Government Oversight Group for Rodenticide Stewardship

Review and recommendations for strengthening the regime

November 2026

Contents

Summary **2**

Introduction **3**

Role of the Health and Safety Executive 4

Stewardship 4

Scope of the review 7

Government Oversight Group assessment of the CRRU UK regime **10**

Governance of the supply chain 10

Competent workforce 16

Monitoring compliance with the regime 23

Summary of main findings 28

Strengthening stewardship **35**

Residues monitoring working group 35

Sales data working group 37

Monitoring best practice working group 39

Resistance working group 41

Recommendations for strengthening stewardship 42

Implementing the recommendations 44

Annex 1: Regulatory background **45**

Summary

The UK Rodenticide Stewardship Government Oversight Group (GOG) considers that the Campaign for Responsible Rodenticide Use UK (CRRU UK) have demonstrated that they have met the agreed assessment criteria and their rodenticide stewardship regime has put in place the controls they originally committed to in 2016. There is also clear evidence of industry compliance with the regime, and its continued development and improvement over time. This had led to improvements in behaviour, attitudes and understanding among professional rodenticide users, as well as improvements in best practice.

While the regime has demonstrably provided benefits, it is disappointing that exposure levels in sentinel species have not decreased as anticipated and have instead remained static. The underlying issues leading to the lack of a reduction in residues remain unclear and are likely due to multiple factors. While GOG will continue efforts to understand the drivers of residues levels, it is also important to acknowledge the ongoing absence of data from the predatory bird monitoring scheme, which has not been updated since 2022 due to the prevalence of highly pathogenic avian influenza (HPAI). Despite this, GOG recognises the value of the additional controls and monitoring that stewardship provides and considers that stewardship should continue to play an important role in the regulation of rodenticides that are in scope.

As part of fulfilling its oversight role, and with the continuing aim of minimising the risks arising from rodenticide use and the associated residues detected in wildlife, GOG has worked to strengthen the stewardship framework and the CRRU UK regime. The recommendations resulting from this work, set out in this report, are important steps in addressing the lack of a reduction in residue levels in sentinel species, and aim to provide insight to the issues raised during the review.

Early changes already implemented include the banning of outdoor open area and waste dump use for all second generation anticoagulant rodenticides (SGARs) and more stringent requirements for users to demonstrate competence before being able to purchase rodenticide products.

The assessment and conclusions set out in this report will further support HSE’s and other relevant government regulators’ future decision-making in relation to rodenticide use.

Introduction

Pest rodents threaten public health and infrastructure, including in homes, schools, hospitals, shops, sewers and waste management facilities. They pose significant health and economic risks, including to agriculture, where they threaten animal health and can contaminate storage facilities and wider food supply chains. As such, controlling problem rodents is socially and economically necessary and sometimes required by law.

There are a range of methods available to protect different environments from pest rodents. There are also a range of methods available to control existing rodent populations – these include lethal and non-lethal, chemical and non-chemical controls. All of these methods may have limitations or be unsuitable depending on the circumstances – for example, in certain locations, for some types of users, or the severity of infestation. Effective control strategies are therefore based on having a wide range of options available, including both chemical and non-chemical methods.

Anticoagulant rodenticides are one of the most commonly used types of chemical control against rodents. In the UK, these include the first generation anticoagulant rodenticide (FGAR) coumatetralyl and the second generation anticoagulant rodenticides (SGARs) brodifacoum, bromadiolone, difenacoum, difethialone and flocoumafen. Other chemical controls include gases, narcotics and the vitamin D substance, cholecalciferol.

By their nature, chemical controls carry potential risks to people, pets, wildlife, and the environment, meaning that non-chemical methods of control should always be considered before chemical controls.

In the UK, rodenticides are regulated as biocidal products by:

- the GB Biocidal Products Regulation (legislation.gov.uk) (GB BPR) in Great Britain (England, Scotland, Wales) (GB)
- the EU Biocidal Products Regulation (eur-lex.europa.eu) (EU BPR) in Northern Ireland (NI).

Under these regulations, rodenticides used by professionals (such as pest controllers) are authorised for supply and use within an integrated pest management (IPM) framework. IPM places high importance on the principle of risk hierarchy, which aims to ensure that chemical controls are used responsibly, and only when needed, to minimise risks to non-target animals and the environment.

Annex 1 contains further information about the regulatory framework for rodenticides.

Role of the Health and Safety Executive

HSE leads on UK biocides policy and is responsible for the operation of GB and EU BPR in the UK. A central aspect of HSE's regulatory role is the scientific evaluation and risk assessment of biocidal active substances and products which must happen before they can be made available or used in the UK (see Annex 1 for further details).

HSE acts on behalf of the Secretary of State (as regards England), Scottish ministers (as regards Scotland) and Welsh ministers (as regards Wales) in the operation of GB BPR in England, Scotland and Wales. HSE acts on behalf of the Health and Safety Executive for Northern Ireland (HSENI) in operating EU BPR in Northern Ireland.

Responsibility for the enforcement of biocides regulations in GB falls to HSE and other relevant enforcing authorities (e.g. local authorities, national environmental agencies). In NI, enforcement of biocides regulations falls to HSENI and other relevant enforcing authorities (e.g. district councils and the Northern Ireland Environment Agency).

Stewardship

The first evaluations of the SGAR active substances under EU biocides regulations were completed in 2009. These evaluations concluded that the risk of non-target animals directly consuming rodenticide baits (primary poisoning) or consuming poisoned rodents (secondary poisoning) were beyond normally acceptable levels for authorisation. They also concluded that individually, none of the SGARs could be described as presenting lower overall primary or secondary poisoning risks than any other SGAR. Despite these risks, SGAR active substances were approved for use because EU regulators, including HSE (at that time), determined that the lack of sufficient and effective alternatives for dealing with rodent problems meant that they were essential to society. The absence of anticoagulant rodenticides would reduce the effectiveness of rodent control efforts and increase the risks to society from rodent-borne disease, food contamination, damage to property and infrastructure, and associated economic costs. Effective rodent control measures are essential to mitigate these risks.

HSE's, and other EU regulators', decision to authorise anticoagulant rodenticide products seeks to avoid the disproportionate negative impacts on society that would result from not allowing their use. Although anticoagulant rodenticide products are subject to a number of regulatory restrictions, additional efforts to minimise the risks arising from their use remain important.

In reaching their conclusions, EU regulatory authorities agreed that the way in which products are used in the environment plays a much greater role in controlling risks when compared to other factors such as where they might be used. To address the concerns relating to risks posed to the environment, HSE considered that it was vital to ensure that

SGAR products were used responsibly and in a way that avoided unnecessary risks to the environment.

In 2012, HSE developed and consulted on a series of proposals for regulatory environmental risk mitigations (National Archives) that could be applied to SGAR products. Recognising that the effectiveness of any regulatory risk mitigations would be difficult to quantify in any future risk assessments, HSE and the sector explored whether non-regulatory mitigations could deliver additional benefits. Following further discussion and workshops with a range of stakeholders, including government departments and agencies, HSE proposed to establish a stewardship framework to ensure that the risks from both FGAR and SGAR use were minimised.

In establishing a stewardship framework, HSE's aim was to ensure that industry took responsibility for the long-term impacts of their activities. While responsibility for pest control policy rests elsewhere in government, stewardship was proposed by HSE as a biocides regulatory policy measure. Alongside the regulatory restrictions imposed on the supply and use of rodenticides by the conditions of their authorisations, stewardship arrangements allow for the monitoring of their use and practical implementation of controls over who is able to use them, supporting their use only when absolutely necessary. The initial work to establish a series of high-level principles which would underpin, and set expectations for, an industry-led rodenticide stewardship regime was therefore led by HSE.

In September 2020, rodenticide stewardship was extended to include products containing the newly approved active substance cholecalciferol, due to the similar environmental risks its use presents.

Key benefits, high-level principles, and performance measure

The approach to the development and operation of rodenticide stewardship is shaped by the following benefits that are expected to arise from a functional stewardship scheme:

- governance of the supply chain, ensuring that professional rodenticide products are only supplied to approved retail outlets and sold to those trained to use them as part of an IPM strategy;

- a competent workforce capable of delivering stewardship standards and of demonstrating an appropriate understanding and attitude toward case-specific control of rodents and use of rodenticides; and

- monitoring compliance with the regime and its environmental impacts and, if possible, an assessment of whether rodenticides and stewardship together are actually tackling the problems.

As the basis for delivering the key benefits a set of high-level principles were agreed and published in 2015. Those principles are:

a. Use of integrated pest management (IPM), including use of rodenticides, involving a hierarchy of risk controls for rodents.

b. Responsible use of rodenticides, when demonstrated they are needed, because of their potential threat to human, animal health and the environment.

c. Applicability to all suppliers, handlers and professional users of rodenticides in scope of stewardship, to address these risks.

d. The need for the regime to be robust, effective, and workable, while remaining as simple as possible.

e. The need for the regime to cover the whole life-cycle of the rodenticide products: manufacture, supply chain, end-use, disposal and environmental fate.

f. The enabling of good practice in the control of rodent populations, as part of an IPM system, while minimising resistance build-up and secondary poisoning in non-target species.

In addition to the key benefits and high-level principles, a performance measure for stewardship was also set to observe a significant decrease in the sum of all SGAR residues detected in the livers of barn owl carcasses collected over the first 4 years of stewardship, compared to baseline pre-stewardship levels. Additionally, GOG thought it would be useful to receive data on red kites in order to gauge the effects of stewardship on scavenging birds.

The key benefits, high-level principles and performance measures were designed to gain an understanding of the effectiveness of a stewardship regime and whether any changes should be made to its operation – not as fixed triggers for specific actions.

Implementing stewardship

The Campaign for Responsible Rodenticide Use (CRRU UK) worked with the industry to develop a stewardship proposal that met the high-level principles and could credibly deliver the benefits of stewardship. On the basis of CRRU UK’s proposals HSE decided that the authorisation of professional use anticoagulant rodenticides would be subject to stewardship conditions.

From 1 April 2016, it became a requirement that any company wishing to supply professional use anticoagulant rodenticides in the UK must be a member of CRRU UK. Stewardship sets clear expectations for holders of professional anticoagulant rodenticide

product authorisations to demonstrate that their products are used in a way that is consistent with the aims of the high-level principles.

Following the extension of stewardship in September 2020, any company wishing to supply cholecalciferol rodenticides in the UK must also be a member of CRRU UK.

Government Oversight Group

Since its inception, the CRRU UK stewardship regime has been overseen by the Government Oversight Group (GOG) for Rodenticides Stewardship. The role of GOG is to ensure that the regime operates as intended and meets the expectations of rodenticide stewardship set out within the high-level principles and delivers the associated benefits.

Annually, CRRU UK is required to report to GOG with data and information to comply with a range of monitoring requirements. GOG meets annually to consider whether the evidence demonstrates that the regime continues to meet the expectations set out in the high-level principles and is delivering the expected key benefits. Decisions are taken to make changes to the regime on the basis of the evidence and conclusions drawn.

