples	Reporting limit (RL) (µg/kg)	Result (µg/kg)
Pâté	**Antimicrobial screen**	2	tetracyclines 600 ß-lactams 10 sulphonamides 100	<RL
	Nicarbazin	2	25	<RL
Ground pork	**Antimicrobial screen**	1	tetracyclines 50 ß-lactams 10 sulphonamides 50	<RL
Poultry muscle	**Antimicrobial screen**	7	tetracyclines 50 ß-lactams 10 sulphonamides 50	<RL
	Chloramphenicol	7	0.3	<RL
	Nitrofurans	7	1	<RL
	Lasalocid	5	20	<RL
	Nicarbazin	5	25	<RL
Salmon	**Antimicrobial screen**	6	tetracyclines 600 ß-lactams 10 sulphonamides 100	<RL
	Avermectins	6	10	<RL
	Malachite & leucomalachite green	6	2	<RL
	Crystal violet & leucocrystal violet	6	2	<RL
Sea bass	**Antimicrobial screen**	1	tetracyclines 600 ß-lactams 10 sulphonamides 100	<RL
	Malachite & leucomalachite green	1	2	<RL
	Crystal violet & leucocrystal violet	1	2	<RL
Trout	**Antimicrobial screen**	2	tetracyclines 600 ß-lactams 10 sulphonamides 100	<RL
	Avermectins	2	10	<RL
	Malachite & leucomalachite green	2	2	<RL
	Crystal violet & leucocrystal violet	2	2	<RL
Cockles	**Antimicrobial screen**	1	tetracyclines 600 ß-lactams 10 sulphonamides 100	<RL
	Chloramphenicol	1	0.3	<RL
	Nitrofurans	1	1	<RL
	Streptomycins	1	50	<RL

Sample	Analysed for	Number of samples	Reporting limit (RL) (µg/kg)	Result (µg/kg)
Mussels	**Antimicrobial screen**	2	tetracyclines 600 ß-lactams 10 sulphonamides 100	<RL
	Chloramphenicol	2	0.3	<RL
	Nitrofurans	2	1	<RL
	Streptomycins	2	50	<RL
Prawns	**Antimicrobial screen**	8	tetracyclines 600 ß-lactams 10 sulphonamides 100	< RL
	Chloramphenicol	8	0.3	<RL
	Nitrofurans	8	1	<RL
Scallops	**Antimicrobial screen**	1	tetracyclines 600 ß-lactams 10 sulphonamides 100	<RL
	Chloramphenicol	1	0.3	<RL
	Nitrofurans	1	1	<RL
	Streptomycins	1	50	<RL

Retailer 2

Sample	Tested for	Number of samples	Residues detected	Concentrations (µg/kg)
Cheese	**Tetracyclines**	5		
	Sulphonamides	5		
	Chloramphenicol	5		
Hen eggs	**Antimicrobial screen**	1		
	Lasalocid	1		
	Nicarbazin	1		
Honey	**Streptomycin & Dihydrostreptomycin**	6		
	Sulphonamides	6		
	Chloramphenicol	6		
	Nitrofurans	6		
	Dapsone	6		
	Tylosin	6		
Beef	**Antimicrobial screen**	3	1	Screened positive[j]
	Avermectins	3		
	Benzimidazoles	3		
	ß-agonists	3		
	Levamisole	3		
	Tranquillisers	3		
	Trenbolone	3		

Sample	Tested for	Number of samples	Residues detected	Concentrations (µg/kg)
Lamb	**ß-agonists**	6		
	Levamisole	6		
	Tranquillisers	6		
	Trenbolone	6		
	Zeranol	6		
Pork	**ß-agonists**	2		
	Levamisole	2		
	Tranquillisers	2		
	Trenbolone	2		
	Zeranol	2		
Poultry, includes chicken, turkey, duck and processed poultry, such as breaded portions and Kievs	**Antimicrobial screen**	17		
	Chloramphenicol	17		
	Dimetridazole	3		
	Nitrofurans	17		
	Nitroimidazoles	14		
	Quinolones and fluoroquinolones	17	1	Screened positive[j]
	Tetracyclines	14		
	Ionophores	17		
	Lasalocid	17		
	Nicarbazin	17		
Veal	**Antimicrobial screen**	2		
	Avermectins	2		
	Benzimidazoles	2		
	ß-agonists	2		
	Levamisole	2		
	Tranquillisers	2		
	Trenbolone	2		
Salmon	**Antimicrobial screen**	13		
	Avermectins	13	5	10, 28, 37, 42, 72[k]
	Benzimidazoles	13		
	Chloramphenicol	13		
	Quinolones and fluoroquinolones	13		
	Nitrofurans	13		
	Malachite green/ leucomalachite green	13		
	Nitroimidazoles	1		

Sample	Tested for	Number of samples	Residues detected	Concentrations (µg/kg)
Trout	**Antimicrobial screen**	6		
	Avermectins	6	1	37 [k]
	Benzimidazoles	6		
	Chloramphenicol	6		
	Quinolones and fluoroquinolones	6		
	Nitrofurans	6		
	Malachite green/ leucomalachite green	6		
Other Fish Includes Sea bass, Sea bream, Jellied eels and Tilapia	**Antimicrobial screen**	8		
	Avermectins	8		
	Benzimidazoles	8		
	Chloramphenicol	8		
	Quinolones and fluoroquinolones	8		
	Nitroimidazoles	1		
	Nitrofurans	8		
	Malachite green/ leucomalachite green	8		
Prawns	**Chloramphenicol**	10		
	Nitrofurans	10		
	Malachite green/ leucomalachite green	10		

j = Although the screening tests were positive, the confirmatory analyses were negative. Screening tests are designed to be very sensitive and so flag up 'false positives'. The confirmatory analyses indicate that the samples contained no detectable residues of the substances sought.

k = Emamectin residues were detected, however, all were at concentrations below the Maximum Residue Limit of 100 µg/mg.

The Committee's Year

The full Committee held four meetings in 2006, including an Open Meeting. As well as the VRC members and the Secretariat provided by the VMD, a number of advisors have attended the meetings. The advisors, while not members of the VRC, were able to help inform the Committee's discussions on a range of subjects. Organisations that provided advisors during the year were:

- Agri-Food and Biosciences Institute (AFBI) of Northern Ireland
- Central Science Laboratory (CSL)
- Food Standards Agency (FSA)
- LGC
- State Veterinary Service (SVS) of Defra
- Veterinary Medicines Directorate (VMD).

The Committee was involved in a number of issues and activities during the year:

- helping plan the National Surveillance Scheme (NSS) and Non-Statutory Surveillance Scheme for 2007
- reviewing the results of the VMD's surveillance schemes
- holding its third Open Meeting on 18 October at the Fishmongers' Hall, London
- evaluating oxytetracycline residues detected in young male calves
- considering nortestosterone residues detected in the urine of male cattle which had been submitted to abattoirs after emergency on-farm slaughter
- reviewing the Committee's Matrix Ranking system. Matrix Ranking helps Members prioritise the sampling carried out under the VMD's Non-Statutory Surveillance Scheme
- considering the options for a brand-name survey for 2006 and recommending a survey of warm-water prawns for nitrofurans
- submitting its business case for extra funding for the VMD's Non-Statutory Surveillance Scheme
- considering whether the Committee should consult on its plans for the Non-Statutory Surveillance Scheme in a similar way to the Pesticides Residues Committee
- working to reduce the incidence and concentrations of lasalocid and nicarbazin residues in poultry products
- testing paired samples of broiler liver and broiler muscle from the same batches of birds to estimate the likelihood of consumers being exposed to nicarbazin residues above the MRL from eating muscle.

The Agri-Food & Biosciences Institute (AFBI) was created on 1 April 2006 as an amalgamation of the Department of Agriculture and Rural Development (DARD) Science Service and the Agricultural Research Institute of Northern Ireland (ARINI). AFBI is a DARD Non-Departmental Public Body (NDPB).

LGC was previously the Laboratory of the Government Chemist.

From 1 April 2007, the State Veterinary Service became part of Animal Health, another agency of Defra.

Planning the Surveillance Schemes

VRC Members were actively involved in advising VMD on planning the surveillance programmes for 2007. In September 2006, two Members attended the NSS planning meeting to help produce the 2007 plan. The full Committee later approved the plan. The NSS is described in detail on page 28 and on the VRC's website (www.vet-residues-committee.gov.uk).

The VRC's Non-Statutory Planning Subgroup met in September 2006 to discuss the plan for 2007, drafted by the VMD. This had been based on the VRC's recommendations and the outcome of its Matrix Ranking assessments (see below). The VRC was then able to comment on the plan before it was finalised.

Reviewing the results

At the four VRC meetings, the Committee reviewed the latest results of the VMD's surveillance schemes. Members were able to ask detailed questions of the advisors, requesting extra information where necessary on causes and follow-up actions. The Committee then advised the VMD and the FSA on the actions they might wish to take.

Open Meeting

The minutes of the meeting and an additional document giving answers to some questions that there had not been time to answer at the meeting are on the VRC website – www.vet-residues-committee.gov.uk.

The Committee held its 3rd Open Meeting on 18 October at Fishmongers' Hall in London. The Open Meeting gives the VRC an opportunity to hear the views of stakeholders, and is part of the Committee's commitment to openness.

In the morning session, the Committee discussed its normal business, including assessing the results of the surveillance schemes. At the end of the morning session there was an opportunity for stakeholders to ask questions and give their views.

In the afternoon, a Member of the Committee and others involved in the NSS gave presentations that formed a case study demonstrating how the scheme worked. These included:

- an overview of the NSS
- sampling on a fish farm and the follow-up procedures where an illegal substance had been found
- analysing samples for residues of veterinary medicines and
- the legal requirements when residues of an illegal substance are found.

There was also a discussion on the merits of recommending a more open approach to the plans for the Non-Statutory Surveillance Scheme. The Committee will make a decision on this in 2007 (see below).

As in the morning session, there was an opportunity for stakeholders to ask questions.

The subjects of questions to the Committee included:

- publishing individual analytical costs
- the possible cocktail effect of combinations of residues of veterinary medicines
- funding of the Non-Statutory Surveillance Scheme
- the European Union's Food and Veterinary Office's concerns over antibiotic residues in milk used in one British dairy
- the VRC's Matrix Ranking system.

Oxytetracycline residues detected in young male calves

The Committee was alerted to an emerging issue towards the end of 2005. A number of young male calves had been detained at abattoirs and sampled as 'Suspects'. Analyses had detected residues of oxytetracycline at concentrations above the MRL. The residues were not of immediate concern for consumer health, but there was the possibility that a sensitive individual consuming meat from such an animal could suffer a mild stomach disturbance. Also, very high doses of tetracyclines can cause some discolouration of developing teeth in children. It is very unlikely that the residues detected would have resulted in such discolouration.

The majority of the calves were taken to livestock sales by farmers and then sold to dealers. They in turn took the animals to slaughterhouses or delivered them the next day. All claimed not to have treated the animals.

The VMD wrote to the Association of Livestock Auctioneers and the Association of British Abattoir Owners to alert them to the problem, as it was clear that few checks were taking place on the residue status of such calves. The Issue was picked up and reported in the Veterinary Record and Veterinary Times.

The Committee also recommended the VMD to increase the numbers of calf samples analysed for antimicrobial substances under the NSS. This was increased from 72 in 2005 to 200 in 2006. The Committee will continue to look closely at this issue and consider what other actions might be required.

Nortestosterone residues detected in the urine of male cattle submitted to abattoirs after on-farm emergency slaughter

Officials from Northern Ireland reported residues of nortestosterone in male cattle submitted to abattoirs after on-farm emergency slaughter (OFES). These were unusual results as nortestosterone was not thought to occur naturally in male cattle. The available evidence suggested that eating beef with nortestosterone residues, at the concentrations found, was unlikely to pose a risk, but this was based on limited data. Nortestosterone has not been proposed as a veterinary medicine, so has not been subject to a systematic assessment. The issue is more fully reported on page 26.

Matrix Ranking review

Matrix Ranking is a system developed by the Committee to prioritise which substances should be included in the VMD's Non-Statutory Surveillance Scheme. It is important to the Committee that decisions should be evidence-based and understood by interested parties. The VRC was pleased that the European Commission has shown interest in the system during its review of Directive 96/23/EC, on which the UK's NSS is based.

VRC members and officials from the VMD and FSA met on 18 September 2006 to review the Matrix Ranking system. At the meeting, it was suggested that the system could be further developed to take account of additional adverse effects. This was seen as improving the transparency of the system.

What is 'Suspect' sampling?

In addition to the normal sampling for the NSS, animals or carcases that arouse the suspicions of authorised officers can be sampled as 'suspects'.

For example, if a lump, which might indicate an injection of a veterinary medicine, is noted on a carcase, the Meat Hygiene Service Officer can detain it at the abattoir. The carcase will be held at the abattoir until the results of analyses of samples taken are known. If the analyses detect residues of an unauthorised substance, or residues of an authorised substance at a concentration above the relevant Maximum Residue Limit, then the carcase does not enter the food chain and is destroyed.

The Matrix Ranking system and review is described in more detail on page 37. A note of the review meeting can be found in meeting paper VRC/07/05

Brand-name survey for unauthorised substances in warm-water prawns

The VRC previously decided that it could recommend one brand-name survey a year, where this was thought necessary. In 2006, a survey was carried out for nitrofuran residues. These substances were chosen, as they should not be present in foods, whether these are produced in the EU or imported from a non-member state. Previous surveys have identified that these substances have continued to be found in imported foods, particularly warm-water prawns. The results are given on page 13.

The report on the brand-name survey and the full results are available on the VRC website www.vet-residues-committee.gov.uk.

Business case for extra funding for the Non-Statutory Surveillance Scheme

The VRC think that the VMD's Non-Statutory Surveillance Scheme requires more funding to allow the level of surveillance that the Committee considers desirable. In 2006, it submitted a revised business case for extra funding. However, the financial pressures on Defra have not allowed it to allocate extra money.

While the Committee understands the great pressures on public finances, it thinks the case for extra funding for testing imported food is strong. The Committee was pleased to hear that the VMD is examining other possible routes to obtain sufficient funds to support the level of testing that the VRC see as desirable – an equivalent level of assurance with UK-produced foods. This issue was raised by stakeholders at the VRC Open Meeting.

Possibility of publishing plans for the Non-Statutory Surveillance Scheme

The Committee made a recommendation soon after it was formed that surveillance plans should not be published in advance. Previously, the VMD had published its plans each year. We made this recommendation to avoid the possibility of some producers changing the substances they used to avoid residues being detected.

More recently, the Committee has been reviewing this approach. We know the Pesticides Residues Committee produces draft plans for its surveillance. They are not detailed, but lay out the types of commodities and groups of substances it may include in the following year's surveillance. These outline plans are then released for public consultation. Suggestions received can be assessed before final decisions are taken.

We understand that publishing plans is a sensitive issue, balancing the need to be open and transparent with the need to have an effective programme. To gather views on the issue, we tabled it for discussion at our Open Meeting in October. The VRC will consider the responses before making a final decision.

We understand that publishing plans is a sensitive issue, balancing the need to be open and transparent with the need to have an effective programme. To gather views on the issue, we tabled it for discussion at our Open Meeting in October. The VRC will consider the responses before making a final decision on whether to recommend the change to Defra ministers.

Reducing the incidence and concentrations of coccidiostat residues in poultry products

The Committee welcomed the launch of an initiative facilitated by the FSA to reduce the incidence and concentrations of nicarbazin residues. The VRC decided that it was the right time to disband its own Feed Additive Subgroup, but will give the Committee's support to the new initiative. The VRC previously reported the key reasons for some of the residues:

- lasalocid residues in eggs were mainly the result of feed having been contaminated with lasalocid at the feed mill and
- nicarbazin residues had often occurred due to poor bin management practices on farm resulting in contamination of unmedicated feed.

Last year, the Committee was pleased to report the greatly reduced incidence of lasalocid residues in hens' eggs and the reduction in the incidence of nicarbazin residues in broiler liver. The incidence of nicarbazin residues above the Codex MRL in 2006 was similar to the 2005 figure, at 8.5% of the samples tested. The Committee was disappointed that the number of positives for lasalocid increased from 1 to 4 this year (1.6% of samples tested). This was despite an MRL being set for lasalocid at 150 µg/kg (there were no samples at concentrations between the old reporting limit of 50 µg/kg and the new MRL).

Testing of paired samples of liver and muscle demonstrate lower concentrations of nicarbazin residues in muscle

In the UK, when we look for nicarbazin residues in broiler chickens, we test liver. This is the tissue that is most likely to contain residues. However, some other countries test muscle. As nicarbazin will occur at lower concentrations in muscle than it would in liver, their results may show fewer positive samples.

The Committee acknowledges that for most people, chicken muscle is a more important component of the diet than chicken liver. Therefore, it wanted to estimate the possible consumer exposure to nicarbazin residues from chicken muscle. So, the VRC recommended that in GB, the VMD take 'paired' samples of liver and muscle from broiler chickens. Where nicarbazin residues were detected in the liver, the corresponding muscle samples were also analysed.

Of the 25 muscle samples tested, only one contained residues above the MRL (Table 2 overleaf). This was where the liver sample had contained 3,100 µg/kg.

Overall, the liver samples with residues above the MRL contained approximately 10-30 times the concentration of their corresponding muscle samples.

Overall, the liver samples with residues above the MRL contained approximately 10-30 times the concentration of their corresponding muscle samples.