GOG membership includes a number of government departments and agencies, each with their own area of regulatory focus or policy responsibility relating to the use of rodenticides. Current membership includes:

- Department for Environment, Food and Rural Affairs (Defra)
- HSE
- HSENI
- Natural England
- Science and Advice for Scottish Agriculture (SASA)
- UK Health Security Agency (UKHSA)
- Welsh Government

Independent scientific advice is provided to GOG by the UK Centre for Ecology and Hydrology (UKCEH).

GOG member regulators remain able to act independently of GOG, or in co-operation, to take appropriate regulatory actions relevant to their respective areas of responsibility.

Scope of the review

As part of establishing stewardship, in addition to agreeing arrangements for the annual assessment of the CRRU UK regime, GOG also set a requirement that the CRRU UK regime should be reviewed after 5 years of operation.

In this review, GOG has considered information and data covering the operation of the regime since 2016. This includes the aggregated monitoring data submitted by CRRU UK and UKCEH for the initial 5-year period and subsequent annual data and information submitted by CRRU UK and UKCEH between 2016 and 2025. The review has assessed the CRRU UK regime's effectiveness and whether it has delivered the expected key benefits. GOG has also considered what changes could be made to improve the operation of stewardship, setting these out as recommendations.

HSE will consider the findings of the review to support regulatory decision-making in relation to rodenticide product authorisations. The findings of the review may also be used by GOG members to inform related policy changes and regulatory action in their respective areas of responsibility.

Assessment criteria

The assessment criteria that accompany the high-level principles, and which have provided the basis for annual assessments of CRRU UK's regime are set out as follows:

1. Evidence that the industry has put in place what it said it would – primarily:

Product labelling

- Clear, consistent and concise labelling that accurately reflects risks and provides clear messaging on mitigations, ensuring instructions and guidance are provided in words comprehensible to users.
- Prominent display of restrictions on sale and use.
- Clear links to codes of practice and promotion of responsible use.

Point of sale conditions

- Proof of competency schemes for all sectors, linked to training and certification frameworks.
- Point of sale checks at all distribution outlets for rodenticides in scope of stewardship, influenced by management of supply chains by manufacturers.
- Provision of information materials to customers and point of sale customer advisors, to promote awareness of risks and responsible use.

Guidance/codes of practice

- Guidance/codes of practice outlining the good practice to be followed by all sectors and including any sector specific requirements – to form the basis of a training syllabus.

User training/competence assurance

- Training syllabus and training framework ensuring consistency and common standards with wide coverage across all sectors.
- Arrangements to record details of all trained users, supporting the demonstration of competence for validation at the point of sale.
- Proactive checks and audits by the sector of actual practice on the ground, ensuring users are adhering to the codes of practice.

Monitoring requirements

- Arrangements, including funding, to monitor and measure the impact of residues on non-target wildlife – including use of the Predatory Bird Monitoring Scheme (PBMS) and Barn Owl Monitoring Study (BOMS).
- Arrangements, including funding, to monitor and measure the geographical spread and severity of rodenticide resistance in target rodents.
- Survey procedures for comparable investigation of knowledge, attitude and practice across, and between, all professional user groups – collection and analysis.
- Arrangements to record provision, uptake and success of training frameworks.
- Annual reporting on all monitoring requirements to GOG.

2. Evidence/indicators of industry's response/changes of behaviour – such as:

- CRRU UK working group reports
- Knowledge, Attitudes and Practices (KAP) surveys
- Training and certification data
- Point of sale audit data
- Product usage data
- Any relevant evidence from enforcement activity

3. Evidence/indicators of impact – such as:

- Wildlife residues data
- Wildlife population health data
- Rodent resistance data
- Sales and usage data

CRRU UK have submitted monitoring data and information relating to the criteria set out above. This information is considered as part of the review to determine whether the high-level principles have been met and whether key benefits have been realised by the CRRU UK regime.

Delivery against the performance measure is considered in the key benefits section – Monitoring compliance with the regime.

Government Oversight Group assessment of the CRRU UK regime

GOG's assessment of the CRRU UK regime considers evidence provided by CRRU UK in their 5-year report, alongside subsequent reports and additional evidence specifically requested by GOG. The evidence is considered for each key benefit in turn, to determine whether the intended benefits of an industry-led stewardship scheme have been/are being delivered.

Governance of the supply chain

The high-level principles set a key benefit of:

> Governance of the supply chain, ensuring that professional rodenticide products are only supplied to approved retail outlets and sold to those trained to use them as part of an IPM strategy

Supply chain governance should ensure that only competent individuals are able to obtain rodenticides that are in scope of stewardship; it is key to the success of stewardship.

Governance of the supply chain and rodenticide point of sale (RPOS) controls prevent those who cannot demonstrate their competence from accessing the higher strength products (typically 50 ppm of active substance for professional products versus up to 29ppm of active substance in products available to the general public) and larger pack sizes that are only available for professionals (maximum pack size of 300g for the general public compared to a minimum pack size of 3kg for the vast majority of professional products). This is essential in minimising risks to human health, animal health and the environment.

For example, a lack of supply chain governance could lead to increased exposure and likelihood of primary and secondary poisoning as a result of improper use of professional anticoagulant rodenticides by the general public; such as the use of inappropriate quantities of bait, inadequate protection of bait, misidentification of species, incorrect use of PPE, baits used in known areas of resistance, and improper collection and disposal of bait and rodent carcasses at the end of treatment.

Governance of the supply chain links directly to the high-level principles. The application of controls to the entire supply chain (principle c), that cover the whole life-cycle of all professional anticoagulant and cholecalciferol rodenticides (principle e), means that those

supplied will be competent to use them responsibly within an IPM approach (principles b and a) and in such a way that minimises negative outcomes such as the development of resistance among rodent populations (principle f).

The GOG assessment is based on the following information CRRU UK are required to submit each year. The information includes:

- Information on the operation of RPOS checks obtained through annual audits.

Point of sale competence checks

Following the implementation of the CRRU UK regime in 2016, a system of competence checks at RPOS was piloted in 2017 and fully introduced in 2018. A system of robust RPOS competence checks are considered essential to the proper functioning of the CRRU UK stewardship regime. Where proof of competence cannot be demonstrated at the point of sale, rodenticide products that are in scope of stewardship cannot be purchased.

An independent audit process is undertaken by BASIS (Registration) Limited to determine the performance of retail outlets in adhering to RPOS competence checks. All premises selling professional anticoagulant and cholecalciferol rodenticides are subject to RPOS audit. Outlets selling professional use rodenticides via the internet are included in the audit process and are not treated any differently to the more traditional 'brick and mortar' outlets. GOG have been assured that CRRU UK members (rodenticide manufacturers and authorisation holders) remain committed to only supplying their products to outlets that successfully pass the BASIS RPOS audit.

In addition to pass/fail markings the audit process also records those premises that achieve a 'qualified pass'. To receive certification that rodenticides in scope of stewardship can be supplied, the premises will then need to demonstrate improvement. BASIS report that, overall, there has been a steady improvement in the number of outlets that have met the required standard without the need for remedial improvement and follow-up. Table 1 shows details of the annual RPOS audits that BASIS have conducted to date.

Table 1: The percentage of audited retail outlets receiving a pass, qualified pass or fail per year.

Year	Total number of audits	Pass (%)	Qualified pass (%)	Fail (%)
2018	572	87	Data not available	Data not available
2019	709	80	18	2
2020	692	90	8	2

2021	680	94	5	1
2022	690	85	14	1
2023	648	83	17	1
2024	621	92.8	5.5	1.7
2025	604*	94.3	5.5	0.2

*Full year data unavailable at time of reporting but will be included in the CRRU UK 2026 annual report.

In 2025, CRRU UK reported a decrease of 2.9% in the total numbers of premises registered to undergo the RPOS audit, with the numbers of premises registered regionally remaining broadly stable (England 70%; Scotland 12%; Northern Ireland 8%; Wales 10%). The proportion of passes at first audit now stands at 94.3% and those obtaining a qualified pass has remained broadly stable at 5.5%. The number of premises failing the audit was 0.2%. 33 suppliers have been removed from the RPOS audit process having decided not to continue to supply rodenticides in 2025, representing 5% of overall outlets audited that year.

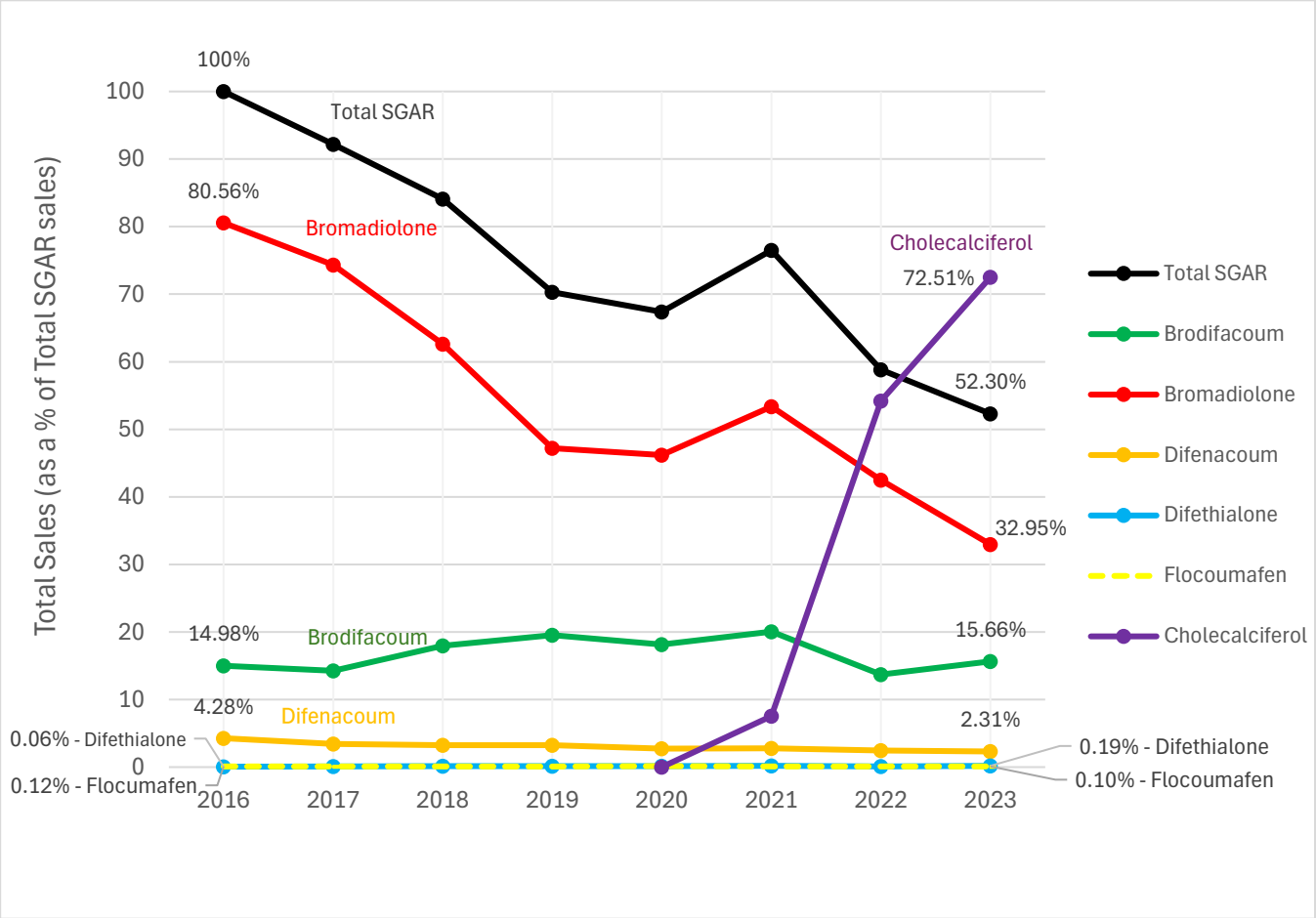
In 2017 CRRU UK established an online tool for reporting complaints relating to failure to comply with the requirements of their regime, including RPOS competence checks. Where sufficient information has been provided, details of the complaint are passed to the CRRU UK member company(s) to take appropriate action. The outcome of the company's action must be reported back to CRRU UK to respond to complainants – this enables complainants to remain anonymous throughout the process. The actions taken to resolve the complaints typically include internet sales listings being amended or removed, or where necessary websites being taken down. Where appropriate complaints are passed to HSE as the regulatory enforcing authority. Of 59 complaints made between October 2017 and November 2020, action was taken to remove/amend listings or escalated to HSE in 39 cases. GOG had earlier raised an issue about the lack of information on the proportion of transactions conducted online. This issue has now been considered by the POS working group who have made recommendations aim to address this gap and to gain greater understanding of how competence is checked for online sales.