If we assume that a conservative ratio of 10:1 for residues in the liver compared to muscle applied in 2001-2005, we might expect at most that 4 or 5 residues in muscle might have been above the MRL. But it is likely that, in practice, there would have been fewer. However, the Committee remain committed to reducing the incidence and concentrations of nicarbazin in poultry.

Year	Number of samples taken	Number of liver samples above the MRL	Estimate of the number of muscle samples above the MRL
2001	210	35	5
2002	353	32	5
2003	281	36	4
2004	277	36	4
2005	306	27	3
2006	305	25 [l]	1

l = In the main results, 26 positives were reported. This includes one sample from Northern Ireland, which was not included in the paired analysis protocol. That liver sample contained 220 µg/kg, so the muscle would have been unlikely to contain residues of nicarbazin above the MRL.

Table 2 Concentration of nicarbazin residues detected in broiler muscle samples was less than a tenth of that found in the corresponding liver sample.

Concentration detected in the liver sample (µg/kg) [m]	Concentration detected in the muscle sample (µg/kg)	Ratio of residue concentration liver : muscle
210	<LOQ	–
230	20	11.5
230	20	11.5
240	20	12.0
250	10	25.0
250	<LOQ	–
260	<LOQ	–
280	20	14.0
330	<LOQ	–
350	20	17.5
350	20	17.5
380	30	12.7
400	20	20.0
400	<LOQ	–
480	50	9.6
490	40	12.3
680	40	17.0
690	20	34.5
780	50	15.6
880	40	22.0
920	60	15.3
980	80	12.3
1,700	150	11.3
2,000	140	14.3
3,100	210	14.8

m = Data are presented where the corresponding liver sample contained residues of nicarbazin at a concentration above the MRL of 200 µg/kg.

Nortestosterone Residues Detected in the Urine of Male Cattle Submitted to Abattoirs after On-Farm Emergency Slaughter

Officials from Northern Ireland reported residues of nortestosterone in the urine of male cattle submitted to abattoirs after on-farm emergency slaughter (OFES). These were unusual results as nortestosterone was not thought to occur naturally in male cattle. It was possible that the hormone was being produced in response to the stress of the injury that necessitated their slaughter on-farm. However, there was also the possibility of illegal use of nortestosterone.

The available evidence suggested that eating beef with nortestosterone residues at the concentrations detected was unlikely to pose a risk, but this was based on limited data. Nortestosterone had not been proposed as a veterinary medicine, so had not been subject to a systematic safety assessment.

On-farm emergency slaughter

Healthy animals that have suffered an accident on farm and are unable to be transported for welfare reasons can be slaughtered on the farm. They can then be submitted to an abattoir for processing.

All OFES cattle in Northern Ireland were tested for nortestosterone from April 2006. Any that tested positive were being excluded from the food chain, on a precautionary basis.

The Agri-Food and Biosciences Institute (AFBI) carried out follow-up investigations on the farms of origin of the positive animals. Up to October 2006, samples from some 700 live male cattle were tested. No detectable residues of nortestosterone were found. AFBI also tested a small number of urine samples from OFES male cattle from three other areas of the EU, including GB. A small number of these samples also tested positive.

The authorities in NI asked Professor Wall of University College, Dublin, to carry out a detailed investigation into the issue. His terms of reference included reviewing the whole collection and processing of samples from cattle, with special attention to those samples collected from animals slaughtered on farm and those injured during transport to the abattoir.

Professor Wall asked the RIVM-ARO laboratory of Bilthoven in the Netherlands to undertake an audit of the analytical procedures against ISO 17025 and Commission Decision 2002/657/EC (see page 41).

Professor Wall has concluded that the procedures in NI for dealing with the samples were sound. He noted that urine samples from male OFES cattle from other EU Member States also tested positive. He suggested that this could be an EU-wide issue and recommended that other Member States should be encouraged to test OFES animals for nortestosterone. The RIVM-ARO laboratory concluded that the NI laboratories' analysis for nortestosterone in bovine urine was entirely satisfactory.

Professor Wall noted that there was no test that could differentiate between naturally occurring and illegally administered nortestosterone. He highlighted the need for such a test. AFBI is currently developing a test that would be used to give good evidence of whether any nortestosterone residues detected in particular animals had been illegally administered or were naturally occurring.

The Committee will continue to monitor the situation and consider what recommendations would be appropriate.

Professor Wall's full report can be found at: http://www.dardni.gov.uk/wall_report.pdf

Professor Wall had concluded that the procedures in NI for dealing with the samples were sound.

The RIVM-ARO laboratory concluded that the NI laboratories' analysis for nortestosterone in bovine urine was entirely satisfactory.

The authorities in Northern Ireland removed the requirement to test all OFES animals in March 2007.

Residues Surveillance

The National Surveillance Scheme

All EU Member States must carry out surveillance to check that their home-produced foods of animal origin are safe. In the UK, the National Surveillance Scheme (NSS) covers: red meat, poultry meat, wild and farmed game, farmed fish, milk, honey and eggs. Annexes to the European legislation set down the number of samples that Member States must take, based on forecast production. The legislation also lays down broad parameters on the groups of substances to be surveyed.

On page 30 is a flowchart of how the NSS works. There is a more detailed explanation on our website, www.vet-residues-committee.gov.uk.

Types of substances analysed for in the National Surveillance Scheme

The EU legislation, Council Directive 96/23/EC, which sets the criteria for operating the National Surveillance Scheme, does not require all substance types to be analysed for in every industry sector. For example, examining honey for substances that promote growth in beef cattle or pigs would not be sensible. Below is a table of the types of substances that were sought in the different sectors. For details of all of the substances sought, please see the annex to this report on the VRC website (www.vet-residues-committee.gov.uk), which contains all of the results of the surveillance.

Type of substance	Product types						
	Eggs	Farmed fish	Game	Honey	Milk	Poultry	Red meat
Hormones			X			X	X
Gestagens							X
ß-agonists			X			X	X
Annex IV substances [n]	X	X	X	X	X	X	X
Antimicrobials [o]	X	X	X	X	X	X	X
Anthelmintics	X	X	X		X	X	X
Non Steroidal Anti-Inflammatory Drugs (NSAIDS)			X		X		X
Coccidiostats	X		X			X	X
Thyrostats							X
Dexamethasone/Betamethasone							X
Carbadox [p]							X
Sedatives			X				X
Pesticides and PCBs	X	X	X	X	X	X	X
Heavy metals		X	X	X	X	X	X
Mycotoxins		X		X	X	X	X
Malachite/Leucomalachite Green		X					

n = Annex IV substances are ones for which no safe concentration can be set for any residues and are, therefore, banned from use in food-producing animals.
o = A general screening method can be supplemented by specific tests for sulphonamides, tetracyclines etc., dependant on the product type.
p = Carbadox is not specifically listed under Directive 96/23/EC. But, because of concerns about possible use in the past, it is included in the UK's surveillance programme.

How the National Surv

Who attends the September planning meeting?

As well as two members of the VRC, a number of organisations are represented:

– Veterinary Medicines Directorate

– Food Standards Agency

– State Veterinary Service

– Department for Environment Food and Rural Affairs

– Agri-Food and Biosciences Institute (see page 40)

– Meat Hygiene Service

– LGC (formerly the Laboratory of the Government Chemist)

– Central Science Laboratory

1 Representatives of the VRC and others meet each September to discuss the plan for the following year. The draft plan is then examined and approved by the VRC. The plan is also submitted to Brussels to ensure it conforms to the relevant EU law.

Planning the Programme

5 Taking account of toxicological advice received and other information, the VRC can give its view on the significance of particular residues and the actions that might be taken, for example to identify the cause of the residue.

The results of the surveillance are fed into the planning process for next year.

Advice Given

4 The VRC sees all of the results of the surveillance. The Committee can consult the FSA and VMD to give a scientific opinion on the significance of any residues for human health.

Results Assessed

Follow-up Investigation

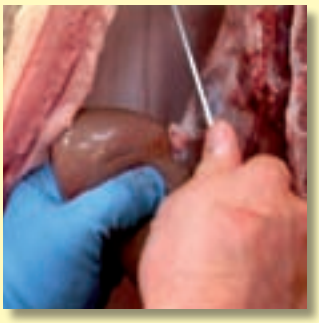
Results Published

All of the results are published

As well as this report, all of the results are published in papers to the VRC on our website. The VMD also publish the results in its quarterly newsletter 'MAVIS', which is available on its website. The website addresses are:
www.vet-residues-committee.gov.uk
www.vmd.gov.uk

eillance Scheme Works

2 Samples are collected and secured with a tamper-proof seal. This allows any sample to be traced back to its farm of origin.



Samples Collected

Samples Analysed

Initial Assessment of Results

3 Follow-up investigations are carried out into the causes of all residues above the relevant MRL or Action Level. The farmer will also be given advice on how to avoid residues in the future.

What happens in Brussels?

Officials from the European Commission and all of the EU Member States examine the plans. This is to ensure that **all** Member States' plans conform to the relevant EU law (Council Directive 96/23/EC).

The Non-Statutory Surveillance Scheme

The VRC has worked to refocus this scheme. The Committee recommended that, with the limited funds available, it should target areas where residues of concern are most likely to occur. Imported raw produce was identified as the primary target for investigation. As such, the scheme continues to complement the National Surveillance Scheme (NSS), which looks at UK produce. The NSS can select the best tissue in which to detect residues. However, the Non-Statutory Surveillance Scheme can only collect the tissue imported. For example chicken muscle, which is likely to have lower residues than chicken liver.

The VRC are very aware that there are other areas where it would be valuable to have surveillance, therefore, the Committee has developed its own system to ensure that the funds are used to best effect, by prioritising the substances of concern. This system – Matrix Ranking – is explained on page 37.

Overleaf is a representation of how the Non-Statutory Surveillance Scheme operates. A fuller explanation is on the VRC's website at: www.vet-residues-committee.gov.uk.

Foods analysed under the Non-Statutory Surveillance Scheme (see results on page 13)

Rolling programme

The foods selected for analysis under the rolling programme, which runs from April to December, were:

- cooked poultry – imported
- raw poultry – imported
- farmed fish – imported
- honey – imported
- farmed warm-water crustaceans – imported.

Not all foods were analysed for all the substances in the scheme. Based on intelligence and previous results, the analyses carried out on a particular food were prioritised. Samples were collected either from shops, wholesalers or Border Inspection Posts. A large proportion was from countries outside the EU.

Brand-name survey of warm-water prawns

The VRC recommended that the VMD carry out a brand-name survey of imported warm-water prawns for residues of nitrofurans. Nitrofurans are banned for use in the EU because of the possible increased risk of cancer that has been associated with long-term exposure to such substances. Their residues should not be present in foods exported to the EU. However, the Committee is concerned that such residues have regularly been found in some imported foods.

How the Non-Statutory S

1 A number of factors, such as toxicity and previous evidence of residues can be fed into the VRC's Matrix Ranking system to give a prioritised list of substances.

Planning the Programme

Results Assessed

5 The VMD can:

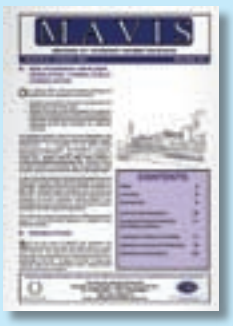
- alert the FSA, who can take the actions listed above
- inform the retailer or importer to get details of the product
- ask Defra's Chief Veterinary Officer to write to the country of origin requesting to be kept informed of any action taken to prevent such residues in future.

Advice Given

6 The FSA can:

- alert consumers
- ask local authorities to investigate
- request and oversee product withdrawals
- alert the European Commission and so other EU Member States of residues problems.

Action



All of the results are published

As well as this report, all of the results are published in papers to the VRC on our website. The VMD also publish the results in its quarterly newsletter 'MAVIS', which is available on its website. The website addresses are:
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www.vmd.gov.uk

urveillance Scheme Works

2 The budget for the year can be applied to the list to see which analyses can be afforded for the final plan in any particular year.

Budgeted Plan Produced

3 Samples are collected from shops, wholesalers and Border Inspection Posts.

Samples Collected

Samples Analysed at CSL

4 The VRC sees all of the results of the surveillance. This allows members to comment and ask questions on the results and assess their significance for consumers.

More detail on operating the Scheme

A fuller explanation of how the Non-Statutory Surveillance Scheme operates is available on the VRC website in the Surveillance Information section.

The Veterinary Residues Committee works to ensure that use of veterinary medicines does not result in residues of health concern for the consumer

Matrix Ranking for prioritising substances for the Non-Statutory Surveillance Scheme

The VRC's review of Matrix Ranking

The Committee developed Matrix Ranking to help prioritise the substances it recommends for surveillance. With the limited funds available for the Non-Statutory Surveillance Scheme not all substances or foods can be included each year. The Committee hopes that by adopting a system where each substance can be assessed transparently against published criteria and weightings, people will understand why particular choices have been made. It would also allow stakeholders to challenge the choices made or make further suggestions.

The Committee wanted the system to be more robust and rigorous. The Matrix Ranking Subgroup met on 18 September 2006 to address this. It looked at a number of issues. For example, the Subgroup recommended:

- adding additional health effects to the Hazard category
- when an ADI had not been set, the highest score would normally be applied, but the Committee retained the provision to adjust this on a case-by-case basis
- changing the method of calculating the overall score for candidate substances as set out below.

To calculate the overall score, it was agreed that instead of a simple addition of the categories, they would be grouped and the three groups multiplied together:

1. scores for Hazard (A) and Potency (B) would be added up
2. scores would also be added up for:
    - proportion of the diet coming from treated animals (C)
    - frequency of dosing with a particular substance (D)
    - evidence of high exposure groups (E)
3. score for the Evidence of detectable residues (F).

The totals for 1, 2 and 3 are multiplied together to get an overall score.

(A + B) × (C + D + E) × F = Overall Substance Score

Overleaf is a graphic that explains the process of assessing a substance. The amended results for the substances assessed using the new scoring method are in Annex 1 on page 56.

The rankings obtained are designed specifically for prioritising the choices for surveillance and are based on a selected set of data.

A full report on the meeting can be found as paper VRC/07/05 on the VRC's website.

Matrix Ranking for Prioritising Substances

Criteria (A + B) × (C + D +

Nature of the hazard
Scale 0 – 6
The more serious the potential adverse effect, the higher the score.

Nature of the hazard
Toxicological data are assessed as part of the authorisation process of a veterinary medicine. In this, potential adverse effects caused by exposure to a substance are identified. The more serious the potential adverse effect identified, especially if it is irreversible, the higher the Matrix Ranking (MR) score.

Potency of the substance
Scale from 0 – 3
The lower the dose that can cause the adverse effect, the higher the score.

Potency of the Substance
Most substances will cause adverse effects if we eat or absorb enough. The MR assessment was based on the Acceptable Daily Intake (ADI – expressed in µg/kg bw/day) or No Observable Adverse Effect Level (NOAEL) if no ADI was available.

Exposure 1
Scale from 0 – 3
The higher proportion of food that might come from a treated animal, the higher the score.

The proportion of the whole population's diet that might come from animals that had been treated with a particular substance
Some medicines are used only in a single species, while others are used in several, increasing the chance of exposure.

Exposure 2
Scale from 0 – 3
The higher proportion of food that might come from a treated animal, the higher the score.

The frequency of dosing with a particular substance
Some medicines are used over a whole herd, while others are used to treat individual animals. Additionally, (e.g. for some endoparasites) sheep flocks might be treated a number of times during the year. These factors need to be taken into account.

Weighting system

Nature of the hazard

Score	Definition
0	No reported adverse effects
1	Reversible adverse pharmacological effects (e.g. increased blood pressure or heart rate). Microbiological effects (e.g. disturbance of gut flora).
2	Reversible organ toxicity (e.g. kidney or liver damage).
3	Irritants. Evidence of allergic reactions in animals.
4	Carcinogenic by mechanisms not relevant to humans. Irreversible organ toxicity. Foetotoxicity/ embryotoxicity. Immunotoxicological effects (e.g. sensitisation).
5	Irreversible neurotoxic effects. Irreversible reproductive effects (e.g. teratogenicity) Evidence of mutagenicity.
6	Evidence of carcinogenicity in humans. Carcinogenic by mechanisms relevant to humans.

Potency of the substance

Score	Based on the ADI (µg/kg bw/day)
0	>10
1	>0.10 – 10
2	>0.001 – 0.10
3	<0.001

Exposure 1

Score	Definition
0	<2.5%
1	2.5 – <20%
2	20% – <50%
3	50% – 100%

Exposure 2

Score	Definition
0	<2.5%
1	2.5 – <20%
2	20% – <50%
3	50% – 100%

for the Non-Statutory Surveillance Scheme

E) × **F** = **Substance total score**

High exposure groups
Scale from 0 – 3
Where there are consumer groups who might be at particular risk and not covered in dietary surveys, a higher score is allocated.

Evidence of high exposure groups
Some groups might ingest a higher amount of a particular residue because of their diet. It is also possible that they are not adequately covered by dietary surveys. Where there is evidence for such groups or if there are little data on which to make an assessment, a higher score is allocated.

Evidence for detectable residues
Scale from 0 – 3
Where residues above legal or other limits have been detected, a higher score is allocated.

Evidence of detectable residues
The higher the concentration detected, in comparison to the MRL/MRPL for the particular substance, the higher the score allocated. The highest score can be allocated when:
- a residue has been confirmed for a substance for which no safe concentration has been identified; or
- no residue testing has been carried out.

To give the overall substance score

(A + B) × (C + D + E) × F = Overall Substance Score

1. scores for Hazard (A) and Potency (B) are added up
2. the scores are also added up for:
   - Proportion of the diet coming from treated animals (C)
   - Frequency of dosing with a particular substance (D)
   - Evidence of high exposure groups (E)
3. is the score for the Evidence of detectable residues (F).