CRRU UK have provided evidence that they continue to maintain oversight of rodenticide supply chains and that the arrangements established are understood by those in scope.

Quantity of rodenticide active substances sold in the UK

To support GOG's review of the CRRU UK regime, in November 2024, HSE requested rodenticide sales data from authorisation holders. The data received indicates there has been a significant overall reduction in the quantity of SGARs supplied across the 2016 to 2023 period. Additionally, the quantity of SGARs supplied for non-professional users over the period appears consistently low relative to professional products.

Figure 1. SGARs and Cholecalciferol sales data 2016-2023 (normalised to Total SGAR sales 2016)



Note: The graph reflects total weight of rodenticide active substance sold per year, and does not reflect sales of formulated rodenticide products. Cholecalciferol product formulations contain 15-30 times more active substance (750ppm) than SGAR product formulations (25-50ppm) – 1kg of SGAR can be used to produce 20,000-40,000 kg of formulated rodenticide product, whereas 1kg of cholecalciferol will produce 1,333 kg of formulated rodenticide product. While the total quantity of pure cholecalciferol sold in 2023 is greater than the total quantity of pure SGAR substances sold in 2023, the quantity of SGAR products sold will still be much higher than the quantity of cholecalciferol products sold.

Focusing on individual active substances, for bromadiolone and difenacoum there are indications that a downward trend in sales from 2016 to 2023 corresponds with lower “low” residues reported for these active substances in barn owls (SGAR residues in barn owls 2022, UKCEH). While post-2022 barn owl residues data is not yet available from the UKCEH PBMS, it is anticipated that this trend will continue following the removal of open area and waste dump use from all bromadiolone and difenacoum product authorisations in 2024.

One of the reasons for the change in the quantities of bromadiolone and difenacoum may be an increasing trend of resistant rodents to SGARs. While this topic is covered in more detail in the Resistance monitoring section, CRRU UK reports on anticoagulant resistance in rats and mice indicate widespread resistance mutations, with the apparently widely spread Y139 single nucleotide polymorphism within the Vkorc1 gene conferring resistance to bromadiolone and difenacoum. More potent SGARs are needed to control highly resistant rats, which might lead the change in usage of bromadiolone and difenacoum. This highlights the importance of ensuring information on resistance is widely communicated and understood – where users are aware of resistance in a population smaller quantities of more potent SGARs could be used to more quickly achieve control; where users are unaware, they may resort to using larger quantities of ineffective SGARs for a longer period, increasing risks and selection pressure for resistant rodents.

Brodifacoum data indicates broadly similar sales quantities over the 2016 to 2023 period compared to an increase in some of the barn owl residue parameters for brodifacoum relative to the baseline period. The percentage of barn owls with detectable residues of difethialone has also increased compared to the baseline period but, unlike the brodifacoum results, this is consistent with the increase seen in sales. Flocoumafen sales are relatively low and residues are infrequently detected in barn owls.

There also appears to be an increase in sales of cholecalciferol following authorisation of the first products containing this substance in 2020. If the increase corresponds with reductions of overall SGAR use, this may beneficially lead to reductions in total SGAR residues in barn owls and other non-target species, though no such effect is apparent yet. However, this finding highlights that there is an increasing need to understand the potential impact of cholecalciferol exposure on the environment.

Sales data also indicates that there have been changes in the types of formulation sold (such as grain, paste, wax block) over the monitoring period, both in respect of the range of formulation types each individual substance is available in, and differences between individual substances. While there have been changes in the proportion of rodenticide products sold in different formats for all SGARs, the change is most pronounced for brodifacoum products (see Figure 2). This may reflect its use in a wider range of situations and may have influenced residue patterns.

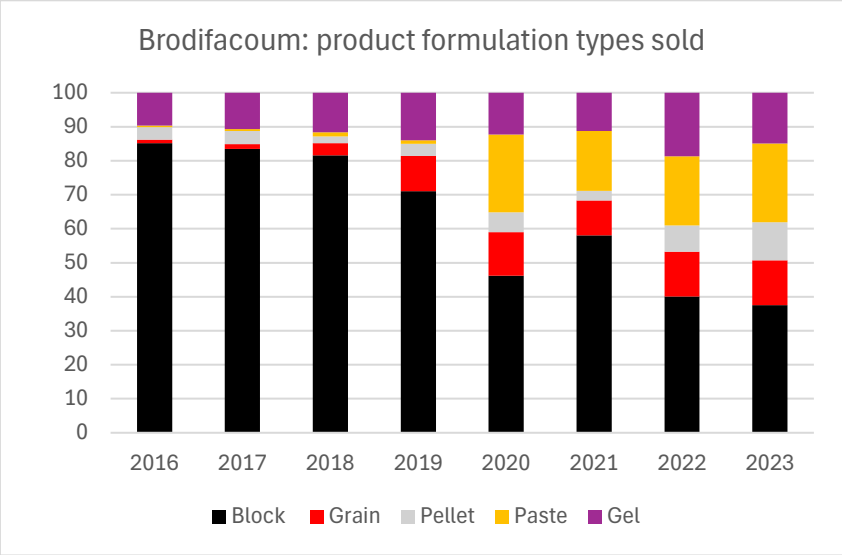


Figure 2. Showing the proportions of brodifacoum product formulation types sold 2016-2023

The areas that individual substances are sold to be used in (indoor, outdoor around buildings, outdoor open areas and waste dumps, sewers) appear relatively unchanged over the period, following the same downward trend as the overall volume of SGARs made available. As noted above, following the removal of outdoor 'open area and waste dump' use for bromadiolone and difenacoum products in 2024, there are now no SGAR products that can be used in these areas.

Conclusion on governance of the supply chain

The available evidence demonstrates that the key benefit of supply chain governance is largely being achieved. The RPOS competence checks are well established, subject to independent audit and supported by clear consequences for non-compliance, helping to ensure that rodenticides in scope of stewardship are supplied only through approved retail outlets and to users demonstrating competence.

Sales data provide indirect support that stewardship controls are influencing industry behaviour, with overall reductions in the quantities of SGARs supplied since 2016 and evidence that sales to the general public remain comparatively low.

However, a potential gap in governance was identified in relation to online sales. One of the recommendations for strengthening stewardship is intended to directly address this issue.

Further work is also required to understand the factors driving the increase in residues of brodifacoum despite the evidence of a broadly similar sales volume since the implementation of stewardship.

Overall, the evidence demonstrates that robust governance arrangements are in place across the supply chain to effectively restrict access to professional anticoagulant and cholecalciferol rodenticides to those with demonstrated competence.

Competent workforce

The high-level principles set expectations for the key benefit of:

> A competent workforce capable of delivering stewardship standards and of demonstrating an appropriate understanding and attitude toward case-specific control of rodents and use of rodenticides

A competent workforce is at the heart of delivering stewardship's underpinning principles and key to ensuring users understand and follow an IPM approach (principle a), use professional anticoagulant and cholecalciferol rodenticides responsibly and only when needed (principle b) and limits the development of resistance among rodent populations (principle f). Professional rodenticides can only be supplied to users providing relevant accreditation as evidence of their competency.

The development of workforce competence since the implementation of the CRRU UK regime mitigates risk in a number of ways:

- An understanding of the pattern of resistance to anticoagulant rodenticides in the UK will allow professional users to choose appropriate chemical controls, reducing the overall amount of bait needed to achieve control.
- Understanding the use of rodenticides as part of a hierarchy of controls means that users will be educated on, and more likely to use, a lower risk method of control before considering chemical interventions.

A more competent workforce that is appropriately trained will be more efficient when tackling infestations and therefore able to achieve control more quickly and with less product used, reducing both the risks posed by rodents and those posed by the use of rodenticides. The GOG assessment is based on the following information CRRU UK are required to submit each year (with the exception of the KAP survey where the frequency is typically every 3 years). The information includes:

- Annual report of training uptake and award of certification/qualification by CRRU UK-approved awarding bodies
- Annual report of number of members of CRRU UK approved farm assurance schemes
- Provision of up to date, relevant best practice guidance documents
- Promotion of regime objectives and raising awareness by stakeholder organisations
- Annual report of status of resistance monitoring in UK

- KAP surveys (every 3 years)

Training and certification

CRRU UK has established a framework for training, setting out required course content and examination procedures. At the outset, awarding organisations submitted existing courses to CRRU UK for evaluation against the required training elements for stewardship. Those found acceptable became CRRU UK-approved. CRRU UK have provided evidence of continued incremental improvement through the provision of approved training by over 150 training providers serving 4 awarding organisations, namely BASIS (Registration) Ltd, City and Guilds/National Proficiency Tests Council (NPTC), Royal Society for Public Health (RSPH) and Lantra.

Since January 2023, all CRRU UK approved training courses have been independently regulated by the Office of Qualifications and Examinations Regulation (Ofqual). GOG welcomes this development, recognising that Ofqual regulation provides assurance that CRRU UK approved training courses are consistent in terms of their content and their assessment.

Table 2. The total numbers of CRRU UK approved certification/qualification awarded by BASIS (Registration) Ltd/Open Awards, City & Guilds/NPTC, Lantra, Royal Society for Public Health.