The totals for 1, 2 and 3 are multiplied together to get an overall score.

High exposure groups

Score	Definition
0	Knowledge that there are no high exposure groups.
1	Unlikely to be high exposure groups.
2	Likely to be high exposure groups.
3	Knowledge that there are high exposure groups or no data on which to make a judgement.

Evidence of detectable residues

Score	Definition
0	No evidence of detectable residues for a substance/food combination included in last year's surveillance.
1	Residues detected in previous year at concentrations below the MRL/MRPL.
2	Residues detected at the MRL/MRPL in previous year, or intelligence from RASFFs or other sources that a particular substance is being detected.
3	Residues detected at concentrations ten or more times the MRL/MRPL in previous year. Residues where no limit has been set, or no previous tests carried out but there is some intelligence of possible presence in food.

Matrix Ranking Principles

In 'Matrix Ranking', specific criteria and weightings were developed, against which candidate substances were assessed. The Committee hopes stakeholders see this as an open and transparent system for prioritising the sampling under the VMD's Non-Statutory Surveillance Scheme.

Results for all of the substances so far assessed are on page 56 and a fuller explanation is on the VRC website.

Who is involved in the VMD's surveillance for veterinary residues?

The VMD operates the surveillance programmes and provides the Secretariat for the VRC, but many other organisations have a role:

Collecting samples

- Border Inspection Posts (BIPs) – Port Health Officers at the BIPs collect samples of imported foods for the Non-Statutory Surveillance Scheme.
- Centre for Environment, Fisheries and Aquaculture Science (Cefas) of Defra – collects statutory samples and carries out follow-up investigations on fish farms in England and Wales.
- In Northern Ireland, the Department of Agriculture and Rural Development (DARD) collects samples for the National Surveillance Scheme (NSS) on behalf of VMD. DARD also carries out follow-up investigations in Northern Ireland. The samples are analysed in the Agri-Food and Biosciences Institute (AFBI), a DARD-sponsored Non Departmental Public Body.
- Egg Marketing Inspectorates (EMI) of Defra and Scottish Executive Environment and Rural Affairs Department – collect statutory samples of eggs from packing stations.
- Fisheries Research Services (FRS) of the Scottish Executive – collects statutory samples and carries out follow-up investigations on fish farms in Scotland.
- Meat Hygiene Service (MHS) of the Food Standards Agency (FSA) – collects statutory samples from abattoirs; it also has powers to detain animals suspected of having been treated with unauthorised substances or of containing residues above the Maximum Residue Limit.
- Mintel International plc, a market research company, has been contracted to buy samples of foods from shops and wholesalers for the Non-Statutory Surveillance Scheme since 2003.
- State Veterinary Service (SVS) of Defra – collects statutory samples from stock farms in Great Britain, and carries out follow-up investigations on farms in Great Britain.

The Veterinary Sciences Division and Food Science Division laboratories of DARD became part of the Agri-Food and Biosciences Institute in April 2006.

From April 2007, the State Veterinary Service will form part of a new Defra agency, Animal Health.

Analysing samples

- Central Science Laboratory (CSL), York – analyses samples collected under the Non-Statutory Surveillance Scheme and samples of honey for the National Surveillance Scheme.
- Agri-Food and Biosciences Institute analyse samples for the National Surveillance Scheme in Northern Ireland.
- LGC, formerly the Laboratory of the Government Chemist, Teddington – analyses samples collected under the National Surveillance Scheme in Great Britain, apart from honey.

Investigating positive samples

- Cefas, DARD, FRS and the SVS also investigate the reasons for positive samples in their areas (see collecting samples, above).

- Legal Department of Defra – prepare the national legislation in Great Britain covering the NSS and has an Investigations Branch to carry out investigations where a positive sample may result in a prosecution.
- Animal Medicines Inspectorate of the VMD – inspects feed mills that produce medicated feed.

Overseeing the surveillance

- Veterinary Residues Committee (VRC) examines the plans, makes recommendations about the surveillance and also scrutinises the results.
- European Commission – in conjunction with the other Member States, examines and approves the National Surveillance Plans. It also issues the Rapid Alerts, to tell all Member States when particular residues are detected in the Community.
- Food Standards Agency – has a responsibility for food safety and protecting consumers' interests in relation to food. The FSA co-ordinates investigations into food safety incidents and acts as UK contact for the EU's Rapid Alert System. Its officials also attend VRC meetings as advisors.
- CSL, LGC, SVS and AFBI attend VRC meetings as advisors.

Accreditation of analytical laboratories

What standards do the analytical laboratories work to?

All analytical methods used in the surveillance schemes are accredited to ISO 17025. This is the international standard that ensures that the analytical methods are fit for purpose. In addition, the methods for substances listed in Annex I, Group A of Council Directive 96/23/EC must also comply with the requirements of Commission Decision 2002/657/EC. This specifies method performance characteristics, to give confidence in the identification and quantification of residues.

What checks are there?

Laboratories are subject to a range of audits:

- United Kingdom Accreditation Service (UKAS) audits annually against ISO 17025
- EC Food and Veterinary Office (FVO) inspects every 3-5 years to check compliance with Decision 2002/657/EC and other Community legislation
- VMD audits LGC twice each year to ensure compliance with Community legislation and contractual specifications
- US Department of Agriculture audit laboratories annually to ensure that analyses meet the requirements of US legislation
- British Standards Institute (BSI) audits against the quality standard, ISO 9001.

The laboratories also take part in proficiency test schemes such as FAPAS. These allow laboratories to compare their individual results with a 'consensus mean' after each has tested the same sample using their own methods.

The VMD sometimes request that unusual or potentially contentious results obtained at one laboratory are repeated at another accredited laboratory. Such 2nd laboratory analyses have always agreed.

The substances listed in Annex I, Group A of Council Directive 96/23/EC include: hormonal substances that might be used for growth promotion, beta-agonists and also substances for which no safe limit can be set for their residues. More information can be found in Annex I of Council Directive 96/23/EC and Annex IV of Council Regulation 2377/90.

Details of UKAS, FAPAS, FVO and BSI are available from their websites:

www.ukas.com

www.fapas.com

http://ec.europa.eu/food/fvo/index_en.htm

www.bsi-global.com/

The UK's Surveillance Schemes as Part of the Regulatory Process for Veterinary Medicines

The UK's surveillance programmes are part of the regulatory process for veterinary medicines. The schemes check that veterinary medicines are being used as authorised and that any residues are at acceptable concentrations.

Understanding the regulatory process for veterinary medicines can help put the results of surveillance in context. Central to the process is that the use of veterinary medicines should not result in any consumer exceeding the Acceptable Daily Intake, or ADI.

Who Sets Maximum Residue Limits?

International committees of scientific experts set MRLs.

In the European Union, the Committee for Medicinal Products for Veterinary Use (CVMP) assess safety data to set MRLs. The CVMP is part of the European Medicines Evaluation Agency. Additionally, the European Food Safety Authority sets MRLs for certain feed additives, such as coccidiostats.

The Codex Alimentarius is an international Committee that also sets MRLs. It is advised by the Joint Expert Committee on Food Additives (JECFA) – a committee of scientific experts jointly administered by the Food and Agriculture Organisation of the United Nations and the World Health Organisation.

Explanation of the significance of Veterinary Residues

Set the Acceptable Daily Intake (ADI) for the Active Substance

Set Maximum Residue Limits for Edible Tissues

such that the ADI is not exceeded

Set Withdrawal Periods for the Medicine

to make sure any residues are below the relevant MRL

Analyse Samples of Foods

the UK's surveillance schemes check that MRLs are not exceeded – action is taken where they are

Setting the Acceptable Daily Intake

International regulatory bodies assess data from a wide range of short and long-term studies. From these, they identify the quantity that had no adverse effect in any of the studies – the 'No Observable Adverse Effect Level' or NOAEL. This quantity is then divided by an uncertainty factor, typically 100-1000, to allow for possible differences between species and individuals and compensate for other uncertainties in the data.

This quantity is the Acceptable Daily Intake, or ADI. This is the amount of a residue that is considered safe for a person to eat every day over a lifetime.

Identify Residues of Human Health Concern

Different species of animals may be treated with a particular medicine. Treated animals may convert the active substance in the medicine to other substances, called metabolites. The regulatory process takes account of this.

Setting Maximum Residue Limits (MRLs)

The ADI is divided among all the edible tissues where a substance is authorised (including honey and milk), taking account of:

- how much of a particular food may be eaten each day
- how much of the substance occurs in each food
- how much the substance is changed in the animal's body
- other possible sources of residues, as some substances are also used as pesticides or human medicines.

MRLs are set so that even if **all** of the foods contain residues at the respective MRLs, the ADI will not be exceeded. In practice, residues are not found in most foods that are tested.

Setting Withdrawal Periods

The amount of a medicine or its residue in an animal will deplete over time as it is metabolised and excreted. The length of time that must elapse after the end of treatment with a medicine before that animal is slaughtered, or animal product is taken, for human consumption is the Withdrawal Period. It is set for each veterinary medicinal product that contains the active substance so that the residues in each food will be below the relevant MRL.

Analyse Samples of Foods – the VMD Surveillance Programmes

We have seen that the regulatory process sets conditions on the use of medicines. When these are followed, any residues will be at concentrations that are safe to eat every day over a lifetime.

The UK's surveillance schemes check that any residues are indeed below the MRLs that the regulatory authorities have set. Where a residue at a concentration greater than the relevant MRL is found, the cause is investigated and further action taken where appropriate.

Acceptable Daily Intake or ADI – is an estimate of the amount of a substance, expressed on a body-weight basis, that can be ingested daily over a lifetime without appreciable risk to the consumer.

Maximum Residue Limit or MRL – is the maximum concentration of a residue that is legally permitted or acceptable in or on a food. It is expressed in µg/kg of that food. When determining MRLs, the ADI must not be exceeded after considering intake from all sources.

No Observable Adverse Effect Level or NOAEL – is the highest concentration of an active substance found to have had no adverse effect in a safety test.

Veterinary Hypothetical Diet – in setting MRLs, the amounts of particular foods in our diet are taken into account. The upper quantities of foods that we are assumed to eat each day are:
100 g liver
300 g muscle
(muscle and skin for fish)
50 g kidney
50 g fat
(fat and skin for pork and poultry)
20 g honey
1.5 litres of milk
100 g of egg

Withdrawal Period – is the length of time after the end of treatment with a veterinary medicine that must pass so that any residues in edible tissues will have depleted to below the MRL. The CVMP or the particular national approvals authority, which for the UK is the Veterinary Medicines Directorate, can set Withdrawal Periods.

What happens when a residue above the MRL, MRPL or Action Level is discovered?

Where a residue at a concentration above the MRL, MRPL or Action Level is found in the National Surveillance Scheme, a Veterinary Officer (VO) or a Fish Health Officer (FHO) visits the farm of origin to investigate the cause. They may also give the farmer advice on how to avoid such residues. Among the things the VO or FHO might look at are:

- the medicines records to see if they are being kept appropriately
- the standard of husbandry employed
- how the medicine was administered – by water, feed or injection etc
- whether the Withdrawal Periods were observed
- if administered by feed, where this was mixed
- how the animals were fed – on the floor or in troughs etc
- how the feed was stored – was there the opportunity for cross-contamination?

What happens when a residue of an illegal substance or major exceedence of the MRL is found?

When a gross violation of the MRL or a residue of an unauthorised substance is detected, the case may be allocated to an Investigation Officer (IO) from Defra. The IO's role is to gather evidence, which will be assessed later by Defra's lawyers to see if there is sufficient to warrant a prosecution. On the initial visit to a farm, a VO or an FHO may accompany the IO to give technical advice.

Outline of actions following the discovery of a residue of an illegal substance

The VMD would arrange for an IO to visit the farm, accompanied by a VO or FHO. The IO may:

- serve a restriction notice to stop all movement of livestock from the farm into the food chain
- investigate the cause of the residue, including taking a statement under the Police and Criminal Evidence Act, 1984 (PACE)
- examine the medicines records
- take further samples from the farm to confirm the previous finding.

The follow-up samples would usually be analysed at the LGC (see page 40).

Further sampling

If the follow-up sample or samples were positive, the VO or FHO would return and carry out more intensive sampling from livestock and possibly feed. Movement restrictions on the livestock would be kept in place.

Testing at the farm's suppliers

It may be that contaminated feed or bought-in livestock are suspected as the source of the residue. In this case, the feed mill or the breeding farm supplying the original farm could be visited and inspected.

Continued surveillance

If the further sampling described above finds more positive samples, more visits may be made to the farm and more samples taken. Restriction notices on the farm may also be maintained.

Slaughter

Where follow-up sampling on a farm confirms residues of unauthorised substances, the VMD can require by law[2], that the affected animals are slaughtered and do not enter the food chain.

Conclusion

At the end of the enquiry, the information would be submitted to the lawyers in Defra's Legal Branch. They would decide if there was sufficient evidence for a successful prosecution and assess if a prosecution was in the public interest. Restriction notices could be kept in place until it can be demonstrated there are no more unacceptable residues. The farm could also be targeted for intensive sampling in the future.

Follow-up actions in the Non-Statutory Surveillance Scheme

The VMD tells the retailer of any samples bought from their stores with residues above the relevant MRL, MRPL or Action Level. The VMD also informs the Food Standards Agency (FSA). If the food concerned is imported, the Chief Veterinary Officer of Defra is informed. She writes to her opposite number in the country concerned and asks them to report the outcome of any action that is taken to avoid recurrence.

If residues of health concern are detected – for example, of banned substances – where appropriate, the FSA can decide to ask local authorities to investigate and can also request and oversee product withdrawals where this is appropriate.

The FSA operates the EU's 'Rapid Alert System for Feed and Food' or RASFF in the UK. Under this system, all EU Member States are required to alert the European Commission when foods or feed containing residues of concern are discovered. The Commission can then inform other Member States. The Commission can also decide if further steps should be taken with regard to particular foods of animal origin entering the EU from a specified country.

2 The Animal and Animal Products (Examination for Residues and Maximum Residue Limit) Regulations 1997 as amended.

The risk assessment process

We report residues found above the MRL or the relevant Action Level. What does this mean in terms of any risk to consumers? Whenever such residues are found, their health significance to consumers is assessed using a process of 'Risk Assessment'. This is often done by comparing the amount a consumer might have eaten with the Acceptable Daily Intake, or ADI.

The ADI is the amount of a residue that is considered safe to consume daily over a lifetime. It might be that single or limited exceedences of the ADI may not be of health concern. However, for some substances a single exceedence would be of concern. So, the seriousness of any exceedence has to be judged case-by-case, depending on what basis the ADI was originally set. The process of assessing any health significance to consumers is assessed using a process of 'Risk Assessment'. This consists of four stages:

1. **Hazard identification** – identifying the toxicological, pharmacological and microbiological properties of drug residues that may be present in food of animal origin and might be capable of causing adverse health effects to consumers.
2. **Hazard characterisation** – nearly all substances will cause harm if exposure is sufficiently high. So the amount of a residue that might cause adverse effects has to be determined. The information used is taken from a range of sources such as:
   - any experience of exposure in humans, such as use as a human medicine
   - studies in laboratory animals
   - studies done *in vitro* (such as cell culture techniques).

   Most effects have a threshold level and exposure to doses below this will not result in adverse effects. Using the most relevant 'No Observable Adverse Effect Level' (NOAEL) identified in these studies, an Acceptable Daily Intake can be determined by applying uncertainty factors to allow for differences in susceptibility between animals and humans, and between individuals. Additional uncertainty factors may be used depending on the nature and severity of the effect and the robustness of the data. The uncertainty factors used typically reduce the NOAEL by 100 to 1000 times.
3. **Exposure assessment** – the surveillance schemes measure the concentrations of any residues of veterinary medicinal products (VMPs) and certain other substances in foods of animal origin. From these data and from estimates of how much of a particular food consumers may eat, the amount of a residue to which consumers might be exposed is calculated.
4. **Risk characterisation** – by comparing the exposure and hazard information generated in stages 1 to 3, the likelihood of adverse effects occurring and their severity in consumers exposed to the residue can be estimated.

   Stages 1 and 2 of this process are carried out before a substance is authorised for use in veterinary medicinal products as part of the regulatory process. However, the risk characterisation stage is repeated in response to the findings of the residues surveillance programmes. This may involve a review of any new data, and identifying alternative endpoints to the ADI; especially if a residue exceeds statutory limits, or if the substance involved is not authorised as a medicine and has no ADI.

Work of the Committee in 2007

Surveillance plans and results

The VRC will continue to be involved in planning the VMD's two surveillance programmes. Members will attend VMD meetings to consider draft plans. Also, the full Committee will comment on and approve the plans for 2008.

At each VRC meeting, Members will receive an up-to-date report on the results of the 2007 surveillance programmes and have an opportunity to ask questions of the advisors.

Wider selection of fish species

The Committee is aware that farming of cod, halibut, tilapia and barramundi is increasing in Great Britain. We will consider whether these species should be included in the National Surveillance Scheme.

Co-operation with the Pesticides Residues Committee (PRC)

The PRC is a similar advisory committee, but for pesticide residues. In early 2007, the PRC Secretariat will attend a VRC meeting to give a presentation on the work of the PRC and some of the issues it faces in the coming year. The VRC will do the same at a PRC meeting.

The VRC is keen to build links with other committees that have common interests. This is particularly the case with the PRC, since some substances are used as both pesticides and veterinary medicines. Therefore, it will be useful to compare the surveillance plans and results of the two committees and also our concerns.