Time Period	Total number of certificates/qualifications awarded by all organisations
August 2015 - July 2016	7,285
August 2016 - July 2017	6,044
August 2017 - July 2018	5,498
August 2018 - July 2019	4,711
August 2019 - July 2020	3,916
August 2020 - July 2021	4,424
August 2021 - July 2022	5,192

August 2022 - July 2023	3,807
August 2023 - July 2024	4,141
August 2024 - July 2025	4,439
Total	**49,457**

During the implementation of stewardship, requirements to produce proof of professional competence at the point of sale emerged as a significant challenge, especially for the farming sector. At that time, GOG agreed that membership of an approved farm assurance scheme (FAS) would be accepted as proof of competence. By March 2018 approved schemes were required to publish standards compliant with those set out in the CRRU UK code of best practice. This change encompassed 17 different schemes, bringing more than 80,000 farm businesses in scope of being audited against CRRU UK best practice standards.

As part of efforts to strengthen rodenticide stewardship, CRRU UK have significantly changed the way competence can be demonstrated. From January 2026, membership of an approved FAS can no longer be used to obtain rodenticide products that are in scope of stewardship. Instead, to purchase such rodenticides, users must hold an up-to-date approved training certificate (issued within the last 5 years) or, where the certificate is more than 5 years old, show membership of a CRRU UK-approved continuing professional development (CPD) scheme. This means farmers, gamekeepers and pest control officers (PCOs) will have to be equally qualified and ensures that competence will be periodically refreshed.

Within the strengthened arrangements, CRRU UK continues to provide approved training through 134 training providers aligned with 4 awarding organisations. In the period August 2024 to July 2025, 8 separate CRRU UK approved courses were available and a total of 4,439 certificates were awarded to training participants. This brings the total number of certificates awarded for successful completion of CRRU UK approved courses to 49,457 during the stewardship period to August 2025. Additionally, the updated proof of competence requirements have driven increased uptake of training, with an increase of 284.3% from 1 July 2025 to 31 December 2025 compared to the same period in 2024.

Best practice and guidance

Essential to the success of rodenticide stewardship is the promotion and maintenance of best practice guidance which ensures that rodenticide users understand what best practice is and sets expectations that they follow it. As part of implementing stewardship in 2015,

CRRU UK developed a code of best practice ('the CRRU UK code'), supported by a range of targeted guidance focussing on key practices and user groups. The CRRU UK code fulfils a key requirement of the high-level principles by establishing rodenticide use within a 'risk hierarchy'. It requires that, when conducting any rodent pest management activity, users must consider all risks and apply those measures that are considered likely to be fully effective and present the least risk. Regulatory conditions placed on product authorisations by HSE require all users of rodenticide products that are in scope of stewardship to follow instructions provided by the CRRU UK code.

CRRU UK continue to update the code of best practice, which remains widely available to all users via the CRRU UK website. This includes a major revision to the code with the latest edition published in 2024, reflecting changes in regulatory processes, use practices, risk mitigation measures and new active substances. Over the stewardship period, CRRU UK have also developed and published guidance documents and on-line training aids, including advice on permanent and burrow baiting, rodent pest management for gamekeepers and on how to conduct environmental risk assessments.

Resistance monitoring

Genetic resistance to anticoagulant rodenticides is widespread in rats and mice in the UK. There are at least five resistance mutations, or single nucleotide polymorphisms (SNPs) within the Vkorc1 gene, that occur in Norway rats, and at least two in house mice, that have detrimental effects on the efficacy of some anticoagulant rodenticides.

At the outset of rodenticide stewardship, it was anticipated that providing users with information on the geographical distribution of resistance in UK rodent populations could reduce ineffective use of anticoagulant rodenticides. A competent workforce should reduce the quantity of anticoagulants used and the primary and secondary poisoning risks associated with their use. Therefore, improved knowledge of the distribution of resistance to SGARs among rats and mice is considered an essential part of reducing exposure to non-target species. Furthermore, ensuring that infestations of resistant rodents are removed efficiently will reduce selection pressure that favours resistant rodents, reduce the spread of resistance, and preserve the effectiveness of existing anticoagulant active substances. As such, resistance monitoring is a key requirement for delivery of the stewardship regime set out in the high-level principles.

Each year, CRRU UK are required to provide an annual assessment of the status of anticoagulant resistance among rats and mice in the UK. The monitoring data collected is based on DNA analysis of tail-tip samples submitted voluntarily and analysed independently. Samples were originally analysed by University of Reading, then laboratories of the Animal and Plant Health Agency (APHA). Since 2025, analysis has been carried out by SASA.

Over the period 2009 to July 2025, a total of 753 Norway rat tissue samples and 144 house mouse tissue samples from around the UK have been analysed. The accumulated data shows widespread distribution of resistance in key target rodent species in the locations for which samples have been submitted. Of the rat tissue samples submitted, 77% were found to carry one or more of the SNPs associated with anticoagulant resistance; for house mice the figure was 94.4%.

The SNPs that are known to confer anticoagulant resistance to rodents in the UK and their severity are, in Norway rats: L120Q (strongest) > Y139S > Y139F > Y139C > L128Q (weakest) and in house mice: both L128S and Y139C (strongest) > L128S > Y139C (weakest).

The Norway rat samples analysed in the latest CRRU UK resistance report (2025) provided further insight into the occurrence of anticoagulant resistance in Scotland. In the areas sampled, L128Q resistance is prevalent, with few susceptible rats found. Of the rats found to carry L128Q, approximately 87% were homozygous for this SNP, meaning that these rats inherited the L128Q SNP from both parents. This reflects long-established resistance and prolonged selection for the resistance mutation, leading to a higher frequency of SGAR resistance in Scotland than in the rest of the UK. It is likely that a high proportion of Norway rat infestations down the entire east side of the country and in the Central Belt would be expected to contain mostly resistant rats. On the basis that the L128Q mutation confers a relatively low level of resistance to animals that possess it, compared to other SNPs such as L120Q, Y139F and Y139C (Buckle, 2013 (scijournals.onlinelibrary.wiley.com)), it is anticipated that authorised SGARs will remain effective against this SNP.

Recent surveys have found the increasing occurrence of the severe Y139C genotype in many areas of the UK, with a strong focus apparently developing in Yorkshire and the presence of Y139C and L128Q SNPs potentially leading to hybridisation. In fact, many L128Q/Y139C hybrid-resistant rats have now been found across northern England. The occurrence of a single homozygous resistant Y139C individual among the 2024 to 2025 samples found near to Galashiels indicates that this SNP may be established in the Scottish borders. The occurrence of several L128Q/Y139C hybrids in the sample indicates that the Y139C SNP may be more common in Scotland than current distribution data indicates. The occurrence of L128Q/Y139C hybrid-resistant rats in Scotland, and elsewhere, is a significant development given the lack of definitive studies on the efficacy of SGARs against hybrid-resistant rats and because continued use of SGARs against resistant rodent populations has adverse consequences.

In order to meet the high-level principles expectation to ‘minimise the build-up of resistance’, CRRU UK have established arrangements to provide resistance information to users via the publication of annual reports and maps showing the scope of existing resistant rat and mice populations. This enables evidence-based decision-making by users

on the use of products for resistance management. In addition, CRRU UK have taken steps to improve accessibility and availability of the data through collaboration with the international Rodenticide Resistance Action Committee (RRAC) - UK users can search interactive maps to find the status of resistance in their locality and obtain information about effective intervention. By following the CRRU UK code of best practice and taking account of the available information on existing resistance, the spread of resistance should be minimised.

Product labelling

A harmonised summary of product characteristics (SPC) was agreed by member state competent authorities in 2016, while the UK was a member of the EU, and was subsequently updated in 2023. Product labelling for anticoagulant and cholecalciferol rodenticides remains consistent with the principles of the harmonised SPC and incorporates UK specific phrasing, outlining the requirement for the CRRU UK code of best practice to be followed as a condition of authorisation.

Knowledge, attitudes and practices

The main tool for providing evidence of changes in understanding, attitudes and behaviours is a series of knowledge, attitudes and practices (KAP) surveys. This type of survey uses a standardised questionnaire, that provides access to quantitative and qualitative information. Such surveys are widely used to observe changes in behaviour and in the level of adoption of advice in a wide range of settings. They collect information on what is known, believed and done in relation to a particular topic in a specific group.

There are inherent limitations to KAP surveys; participant responses are assumed to be representative but there is no way to be certain that the knowledge, attitudes and practices demonstrated in survey returns are truly representative of real world practice, and further confirmatory data is needed to gauge the environmental impact of rodenticide stewardship. However, there is no other source of evidence available to CRRU UK or GOG that gives this rodenticide user perspective of stewardship and its aims. While Scottish Pesticides Usage Surveys give some insight into practices, only a few sectors are surveyed. Including questions on rodenticide use in the UK wide Pesticides Usage Survey may provide additional evidence.

Consecutive KAP surveys conducted and collated by an independent research organisation on behalf of CRRU UK in 2015, 2017, 2020 and 2023 indicate marked changes across the years covered by the surveys. All rodenticide user groups have shown improvements in uptake of training, environmental awareness and product knowledge. This suggests that CRRU UK best practice advice and guidance is being understood and adopted. Prior to stewardship the gap between highly trained PCOs and relatively untrained farmers and gamekeepers was significant; evidence suggests this gap is now closing. There has also been an increase across all sectors in the uptake of CPD.

Overall, across all sectors there is evidence of a move away from product selection based only on recommendation with consideration of other approaches more apparent. KAP survey data provides evidence of developing knowledge and attitudes that reflect pest management practices that do not rely on chemical rodenticide application as the first step of a treatment process. Specifically, the 2017 survey indicated that environmental safety was a more significant consideration than it was in 2015. This trend continued, with the 2020 and 2023 surveys noting improvements among key user groups. In the farming sector, respondents reflected a greater awareness of risk to the environment and non-target species, including the need for covering bait, using bait boxes and removing spent bait. Similarly, gamekeepers showed improved trends towards using less rodenticide, linked with increased trapping as part of adopting non-toxic solutions. The trend towards using less rodenticide and using more trapping was even stronger amongst PCOs.

The 2020 survey data provides evidence that attitudes to using rodenticides continue to change, including a notable improvement in knowledge levels among gamekeepers. This is an important finding given the limited number of products that could be legally used in ‘open areas’ at the time, and the latest restrictions that removed all such use for SGARs in 2024. Notable in the 2023 survey is a significant increase in awareness of CRRU UK, especially among farmers. Survey data suggests this increased awareness is often associated with reduced rodenticide usage, with farmers now more likely to consider other, non-chemical, control measures. Additionally, the 2023 survey suggests that some larger (100ha+) farming operations now contract out their pest control to specialist companies.

Looking ahead, 2026 will see the next iteration of the KAP survey and GOG are particularly interested to see how indicators may have changed in light of updates to the CRRU UK regime.

Conclusion on a competent workforce

The evidence provided by CRRU UK indicates that the key benefit of a competent workforce is met. CRRU UK have established a comprehensive and increasingly robust competency framework. This has been supported by the introduction of Ofqual regulated training, widespread dissemination of best practice guidance and strengthened proof of competence requirements.

The new requirement from 2026 for all users to hold current certification or demonstrate continuing professional development is particularly welcome and represents a significant improvement in ensuring competence is maintained over time.

At the present time, GOG considered it was important to provide time for the recent CRRU UK changes to training and certification requirements to become established prior to recommending further changes.

Evidence from training providers and successive KAP surveys demonstrates improvements in knowledge, attitudes and behaviours across all user groups; particularly across the farming and gamekeeping sector, where baseline evidence highlighted competency gaps. Survey results show that users better understand environmental risks, resistance management and the use of rodenticides within an IPM approach, with greater consideration being given to non-chemical control measures.

While it is important to acknowledge the limitations of the survey methodology, when considered in combination with certification data and the provision of best practice guidance, it indicates a picture of improved competence across the sector. However, continued monitoring is important to ensure that these improvements are sustained and translated into measurable environmental outcomes.

While acknowledging the limited data available, GOG considers that following the CRRU UK code of best practice remains the most effective way to manage and minimise the spread of resistance.

Monitoring compliance with the regime

To understand whether the high-level principles for stewardship are working it is necessary that steps are taken for:

> Monitoring compliance with the regime and its environmental impacts and, if possible, an assessment of whether rodenticides and stewardship together are actually tackling the problems.

Given the overarching nature of this requirement it is directly relevant to all of the high-level principles.

The GOG assessment is based on information CRRU UK are required to submit each year (with the exception of the knowledge, attitudes and practice survey where the frequency and timing of the survey is agreed on a case by case basis). The information includes:

- UKCEH annual survey of residues in livers of 100 barn owls
- Annual survey of barn owl breeding performance
- KAP surveys (covered above)

Barn owl residues monitoring

The barn owl (Tyto alba) was chosen for monitoring of SGAR residues because it acts as a sentinel (early indicator) for generalist small-mammal predators in rural areas. Exposure is thought to be secondary (from feeding on poisoned prey, rather than directly on rodenticide baits) and arises mainly from predation on non-target species rather than

commensal rodents. Therefore, SGAR residues in barn owls should be sensitive to changes in the exposure of non-target species to SGARs. Each year up to 100 barn owl samples are tested for liver SGAR residues. The samples are obtained from carcasses of dead birds that have been collected and are submitted by members of the public for autopsy.

Residues monitoring is conducted by the UK Centre for Ecology and Hydrology (UKCEH) and forms part of the wider PBMS (pbms.ceh.ac.uk), which is now co-funded by CRRU UK as part of delivering stewardship requirements. A pre-stewardship barn owl residues baseline was established (Power analysis of liver SGAR residue data in barn owls from Britain, UKCEH et al., 2014 (pbms.ceh.ac.uk)) as the basis for comparison with samples collected following the implementation of CRRU UK's regime. This baseline was established using the results obtained from analysis of 395 barn owls that died between 2006 and 2012.

Performance measures and other criteria were set for the interpretation of SGAR residue levels. These were:

1. There should be a significant decrease in the exposure of the sentinel species – barn owl – in terms of sum residues of SGARs detected in livers of barn owl carcasses collected over the first four years.

2. Within the expected long-term downward trend, any significant increase observed in the exposure to the sum and any individual SGAR active substances on a yearly basis will be considered.

3. Monitoring will continue through the lifetime of the rodenticide stewardship regime to ensure the regime is meeting its objectives.

4. Changes to the rodenticide stewardship regime may result if the above are not met.

5. The following criteria will be used to determine exposure:

    - Mean low hepatic residue level – ≤0.1 µg/g wet weight or
    - Mean high hepatic residue level – >0.1 µg/g wet weight or
    - Ratio of barn owls with high to low hepatic residue levels

While the performance measures specify that consideration is given to the mean low/high hepatic residues, UKCEH residues analysis refers to median values – these are less susceptible to distortion by outliers and better represent typical levels of residues detected and are therefore considered more robust.

The UKCEH barn owl residues reports covering the first four years of the stewardship period are those for the years 2016, 2017, 2018 and 2019. In terms of sum residues of SGARs detected in livers of barn owl carcasses, no statistically significant decrease in

SGAR residues was found in any of the years when compared to the baseline period. However, it should be noted that stewardship conditions were not imposed on the relevant products until April 2016.

As noted above, monitoring of SGAR residues in barn owls did not detect a significant decrease in the sum of residues in any of the first four years when compared to the baseline period. Similarly, annual reports for 2020, 2021 and 2022 did not show a significant decrease in sum SGAR residues in any year when compared to the baseline period. In fact, for the period 2016 to 2022, the level of sum residues detected has remained static, showing no significant increase or decrease. Therefore, a downward trend in sum SGAR residues has not been observed.

In respect of the ratio of barn owls with ‘high’ to ‘low’ sum SGAR residues, there was no statistically significant difference between the baseline period and the years 2016, 2017, 2018 and 2019. In 2020 and 2021 a statistically significant increase in the proportion of birds with high sum residues was detected when compared to the baseline period. However, in 2022 the proportion of barn owls with high sum residues had reduced and there was no statistically significant difference with the baseline period.

However, statistically significant differences have been detected for some individual SGAR active substances. UKCEH report that a generalised linear regression analysis on the proportion of barn owls in the ‘high’ residues category indicates a statistically significant increasing trend for brodifacoum, and a significant decreasing trend for difenacoum, from the baseline period to 2022. Median ‘low’ concentrations of bromadiolone and difenacoum have declined. However, UKCEH residues analysis indicates that exposure to brodifacoum may be increasing, with an increase to median ‘low’ concentrations of brodifacoum. There have been no significant changes in median ‘high’ concentrations for these three active substances.

The predominant SGARs detected in barn owls in both the baseline and subsequent monitoring periods are bromadiolone, difenacoum and brodifacoum. The detection rate for flocoumafen and difethialone are low throughout. The prevalence of difethialone showed a statistically significant increase above the baseline period in 2018, 2019, 2020 and 2021. However, the detection rate remained low and this substance does not appear to be making much contribution to sum SGAR residues.

Red kite residues monitoring

While the residues monitoring performance measure relates specifically to the sentinel species for predatory birds (barn owl), in order to gauge the effects of stewardship on scavenging birds GOG has also considered UKCEH SGAR residues analysis for red kites. Data on scavenging bird species provide additional insight beyond the data on predatory bird species as they feed more regularly on dead and dying rodents that are the target of rodent control.

As with barn owls, the predominant SGARs detected in red kites are bromadiolone, difenacoum and brodifacoum. Over the period 2015 to 2022, residues of at least one SGAR were detected in 248 of the 263 red kites examined (94%); the median number of different SGARs detected in red kite liver samples was 2. UKCEH's findings do not indicate a consistent broad scale change in exposure of red kites to SGARs following the implementation of rodenticide stewardship in 2016, either in terms of the proportion of samples in which SGARs were detected or the magnitude of sum SGAR residues detected. However, the results indicate an increasing trend for brodifacoum residues.

UKCEH report that there is evidence that the proportion of red kites in which SGARs were implicated as a contributory factor in the death of the bird has decreased. Annual sample sizes of birds for which SGARs were diagnosed as a contributory mortality factor were small, making year on year comparisons difficult. However when data were pooled into year blocks (2017 to 2022 vs 2015 to 2016), the proportion of red kites in which SGARs were implicated as a cause of death was significantly lower in the later years than in the earlier years.

Wildlife Incident Investigation Scheme (WIIS)

WIIS makes enquiries into the death or illness of wildlife, pets and beneficial invertebrates that may have resulted from pesticide or biocide poisoning. WIIS has monitored pesticide (and latterly biocide) related harm to wildlife in the UK since 1985. The scheme focuses on investigating reports of poisoning incidents which also include the misuse of substances and their abuse where the intention was to deliberately harm wildlife.

A review of the data collected under the scheme between 1993 and 2011 was undertaken by the University of Reading and published in the CRRU UK annual report 2016. This review showed that vertebrate casualties caused by rodenticides, where they were used in accordance with their label conditions which require the correct use of risk mitigation measures, were rare. Of the 1,791 incidents analysed involving a broad range of species and 14 chemical substances, relatively few incidents arose from authorised rodenticide use (2.1%) which are the only outcomes in scope of stewardship. CRRU UK examination of more up to date WIIS data supports the same conclusion. As such, it was agreed that further analysis would only be undertaken should the number of WIIS cases arising from authorised use increase. The data collected through the scheme continues to be published on the HSE website (for the period 2016-2025 one incident is attributed to the authorised use of SGARs). In addition, the UKCEH annual review and analysis of SGAR residues in red kites and separately in barn owls (both unavailable since 2022 due to HPAI) submitted to GOG is available from the UKCEH website.

Barn Owl Monitoring Study (BOMS)

The BOMS was established as a surveillance project under arrangements to support the CRRU UK regime. The scheme was established to collect information on key breeding parameters in selected UK barn owl populations via a collaboration between the Wildlife Conservation Partnership (WCP) who conduct field work and the University of Reading, where data analysis and interpretation is carried out. The BOMS provides the opportunity to monitor the same nest sites each year enabling comparisons of nest site occupancy and brood size as a metric for barn owl breeding performance. A key objective is to obtain information about barn owl breeding performance among birds assumed to be carrying SGAR liver residues. In contrast to UKCEH residues data, which is derived from liver samples of dead birds, the BOMS focus is on breeding performance of live birds. Exposure of the monitored birds to SGARs is not measured as part of this study.

Over the period, CRRU UK received and analysed BOMS data for 2015, 2016, 2017, 2018, 2019, 2021 and 2022 (the 2020 study was not undertaken due to COVID restrictions). While the overall picture is complex, the analysis provides evidence that following a poor 2015, the breeding seasons in 2016 and 2017 were an improvement, primarily as a result of repeat nesting attempts, resulting in productive months for June and July. The 2018 breeding season in the UK was generally considered poor when compared with 2017, with below average nest occupancy and average brood size. The 2019 breeding season was considered generally good, with nest occupancy above average. 2020 was a poor year for barn owls, with nest occupancy down by 8.5% and brood size down by 14% when compared with the average for previous years (according to The Barn Owl Trust). However, nest occupancy for UK barn owls was above average in 2021, with a marginal improvement in brood size when compared with 2020.

While it is not possible to establish a direct relationship between nest productivity and residues monitoring data, CRRU UK state that information from a variety of sources suggests that, following a decline throughout much of the 20th century there has been an increase in the barn owl population from around 4,000 breeding pairs during the 1990s, to around 14,000 breeding pairs currently. It is clear from the data that increases and falls in nesting numbers are dependent on several factors, including weather characteristics and habitat and prey availability. Of the eggs and birds (both young and adult) studied during 2022, none were found to have unusual growth characteristics or physical deformities consistent with any sub lethal effects of exposure to SGARs. CRRU UK and GOG agreed that the 2022 BOMS report would be the final report.