Brand-name survey for 2007

The VRC previously decided that it could recommend one brand-name survey each year, where there was a need. It will consider the options and make a recommendation, if it thinks it is appropriate, bearing in mind the extra resources required to conduct a brand-name survey.

Matrix Ranking

The Committee will continue to refine Matrix Ranking in 2007. The Matrix Ranking Subgroup will look to assess further substances and also re-evaluate the scores for some of the substances previously assessed.

Open Meeting

The VRC will hold its 4th Open Meeting in 2007. The Committee will consider both the venue and the format of the meeting and will write out to previous attendees for their views before making a decision.

Nortestosterone residues in male cattle

The Committee will consider what sampling might be appropriate in Great Britain, in light of the residues of nortestosterone detected in casualty animals in Northern Ireland. At present, it is not possible to state definitively if any residues detected are naturally occurring, or the result of illegal administration. The Agri-Food and Biosciences Institute in Northern Ireland are

At its March 2007 meeting, the VRC decided that it would hold its Open Meeting in Belfast. The VRC is aware that holding its Open Meetings in London is convenient for many, but it does not suit everyone. This is particularly so for those in Northern Ireland, where agriculture is an important part of the economy.

well advanced with a test that would give a very good indication of the origin of any nortestosterone residues detected. The Committee will observe this development with interest.

Reducing the incidence of coccidiostat residues in poultry products

The Committee has devoted a lot of time to this issue. It is pleased that it has helped to highlight the causes of nicarbazin residues in broiler liver and lasalocid residues in eggs. It was also reassured that the British Egg Industry Council took action to dramatically reduce the incidence of lasalocid residues in eggs. The Committee will also support the joint initiative facilitated by the FSA to overcome the issue of nicarbazin residues in broiler liver.

European Union's Reflections Exercise

The European Commission has set out to redraft a number of pieces of legislation concerning veterinary residues:

- Council Directive 96/22/EC, which controls the use of hormonal substances and beta-agonists in farm animals
- Council Directive 96/23/EC, which sets out how the National Surveillance Scheme is set up and run
- Regulation 2377/90, which sets MRLs for candidate active ingredients for veterinary medicines.

The Commission should circulate proposals in 2007 for this initiative and the VRC will wish to take the opportunity to evaluate the draft legislation and feed in its views.

Communication

The VRC will launch its new website. Following feedback at an Open Meeting, the VRC want a website that is easier to use and where the latest news is on the Home page.

The VRC will launch its new website. Following feedback at an Open Meeting, the VRC want a website that is easier to use and where the latest news is on the Home Page. The VRC Communications Subgroup will meet in early 2007 to look at the Committee's communications to ensure it still meets its obligations to communicate in a comprehensive, understandable and timely way.

Recruitment exercise

The terms of office of some of the members of the Committee will end on 31 December 2008. So, a recruitment exercise will begin during 2007. This will be advertised on the VRC and VMD websites and in MAVIS, the VMD's electronic house magazine.

If you feel you have the relevant expertise to help the Committee in its work, please do consider applying.

Glossary

ACCEPTABLE DAILY INTAKE – is an estimate of the amount of a substance, expressed on a body-weight basis, that can be ingested daily over a lifetime without appreciable risk to the consumer.

ACTION LEVEL – where there is no MRL for a particular substance, usually any confirmed residue above the Limit of Quantification (LOQ) will trigger a follow-up investigation. However, if there are no health concerns associated with particular residues, a higher concentration can be set – the Action Level. This is to prioritise the limited resources for investigations.

ANALYTE – a substance in a test sample, the presence of which has to be detected and/or quantified.

ANNEX IV – the active ingredients of veterinary medicines used in food-producing species must be assessed for safety and allocated to one of Council Regulation 2377/90 EC's annexes. Annex IV indicates that on safety grounds no MRL can be set. Substances in Annex IV may not be administered to food-producing animals.

ANTHELMINTICS – are veterinary medicines used to control internal parasites, such as liver fluke, tapeworms and roundworms in farm animals.

ANTIMICROBIALS – compounds that, at low concentrations, exert an action against micro-organisms and exhibit selective toxicity towards them. The term includes any substance of natural, synthetic or semi-synthetic origin that is used to kill, or inhibit the growth of, micro-organisms (bacteria, fungi, protozoa and viruses). Antimicrobials include antibiotics, disinfectants, preservatives and other substances. Antimicrobials are used on farms to treat and prevent diseases, such as mastitis and foot rot, caused by micro-organisms.

BRAND-NAMING – a one-off survey where information, such as the brand on the packet and name of the shop where it was bought, is published.

COCCIDIOSTATS – Products that control coccidiosis, a protozoal disease that can cause diarrhoea and dysentery. Control of this infection is particularly important in the poultry industry where the prophylactic use of coccidiostats prevents the disease from developing.

Defra – Department for Environment, Food and Rural Affairs. The parent department for organisations such as the VMD and the Centre for Environment, Fisheries and Aquaculture Science.

DETECTION LIMIT – see LOD and LOQ.

DG-SANCO – the European Commission body responsible for health and consumer protection.

GENOTOXIN – a substance that damages DNA. A genotoxin can cause mutations in DNA (and so be a mutagen), it can trigger cancer (and so be a carcinogen), or it can cause a birth defect (and so be a teratogen).

HEAVY METALS – Cadmium and lead are not veterinary medicines. They are found in the environment and can accumulate in animals' body tissues. European law requires them to be analysed for in the National Surveillance Scheme.

HORMONES – Hormones are substances produced by endocrine glands such as the ovaries, testes, thyroid, adrenal or pituitary and released into the blood stream to be carried to a particular organ or tissue, where they produce a specific response. There are also synthetic, hormonally-active substances, such as STILBENES, GESTAGENS and THYROSTATS. Administering any hormonally-active substances to increase growth rate in food-producing animals is banned in the EU. Some hormonal substances have legal therapeutic uses and are used for controlling oestrus in farm animals.

INVESTIGATION OFFICER – a member of the Legal Department from the Department for Environment Food and Rural Affairs. Usually these are ex-police officers and are trained in taking statements.

LOD – Limit of Detection: the smallest analyte concentration that a method can detect with reasonable statistical certainty.

LOQ – Limit of Quantification: the smallest analyte concentration for which a method has been validated with specified accuracy and precision.

MATRIX – The sample of, for example, liver, kidney or animal feed, analysed for the presence of a residue. (This use of matrix is different from Matrix Ranking for prioritising substances to be included in the Non-Statutory Surveillance Scheme, as described on page 37)

MAXIMUM RESIDUE LIMIT – is the maximum concentration of a residue that is legally permitted or acceptable in or on a food. It is expressed in µg/kg of that food. When determining MRLs, the ADI must not be exceeded after considering intake from all sources.

METABOLITE – substances entering the body are usually converted into other chemicals, which are known as metabolites.

MRPL – Minimum Required Performance Limit: the European Commission set concentrations for residues of some Annex IV and certain other banned substances that all Member States must be able to detect (See inside back cover).

MYCOTOXINS – are toxic metabolites produced by some species of fungi – especially strains of *Aspergillus flavus*. These fungi grow on many plant-based foods, such as peanuts. When such mouldy foods are fed to animals, residues of the mycotoxins may later be detected in tissues of the animal.

NITROFURANS – were previously authorised as veterinary medicines to treat some infections in farm animals. In 1995, they were banned in the European Union. This was because of an increased risk of cancer if foods containing their residues were eaten over a long period.

NSAIDS – are non-steroidal anti-inflammatory drugs. Carprofen and flunixin are examples sought in the National Surveillance Scheme. Aspirin is the most well known example used to treat humans.

ORGANOCHLORINES – substances such as DDT, were previously used as insecticides. They degrade very slowly in the environment and can be ingested by animals and accumulate in their tissues.

OPs – organophosphorus compounds which are used as veterinary medicines, such as sheep dips, to control ticks and mites. They are also widely used as insecticides.

"POSITIVE" – a "positive" sample is a sample which on confirmatory analysis is shown to have a concentration of an authorised substance above the MRL or Action Level, or where this has not been set for the substance or the matrix concerned, it is usually in excess of the Limit of Quantification (LOQ), or the presence of an unauthorised substance.

RAPID ALERT SYSTEM FOR FEED AND FOOD, or RASFF – this is a European Union-wide system for alerting Member States when a residue of potential concern has been detected in home-produced or imported produce.

RESIDUE – That portion of the administered dose of a veterinary medicine or other substance present in the tissues, body fluids, products or excreta of an animal arising from treatment of the animal. The total residue includes the parent compound plus any metabolites.

STATUTORY SURVEILLANCE – the National Surveillance Scheme has a legal status. The VMD and the other agencies have powers under the legislation to take samples and to prosecute where results indicate that it is warranted.

TERATOGEN – is a substance that can cause birth defects. Teratogenicity is the ability of a chemical to cause birth defects. Teratogenicity results from a harmful effect to the embryo or the fetus/foetus at a specific period of development.