Conclusion on monitoring compliance with the regime

As part of implementing stewardship HSE set a performance measure requiring a significant reduction in SGAR residues in the barn owl. However, UKCEH analysis of monitoring data shows no statistically significant decline in sum SGAR residues in this sentinel species compared to the pre-stewardship baseline.

While there is no evidence of the anticipated long-term downward trend, with the overall sum of SGAR residues detected in barn owls remaining static, there are indications that levels of SGAR residues of difenacoum and bromadiolone detected in barn owls have significantly declined when compared to the baseline years. Additionally, UKCEH analysis suggests a reduction in the frequency with which SGARs are implicated as a contributory cause of death in red kites. This is despite no observed decrease in SGAR residues in red kites.

The reported increase in brodifacoum residues in both barn owls and red kites is a significant concern. UKCEH analysis indicates that this trend could be offsetting reductions in exposure to difenacoum and bromadiolone, preventing an overall reduction in summed SGAR residues.

While brodifacoum has never been authorised for use in outdoor open areas, in 2022 GOG and CRRU UK discussed whether the increase in residues could be linked to a misunderstanding of authorised uses, as some bromadiolone and difenacoum based products could legally be used in this way.

CRRU UK agreed that HSE removing open area use for the remaining SGARs would provide clarity and address GOG's concerns. HSE amended product authorisations so that from 1 January 2025 it has been illegal to use any SGARs in open areas and waste dumps. GOG believes this may reduce residue levels arising from any inadvertent misuse, though monitoring data from the PBMS is not yet available following this change.

Multiple factors may be influencing the observed pattern of SGAR residues including wider changes in rodent control practices, such as in tackling resistance, or ecological factors, such as prey availability, influencing the behaviour of monitored species, *or changes to permitted use areas such allowing use outdoors around buildings for some SGARs including brodifacoum*. An understanding of the factors driving the observed residue patterns is important to inform future actions, particularly if the change to remove open area and waste dump uses does not influence the residues pattern as expected.

Overall, while stewardship may have contributed to changes in the patterns of exposure to individual SGARs, it has not delivered a measurable reduction in sum SGAR residues in the barn owl and therefore the performance measure has not been met.

Summary of main findings

In concluding this review, the Government Oversight Group considers that the CRRU UK Rodenticide Stewardship Scheme, consistent with successive annual assessments, continues to meet the governments high-level principles and deliver the anticipated benefits, despite not meeting the performance measure. In meeting their obligations to

monitor rodenticide use and their effects, CRRU UK have provided robust evidence to demonstrate that the assessment criteria, established at the outset of stewardship, have been met. Specifically:

High-level principle a:

Use of integrated pest management (IPM), including use of rodenticides, involving a hierarchy of risk controls for rodents.

The CRRU UK code of best practice has established rodenticide use within a risk hierarchy. IPM is a core component of the CRRU UK approved training that must be undertaken to acquire proof of competence in order to obtain rodenticides in scope of stewardship. KAP survey data provides evidence of developing knowledge and attitudes that reflect pest management practices that do not rely on chemical rodenticide application as the first step of a treatment process.

CRRU UK, during the review of stewardship, have taken steps to raise the benchmark for demonstrating competence. Since January 2023, CRRU UK's approved training has been independently regulated by Ofqual, and more recently changes to training and certification have been implemented that will require all users in scope of stewardship to take action to retain their proof of competence.

High-level principle b:

Responsible use of rodenticides, when demonstrated they are needed, because of their potential threat to human, animal health and the environment.

There is positive evidence of developing knowledge and attitudes across the sector, including evidence of pest management practices that do not rely on chemical rodenticide application as the first step in a treatment process. Recent sales data collected to support the review of stewardship shows that the total quantity of SGARs sold in the UK has significantly declined since the implementation of CRRU UK regime, with the total quantity of SGARs sold in the UK reducing by almost half between the years 2016-2023.

High-level principle c:

Applicability to all suppliers, handlers and professional users of rodenticides in scope of stewardship, to address these risks [to human, animal health and the environment].

Membership of the CRRU UK regime is a condition of authorisation placed on all stakeholders wishing to place professional anticoagulant and cholecalciferol rodenticides on the UK market. Compulsory stewardship phrasing and directions to follow the CRRU UK code of best practice are also required on the labels of products in scope of stewardship – not adhering to conditions on product labels may be an offence.

This means that CRRU UK requirements for competence and supply chain governance apply to all professional anticoagulant and cholecalciferol rodenticide product authorisation holders, their products and users of their products.

There is evidence that training and continuing professional development continue to be accessed, meaning that best practice continues to be embedded across the sector. Additionally, RPOS controls applied across all supply chains provide assurance that professional anticoagulant and cholecalciferol rodenticide products are only supplied to those who are competent to use them.

High-level principle d:

The need for the regime to be robust, effective, and workable, while remaining as simple as possible.

The effective operation of the CRRU UK regime relies on positive engagement with stakeholders across the sector providing active channels to receive feedback on the effectiveness of the arrangements established or where they are proving unworkable.

Evidence from a range of CRRU UK monitoring activities suggest that the regime is operating as designed to deliver key objectives. Take up of training and CPD remains key to workforce competence, with feedback from the latest KAP survey demonstrating their impact. Similarly, arrangements to support supply chain governance have been established and are working as designed, with changes implemented to improve their effectiveness. Proof of competence requirements demonstrate that the regime is robust and workable.

High-level principle e:

The need for the regime to cover the whole life-cycle of the rodenticide products: manufacture, supply chain, end-use, disposal and environmental fate.

Biocide regulations set regulatory requirements for manufacturers, product authorisation holders and users. This places legal responsibilities at each stage of the professional products lifecycle. Manufacturers and authorisation holders must comply with the

conditions of authorisation arising from the scientific evaluation of each product, including their formulation, packaging and label conditions. Users must follow all label conditions which provide for who can use each product, where they can be used, and their disposal.

For professional anticoagulant and cholecalciferol rodenticide products, HSE has set stewardship as a further condition of authorisation. This means that manufacturers and users must adhere to CRRU UK arrangements for supply chain governance and demonstrating competency.

High-level principle f:

The enabling of good practice in the control of rodent populations, as part of an IPM system, while minimising resistance build-up and secondary poisoning in non-target species

The evidence discussed above suggests that CRRU UK have made progress with embedding the CRRU UK code of best practice into how professional rodenticides are used through the take up of training. This has resulted in improvements in knowledge and attitudes that have led to the adoption of IPM practices. It is reasonable to assume that, under these circumstances, these improvements will also minimise the poisoning of non-target species arising from unnecessary exposure or the development of resistance among pest rodents.

However, regarding secondary poisoning in non-target species, it seems clear that the expected decrease in the sum of SGAR residues envisioned by the performance measures set for barn owl residues monitoring has not been realised.

Next, it should be considered whether the key benefits have been delivered, alongside associated performance measures.

Key benefit 1:

Governance of the supply chain, ensuring that professional rodenticide products are only supplied to approved retail outlets and sold to those trained to use them as part of an IPM strategy.

CRRU UK continues to deliver their commitment to govern professional anticoagulant and cholecalciferol rodenticide product supply chains by implementing a system of RPOS controls. This system of checks was augmented by the introduction of independent auditing to determine product suppliers' performance in adhering to requirements for

checking competence, and keeping records of such checks, prior to supplying professional products.

Key benefit 2:

A competent workforce capable of delivering stewardship standards and of demonstrating an appropriate understanding and attitude toward case-specific control of rodents and use of rodenticides.

CRRU UK continues to maintain and promote their code of best practice, first published in 2016 and subsequently developed as requirements have changed. The code operates as a framework underpinning all training for certification and supports IPM practices and responsible use of rodenticides in the control of rodent populations. Training and certification data provides further evidence of the training being undertaken and KAP survey data suggest improvements in knowledge, awareness and practice across all sectors and provide evidence of behaviour change and improvement in workforce competence.

Key benefit 3:

Monitoring compliance with the regime and its environmental impacts and, if possible, an assessment of whether rodenticides and stewardship together are actually tackling the problems.

From 2016, GOG has met with CRRU UK to consider what the required monitoring information means in relation to the delivery of the CRRU UK regime and the progress being made to secure the key benefits. Each year, GOG reports have broadly concluded that the regime has met the requirements of the high-level principles.

Rodenticides continue to demonstrate their effectiveness in reducing the adverse impacts that arise from uncontrolled pest rodent populations. As discussed, there is also evidence that the controls established under stewardship, and the CRRU UK regime, continue to play an important role in minimising the risks rodenticides pose to non-target species. However, GOG is disappointed that stewardship has not led to a reduction in the sum of all SGAR residues detected in the livers of barn owls as hoped for when stewardship was implemented.

In addition, although there have been significant decreases in the quantity of SGARs sold in the UK following the implementation of stewardship, this reduction has not led to a comparable decrease in the residues detected in barn owls. Instead, residues have remained static. While reductions in the amount of bromadiolone and difenacoum sold

appear to reflect similar decreases in the residues of these substances detected in barn owls, this is not the case for brodifacoum. Here, the annual quantities sold have been broadly similar for each of the years 2016 - 2023. However, UKCEH analysis for almost the same period (2016 – 2022) has identified an increase in some of the residues markers for brodifacoum over the same period. Therefore, GOG considers that the CRRU UK regime has not delivered the expected outcome with regard to the environmental impacts of anticoagulant rodenticide use.

Further work is needed to understand the underlying causes and issues driving changes in the UK market and to the pattern of residues. This includes how the distribution and extent of resistant rodent populations are leading to changes in the active substances used to control pest rodent populations.

Conclusion

Stewardship is intended to mitigate the risks associated with the professional use of anticoagulant and cholecalciferol rodenticides. The CRRU UK regime was implemented with this as a key objective, and with a performance measure (in the form of a reduction in sum SGAR exposure in barn owls) to indicate whether this objective was achieved. As established in this report, this performance measure has not been met. Similar findings have also been reported in red kites, where overall exposure appears unchanged since the introduction of stewardship.

Despite static levels of sum SGAR residues, and an increasing trend for brodifacoum residues, GOG recognises the value delivered by the additional controls and monitoring introduced by stewardship. In the absence of the steps taken to improve workforce competence and ensure that products can only be obtained by competent users, the risks to human health, animal health and the environment would likely be greater than they now are. The performance measure not being met does not mean that risk has not been mitigated at all, and GOG do not interpret this as an overall failure of stewardship.

Monitoring data is fundamental to rodenticide stewardship and the CRRU UK regime has been instrumental in ensuring these data are available. Without stewardship, GOG's ability to understand these issues would be significantly reduced.

Furthermore, GOG is content that the high-level principles continue to be met and that the key benefits relating to governance of the supply chain, a competent workforce and the reporting on monitoring requirements have been delivered by the CRRU UK regime.

Therefore, stewardship is contributing to mitigating the risks arising from the use of rodenticides in scope of stewardship, even though this is not being reflected in the environmental monitoring results. While it is clear that stewardship continues to play an important role in managing the risks arising from the use of rodenticides in scope, in

respect of residues monitoring, it is also clear that more needs to be done to decrease the levels of residues detected in non-target species.