VETERINARY MEDICINAL PRODUCT, or VMP – this technical term refers to both veterinary medicines, such as penicillin and also to feed additives, such as nicarbazin, which are also defined as specified feed additives.

The Veterinary Residues Committee

The Veterinary Residues Committee (VRC) is an independent advisory committee, established in January 2001. It is part of the Government's commitment to make all advisory committees more open and independent.

All members are appointed in line with the code of practice of the Commissioner for Public Appointments. The code of practice sets out the regulatory framework for the public appointments process and is based on the seven 'Nolan' Principles of Public Life.

Terms of Reference

The VRC was established in January 2001 to:

advise Ministers[1] (where appropriate) and the Chief Executives of the Veterinary Medicines Directorate (VMD) and the Food Standards Agency (FSA) on:

- the incidence and concentrations of residues of veterinary medicines[2] in samples collected under the VMD's surveillance programmes, with particular reference to food safety and observance of withdrawal periods for veterinary medicines;[3]
- to assess and advise on the scope and operation of the VMD statutory surveillance programme within the requirements of European Community legislation;
- to formulate an annual non-statutory surveillance programme, advise on the scope and results of relevant FSA surveys and consider the need for further analytical surveys; and
- to set up subgroups as necessary to further the work and objectives of the VRC.

To publish an Annual Report on Veterinary Residues Surveillance, and to communicate the VRC's findings and recommendations to Government and stakeholders in a comprehensive, understandable and timely way.

1 The Ministers referred to are: The Secretary of State for Environment, Food and Rural Affairs, Ministers of the Scottish Executive, the National Assembly for Wales and the Minister for Agriculture and Rural Development Northern Ireland.

2 In addition to veterinary medicines, surveillance also covers banned substances, heavy metals (lead and cadmium), malachite green, organochlorines (OCs), organophosphates (OPs), and polychlorinated biphenyls (PCBs).

3 A withdrawal period is the length of time after the end of treatment with a veterinary medicine that must pass so that any residues in edible tissues will have depleted to below the Maximum Residue Limit (MRL).

Membership of the Veterinary Residues Committee in 2006

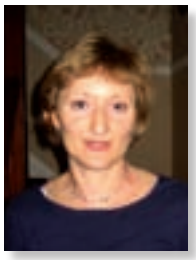
All of the Members were appointed in line with the code of practice of the Commissioner for Public Appointments[3]. Members were chosen to give the Committee a wide range of expertise in areas relevant to residues surveillance and consumer matters. The members are:

Dorothy Craig MBE,
Chairman

John Ambrose
Local Authority

Professor Keith Anderson
Food Industry

Dr Paul Brantom [q]
Toxicology/Food Safety



Sarah Buckley
Consumer

Mr Neil Cutler OBE
Farming

Susan Knox
Consumer

Stephen Lister
Veterinary

Dr W John McCaughey
Analytical Chemistry

Stephen Spice
Retail

Dr Brian Vernon
Feed Industry

Dr Keith Lawrence [r]
Pharmaceutical Industry

Dr Shirley Price [r]
Toxicology

q = Dr Brantom was nominated by the Food Standards Agency to advise on food safety and risk assessment.
r = No photograph was available

3 The code of practice sets out the regulatory framework for the public appointments process and is based on the seven 'Nolan' Principles of Public Life.

Short biographies of the VRC Members are on the VRC website: www.vet-residues-committee.gov.uk

Membership of the Subgroups

To further its work, the Committee has three subgroups. These specialise in: communicating the work of the Committee; planning the VMD's Non-Statutory Surveillance Scheme; and developing the Committee's Matrix Ranking system of prioritising surveillance.

The Communications Subgroup members were:

Dr Paul Brantom — Chairman

Mrs Sarah Buckley

Mr Neil Cutler

Mr Stephen Lister

The Non-Statutory Surveillance Subgroup members were:

Mrs Dorothy Craig — Chairman

Mr John Ambrose

Dr Paul Brantom

Mrs Susan Knox

Dr W John McCaughey

Mr Stephen Spice

Matrix Ranking Subgroup members were:

Dr Paul Brantom

Dr W John McCaughey

Dr Shirley Price

Contact addresses

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E-mail: secretariat@vet-residues-committee.gov.uk
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Food Standards Agency

Food Standards Agency
Pesticides, Veterinary Medicines and Biocides Branch
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London
WC2B 6NH

Tel: 0207 276 8829
E-mail: helpline@foodstandards.gsi.gov.uk
Website: www.food.gov.uk

Annex 1 Revised Matrix Ranking Scores and Overall Rankings (see page 37)

Substance	Nature of the hazard (A)	Potency of the Substance (B)	Diet (C)	Usage (D)	High Exposure groups (E)	Evidence of Detectable Residues (F)	Total (A+B) x (C+D+E) x F	Ranking
Nitrofurans	6	3	3	1	1	3	135	**1**
Zeranol	6	3	3	1	1	3	135	**1**
Chloramphenicol	6	3	2	0	2	3	108	**3**
Metronidazole	6	3	1	1	2	3	108	**3**
Phenylbutazone	6	3	1	3	2	2	108	**3**
Malachite Green	6	3	2	1	1	3	108	**3**
Albendazole	6	2	2	2	2	2	96	**7**
Fipronil	3	2	1	2	3	3	90	**8**
Naphthalene	3	3	1	1	2	3	72	**9**
Lasalocid	2	2	3	2	2	2	56	**10**
Bromopropylate	3	0	1	2	3	3	54	**11**
Florfenicol	3	1	2	1	1	3	48	**12**
Tetracyclines	2	2	3	2	1	2	48	**12**
Oxyclozanide	3	0	2	2	1	3	45	**14**
Tylosin	2	1	3	2	0	3	45	**14**
Nitroxynil	3	1	1	1	1	3	36	**16**
Sulphonamides	1	1	2	2	1	3	30	**17**
Nicarbazin	1	1	3	2	2	2	28	**18**
Diazinon	2	2	2	2	2	1	24	**19**
Cypermethrin	2	2	2	2	2	1	24	**19**
Enrofloxacin/ Ciprofloxacin	3	1	3	0	0	2	24	**19**
Salinomycin	3	1	2	1	2	1	20	**22**
Ivermectin	3	2	1	1	1	1	15	**23**
Clenbuterol	3	2	3	0	0	1	15	**24**
Streptomycin	1	0	3	1	2	2	12	**25**
17ß-oestradiol	6	3	3	0	0	0	0	**26**
Levamisole	4	1	2	2	1	0	0	**26**
Dimetridazole	5	2	0	0	0	0	0	**26**
Dexamethasone	2	2	3	1	1	0	0	**26**
Oxolinic acid	3	1	0	0	0	3	0	**26**

Reference Points – the concentrations that trigger follow-up actions

The Reference Points act as trigger concentrations for a follow-up investigation on the farm of origin of the animal product to find the cause of the residue, or for a sample to be flagged as a 'positive' sample. Usually these are the Maximum Residue Limits (MRLs), which are legal limits, but where there is no MRL other points are used:

- **Maximum Residue Limit, or MRL (where set)** is the maximum concentration of a residue that is legally permitted or acceptable in or on a food.
- **Limit of Quantification (LOQ)** – the smallest analyte concentration for which a method has been validated with specified accuracy and precision.
- **Action Level** – where there is no MRL for a particular substance, usually any confirmed residue above the LOQ will trigger a follow-up investigation. However, if there are no health concerns associated with particular residues, the VRC can recommend that a higher concentration is set – the Action Level. This is to prioritise the limited resources for investigations.
- **Minimum Required Performance Limit (MRPL)** – for some banned substances, the EU has set MRPLs. Originally to harmonise analytical capability, these are the concentrations at or above which the EU requires enforcement action for certain banned substances.

The MRPLs relevant to veterinary surveillance are:

Substance	Concentration (µg/kg)
Chloramphenicol	**0.3**
Malachite green	**2** (Sum of malachite green and its metabolite, leucomalachite green)
Medroxyprogesterone acetate	**1**
Nitrofurans	**1** (for each of the metabolites, AHD, AMOZ, AOZ and SEM)

AHD = 1-aminohydantoin idinone
AMOZ = 3-amino-5-morpholinomethyl-2-oxazolidinone
AOZ = 3-amino-2-oxazolidinone
SEM = semicarbazide hydrochloride

The Veterinary Residues Committee understands why the EU has set MRPLs. But, the Committee recommends **all** confirmed residues of unauthorised or banned substances at concentrations above the LOQ should be reported as positive. Positive reports, therefore, do not necessarily imply health concerns, it is for the relevant authority, such as the Food Standards Agency or Veterinary Medicines Directorate to decide what actions were appropriate to manage any risk.

How Maximum Residue Limits are set and what happens if a concentration above one of the Reference Points is exceeded is explained on pages 44 and 45.

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