GOG recognises the importance of effective rodent control and notes that the regulatory framework requires the risks of rodenticide use to be balanced against the risks posed by pest rodents. Previous assessment of this balance has determined that the disproportionate negative impacts on society from not allowing the use of rodenticides in scope of stewardship would outweigh the risks arising from the use of such rodenticides.

In light of this conclusion on the importance of rodenticides, GOG recommend that stewardship, and the CRRU UK regime, should continue, but be strengthened in key areas.

Strengthening stewardship

To consider where changes could be made to improve the operation of the CRRU UK regime GOG established a number of working groups, comprised of members from both GOG and CRRU UK, to focus on agreed issues:

- Residues monitoring working group
- Sales data working group
- Monitoring best practice working group
- Resistance working group

The shared aim for each working group was to consider ways that current arrangements could be improved and strengthened in order to help rodenticide stewardship deliver its expected benefits.

Residues monitoring working group

The residues monitoring working group (RMWG) was established to consider expanding residues monitoring beyond the sentinel species, the barn owl, to include other predatory and scavenging bird and mammal species. As with the barn owl, this would include acknowledging any limitations in the underlying data.

While overall SGAR residues in barn owls have not increased, the expected decrease in sum SGAR residues when compared to the pre-stewardship baseline period (2006 to 2012) has not been observed. The data for red kites (previously agreed to be included as part of residues monitoring in 2022) also does not show a decrease in SGAR exposure since the introduction of rodenticide stewardship.

The aim of expanding monitoring of rodenticide residues is to provide a broader set of data that can be used, for example, to determine the significance of different exposure pathways and monitor the impacts of any changes to the regime. A developed understanding of the observed residues patterns and their impact on wildlife will further support decision-making on introducing changes to the CRRU UK regime.

Objectives

The initial objectives for the RMWG were set out as:

a. Assess the availability of relevant residues data for other non-target species.

b. Assess the suitability of available residues data in other non-target species.

c. Is it possible to derive a pre-stewardship baseline for other non-target species? If not, how will residue levels be compared?

d. How will residue levels from non-target species be weighted when determining if there has been an overall reduction in SGAR residues?

Summary

Following analysis of available sources of data, the RMWG concluded that suitable data are available for 6 additional species relevant for understanding exposure of predatory and scavenging birds and mammals:

- buzzard (Buteo buteo*)*
- sparrowhawk (Accipiter nisus)
- peregrine falcon (Falco peregrinus)
- fox (Vulpes vulpes)
- hedgehog (Erinaceus europaeus)
- otter (Lutra lutra)

While there were too few hedgehog samples available from the period for robust statistical evaluation, initial analysis of the available data from the period 2001 to 2022 for the other 5 species suggests there is no indication of a reduction in exposure to sum SGARs since the introduction of stewardship. This, and the observed patterns of exposure to brodifacoum, are both consistent with findings from barn owl and red kite data.

The 6 additional species identified are considered relevant for understanding exposure of predatory and scavenging birds and mammals in general, providing insight to potential exposure arising from different dietary pathways and in different environments. It is hoped that obtaining data for a range of species will assist with targeting mitigation efforts and provide insight to the impact of using rodenticides in different settings and locations, including any variations arising from the use of different types of product formulations. However, it is important to acknowledge that the statistical analysis performed using existing SGAR residue data will vary between the species selected, mainly due to differences in sample sizes that comprise current datasets.

Specifically, the typical yearly sample sizes available for buzzard and fox (if shot foxes are included alongside other data) are considered sufficient to support the yearly comparison of current residues against a pre-stewardship baseline. Sample sizes for sparrowhawk, peregrine falcon, hedgehog and otter are insufficient to perform reliable yearly analysis, but would support analysis conducted on a 5-yearly basis. The number of otters and hedgehogs submitted under WIIS are unlikely to provide for robust analysis over the long term; however, datasets for these species are available from other independent sources.

In key areas, existing data on SGAR residues contains gaps or, where data is being collected, the arrangements for doing so are not on a sustainable footing. GOG has agreed that further consideration should be given to potential routes for funding existing and new analysis of SGAR residues. This should include assessing available data on SGAR residues in potential prey species, such as non-target rodents and molluscs.

For the 6 additional species identified, the RMWG considered what additional measures might supplement residues data to provide insight to the impact of SGAR residues on population health. The conclusion reached was that while data are available, it is unlikely they would provide any meaningful insight into the impact of SGAR residues on population health for the identified species. In theory, consideration of temporal trends in population and reproductive performance might provide insight into whether the risk from SGARs to these populations is increasing, decreasing, or remaining stable. However, in practice, like with barn owls, the influence of weather and prey availability has a major impact on populations of the identified species. Without accounting for the influence of these, and other confounding factors on population parameters, it is not possible to determine any impact of SGAR exposure, or the extent to which that impact is changing over time.

An additional complicating factor is that, although annual data on population status is available for UK raptor species, including buzzard, sparrowhawk, peregrine falcon and red kite, there are fewer information sources available for some mammal species. There are well documented cases that population abundance is already changing for some species, such as the expanding range of red kites, suggesting it is possible that populations exhibiting SGAR exposure may increase or be stable. However, this does not mean population impacts are not experienced as an effect of SGAR exposure.

The RMWG recognises that a knowledge gap exists in the area of linking exposure of predatory and scavenging birds and mammals to SGARs with impacts on individual and population health. Further consideration should therefore be given to the feasibility of establishing thresholds that could be used to determine the extent of any harm arising from the levels of residues detected in key species.

Sales data working group

The sales data working group (SDWG) was established to consider whether the volume of different SGARs sold in the UK since 2016 can be used to put the observed SGAR residue levels into context.

Monitoring data has shown that there has been no significant reduction in sum SGAR residues in barn owls since the introduction of stewardship. However, there has been some variation in the residues of individual SGARs observed, notably brodifacoum.

The aim of using sales data to put the SGAR residues data into context is to provide a fuller picture of the impact of rodenticide stewardship – if barn owl residues are the observed outcome of SGAR use, then SGAR sales data would be an obvious proxy for the input. A developed understanding of the observed residues patterns and how they can be influenced by rodenticide stewardship will further support decision-making on introducing changes to the CRRU UK regime.

Objectives

The initial objectives for the SDWG were set out as:

a. Agree how industry can provide product sales data to HSE, as the biocides regulator, whilst ensuring that commercial confidentiality can be maintained.

b. Assess the reliability of UK sales/tonnage data as a proxy for SGAR usage in the UK.

c. Consider how sales data can be used to help strengthen rodenticide stewardship. This should include consideration of any correlation between SGAR sales volumes and SGAR residues in wildlife.

Summary

The SDWG collected and analysed sales data on rodenticide products that are in scope of stewardship, for the period 2016 to 2023, including:

- tonnage of individual active substances
- proportions of individual active substances by product user (professional and non-professional)
- proportions of individual active substances by product formulation type (block, grain, pellet, paste, gel)
- proportions of individual active substances by product use area (indoor, outdoor around buildings, outdoor open areas and waste dumps, sewers)
- proportion of individual active substances by online sale

The main results of this analysis are discussed earlier in this report – Governance of the supply chain.

Separately, information on rodenticide use on arable, grassland and fodder farms is collected in Scotland through the Pesticide Usage Survey conducted by SASA. The latest report published by the Scottish Government, indicates a significant downward trend in rodenticide use compared to the previous 10 years. This is consistent with the downward trend in total SGAR sales observed in the collected sales data. The SDWG considers that the systematic collection of sales data would complement usage data, improving insight to use patterns across a range of sectors. Including rodenticide use in the similar Pesticide

Usage Survey carried out for England and Wales will assist in providing more comprehensive insight to UK use patterns.

To further understanding of the observed residues patterns and how they can be influenced by rodenticide stewardship, GOG agreed that additional independent analysis is required to determine any correlation between the sales dataset and that derived from residues monitoring.

The data collected for the proportions of online sales provided an unclear picture. Through following discussions with independent RPOS audit provider, BASIS, this was identified as a potential gap in supply chain governance. GOG considers that, to address this gap and improve the assurance provided by the RPOS audit process, the supply chain should be fully mapped.

Monitoring best practice working group

The monitoring best practice working group (MBPWG) was established to consider how the awareness and application of best practice amongst users of professional rodenticide products can best be monitored.

The KAP survey provides evidence of improving competence among professional users of rodenticides; however, residues monitoring shows that sum SGAR residues have not reduced.

The aim of monitoring best practice is to identify how changes in guidance and training and certification schemes are ensuring the responsible use of rodenticides in scope of stewardship. A developed understanding of practices amongst professional users and their impact on observed residues patterns will further support decision-making on introducing changes to the CRRU UK regime.

Objectives

The initial objectives for the MBPWG were set out as:

a. Are other methods needed to monitor best practice, and/or complement the findings from the KAP survey?

b. Do current training courses adequately address IPM approaches to rodent control? While those undertaking training will learn how to use rodenticides properly, will they also give consideration to other pest control techniques and appropriate measures that reduce the need for chemical interventions.

c. How soon will CPD scheme(s) be in place, and how soon will their benefits be realised?

d. Are there certain sectors/user groups for which enhanced monitoring is required?

e. Are criteria needed for the removal of an individual's certification?

Summary

In the area of embedding best practice among user groups, GOG identified 3 specific concerns:

1. Different standards for different users to acquire proof of competence

2. Variability in quality of training courses and training provision

3. Certification for life

As of 1 January 2026, sellers of professional-use rodenticides will only accept two forms of proof of competence at the point of sale. All professional users must now demonstrate:

- CRRU UK-approved training certification, issued within the last 5 years; or
- CRRU UK-approved training certification, issued outside the 5 years, and current membership of a CRRU UK-approved CPD scheme.

The MBPWG considers that this addresses the first concern as all users are required to demonstrate the same standard of competence. Practically speaking it may be difficult to enforce the removal of certification and so it may be beneficial to pursue amending the criteria in future, for example, reducing the period that individual awards remain valid for by applying expiry dates and requiring specific action to retain certification. However, at this time, the MBPWG consider that the changes implemented do address the third concern regarding 'certification for life'.

Since January 2023 all CRRU UK-approved training courses are regulated by Ofqual. Ofqual regulation ensures all courses are closely aligned in terms of the material covered and learning hours. It also requires invigilation to ensure examinations are conducted fairly and properly. These changes provide assurance that training and examination is being carried out to an equivalent standard across all CRRU UK-approved training providers. Since IPM approaches feature in CRRU UK-approved training courses, assurance is also provided that users are learning how to use rodenticides as part of a hierarchy of controls, rather than simply how to use rodenticides in a standalone way. The MBPWG therefore considers that this addresses the second concern.

At this time, the MBPWG considers that these changes to training and certification are likely to have a greater impact on user behaviour than actions targeted at specific user groups or sectors, particularly as it is not clear from the available data (KAP surveys, training uptake and number of users certified) which group(s) should be targeted. Implementing enhancing monitoring by targeting of KAP surveys to particular user groups

and sectors could inform such targeted actions; however, the next KAP survey is set to take place in 2026. The MBPWG considers that this will provide an early opportunity for the impact of the training and certification changes to be assessed and will support any decisions on future strengthening in this area.

The MBPWG also notes that data considered by other working groups, notably the RMWG and SDWG, are expected to provide broader insight to the impacts from best practice amongst users.

Resistance working group

The resistance working group (RWG) was established to consider how regulatory action might influence the development and/or spread of SGAR resistance.

Resistance to anticoagulant rodenticides is widespread across the UK and its frequency and severity are of particular concern. CRRU UK have regularly provided and updated distribution maps showing where different markers for resistance have been identified across the UK. The maps show the geographical spread of resistance but are unable to demonstrate how quickly the resistance has spread, since sequential records for resistance at a specific place over time are not available. Therefore, when resistance is identified, it cannot be determined if it has just developed or if it has been present for any measurable amount of time.

The aim of understanding the links between regulatory action and the development and/or spread of resistance is to ensure that use of anticoagulant rodenticides result in effective rodent control, thereby reducing risks from residues in non-target species.

Objectives

The initial objectives for the RWG were set out as:

a. What are the key drivers of resistance development and spread?

b. Could regulatory restrictions impact the development/spread of resistance? If so, what suggestions does the group have?

c. Should additional guidance be developed to help slow/reduce the development of resistance?

Summary

Genetic resistance occurs when a random mutation leads to decreased effectiveness of rodenticide products. Sustained use of such products leads to selection pressures that favour individuals with the mutation, and therefore the pool of resistant individuals increases. Using substances that are effective in areas where resistance is present

ensures that control is achieved using the smallest quantity of rodenticide and minimises the associated risks to wildlife. It also ensures that resistant infestations are removed efficiently, limiting the effectiveness of biological selection processes that drive the spread of resistance and its severity. In areas where resistance is widespread, rapid and effective rodent control relies on rodenticides identified as ‘resistance-breakers’. This avoids exposing resistant populations to less effective substances and preserves their efficacy in the longer term.

The RWG considers that the provision of information to users in areas where mutations are present is vital for best practice pest management strategies. Both CRRU UK and RRAG produce comprehensive guidance on how users can take action to help slow/reduce the development of resistance. Current advice is to switch mode of action or use a higher potency active substance when resistance is known or suspected. By introducing simple, easy to understand, and standardised information on product labels, users will more easily be able to select appropriate or alternative products when faced with a resistance issue. HSE could support such a labelling system by embedding it into regulatory assessment and authorisation documents.

Despite resistance distribution maps comprising of a total of 897 data points (Buckle et al., 2025 (thinkwildlife.org)) in 2025, there remains an incomplete geographical and temporal picture of resistance status across the UK. GOG considers that there is scope to improve resistance monitoring arrangements, both in terms of reporting routes and strength of available datasets.

Recommendations for strengthening stewardship

GOG agreed on a number of recommendations for strengthening stewardship from the working groups, intended to provide better insight and support future decision-making. The extent to which the planned improvements will directly influence the level of residues in the environment is as yet unknown. However, it is expected that strengthening the regime and continuing to respond to existing, and new, monitoring data will support continued efforts to minimise the environmental exposures that arise from rodenticide use in scope of stewardship.

Recommendation 1: Extend monitoring of environmental impacts

Expand monitoring of SGAR residues in a broader range of predatory and scavenging bird and mammal species. Specifically, 6 additional species relevant for understanding exposure of predatory and scavenging birds and mammals (buzzard, sparrowhawk, peregrine falcon, fox, hedgehog and otter).

The additional information will be used to inform future change (such as determining the significance of different exposure pathways) and evidence the impacts of any changes to the regime that aim to reduce exposure and risk to non-target species (such as removing authorisation for SGAR use in open areas and waste dumps).

Recommendation 2: Identify routes of exposure for key species

Initiate work to understand routes of exposure for the identified species from different product uses and formulation types, particularly for the hedgehog and otter. This will include assessing available data on SGAR residues in potential prey species, such as non-target rodents and molluscs. Alongside this work, consideration will be given to the feasibility of establishing thresholds that could be used to determine the extent of any harm arising from the levels of residues detected in key species.

Recommendation 3: Fund existing and new analysis of SGAR residues

Fund existing and new analysis of SGAR residues where existing data contains gaps or where data collection arrangements are currently unsustainable:

a. To expand datasets for sparrowhawk, peregrine falcon, hedgehog and otter, analysis of SGAR residues in stored carcasses submitted during relevant time periods is required.

b. The Cardiff University Otter project and Garden Wildlife Health project have additional datasets for otters and hedgehogs, respectively. However, as with barn owl monitoring, for stewardship to rely on data from these sources, the arrangements for its collection and analysis must be reliable in the longer term.

c. A valuable feature of the barn owl residue dataset is the analysis conducted to understand the statistical power and the timeframe required to detect changes in residue parameters. No such analysis has been performed for the additional species identified and doing so would require funding.

Recommendation 4: Improve information to users

Additional label information will allow users to combat resistance by more easily identifying potentially ineffective options and only use those known to be effective at specific locations. This measure could also support users to switch between products with different modes of action and consider the levels of anticoagulant potency.

Recommendation 5: Improve reporting of incidents of resistance to SGARs

Monitoring development of resistance to SGARs is important, given the potential to undermine effective rodent control and increase the risk of exposure to non-target species. New approaches to improving resistance monitoring should be considered, including mandatory reporting, while minimising additional burdens on users.

Recommendation 6: Establish the systematic collection and analysis of sales data

Improve insight to possible drivers of residues in the environment by:

a. Establishing arrangements for the systematic collection of sales data directly from manufacturers and authorisation holders.

b. Undertaking further analysis of the sales data to determine whether there is a relationship with residue levels detected in barn owls (possibly via UKCEH).

Recommendation 7: Make changes to the RPOS audit process

Further improve the assurance provided by the RPOS audit process by seeking BASIS input to fully map the rodenticide supply chain – including insight to the extent of in-person vs online provision.

Recommendation 8: Develop insight to SGAR key user groups

Develop insight to SGAR key user groups by including rodenticide use on farms in the Pesticides Usage Survey.

Implementing the recommendations

To take forward these improvements to stewardship, GOG and CRRU UK have secured a common understanding of the aims and rationale underpinning the recommendations. Implementation of some of the recommendations, via the work already undertaken through the review, will be straightforward. For some specific recommendations, CRRU UK and individual government bodies that form GOG have identified issues that require further clarification. In these areas, GOG and CRRU UK will work closely to develop solutions and agree timelines for securing the improvements. Once these timelines are agreed, HSE will consider future arrangements for review of the CRRU UK regime.

Annex 1: Regulatory background

Biocidal products are used to protect people and animals, preserve goods and infrastructure, stop pests like insects or rodents, and control viruses, bacteria and fungi through a chemical or biological action. Common examples are hand sanitisers and other disinfectants, wood preservatives, rodenticides and insect repellents. To make sure that, when used properly, they do not harm people, pets or the wider environment, biocidal products are regulated by:

- the GB Biocidal Products Regulation (legislation.gov.uk) (GB BPR) in Great Britain (England, Scotland, Wales) (GB)
- the EU Biocidal Products Regulation (eur-lex.europa.eu) (EU BPR) in Northern Ireland (NI).

A biocidal product must be authorised before it can be supplied or used in the UK. Before the product can be authorised, the active substance or substances it contains or generates must be approved for use in that product type.

Active substance approval

Active substances need to be approved before an authorisation for a biocidal product containing them can be granted. GB and EU BPR set standards for the approval of biocidal active substances. The approval process of an active substance requires industry to submit a technical and scientific dossier for that active substance. The information is evaluated by the regulatory competent authority in line with the requirements of GB or EU BPR and a draft competent authority report setting out the conclusions reached on the data and information submitted is prepared.

Under GB BPR, the regulatory competent authority prepares an opinion, and a decision on whether the active substance should be approved or not is taken by the Secretary of State with consent from the devolved governments. Under EU BPR, the Biocidal Products Committee (BPC) (echa.europa.eu) of the European Chemicals Agency (ECHA) prepares an opinion, and a decision on whether the active substance should be approved or not is voted on by Member States and taken by the European Commission. Active substance approvals are granted for a defined number of years, not exceeding 10 years in the first instance, and can be renewed. Active substances meeting exclusion criteria, such as the anticoagulant rodenticides, are limited to an initial approval period of 5 years, and 7 years on each renewal.

Article 14(5) of GB and EU BPR allow the approval expiry dates for active substances to be postponed where the approval is likely to expire before a decision has been taken on its renewal. Under GB BPR, such decisions are taken by the Secretary of State, with the

consent of the devolved governments. Under EU BPR, such decisions are taken by the European Commission.

Exclusion criteria and candidates for substitution

Article 5(1) of GB and EU BPR set criteria for active substances that should not normally be approved. Anticoagulant rodenticide active substances meet these criteria because they are toxic for reproduction and, in most cases, are persistent, bio-accumulative and/or toxic (PBT) in the environment. Cholecalciferol meets these criteria because it has endocrine disrupting properties for both human health and the environment.

However, derogations in Article 5(2) of GB BPR and EU BPR allow the anticoagulant rodenticide active substances and cholecalciferol to be approved because:

- they are essential to prevent a serious danger to human health, animal health or the environment; and
- not approving the active substances would have a disproportionate negative impact on society compared with the risk to human health, animal health or the environment arising from the use of the substances.

Because the anticoagulant rodenticide active substances and cholecalciferol are approved in this way, it means they are also considered to be candidates for substitution under Article 10(1).

When determining whether active substances meet the criteria for derogation, it is necessary to consider the availability of suitable and sufficient alternative active substances or technologies.

Information on the availability of suitable and sufficient alternatives is normally collected through consultation as part of the active substance approval or renewal process for candidates for substitution under Article 10(3) of GB and EU BPR. Under GB BPR, this is carried out by the competent authority; under EU BPR, it is carried out by ECHA.

Product authorisation

Once an active substance has been approved, products containing that active substance can then be considered for authorisation. GB and EU BPR set standards for the authorisation of biocidal products. The authorisation process of a biocidal product requires industry to submit a technical and scientific dossier for that product. The information is evaluated by the regulatory competent authority in line with the requirements of GB or EU BPR and a product assessment report setting out the conclusions reached on the data and information submitted is prepared.

Under both GB BPR and EU BPR, the regulatory competent authority takes a decision on whether or not a biocidal product can be authorised. Product authorisations are granted for a defined number of years, not exceeding 10 years in the first instance and are usually

renewable. Biocidal products containing active substances meeting exclusion criteria, such as the anticoagulant rodenticides, are limited to an initial authorisation period of 5 years, and 5 years on each renewal.

Article 31(7) of GB and EU BPR allow the authorisation expiry dates for biocidal products to be postponed where the authorisation is likely to expire before a decision has been taken on its renewal. Under both GB BPR and EU BPR, such decisions are taken by the regulatory competent authority.

Article 19 of GB BPR and EU BPR set the criteria that a biocidal product must normally meet to be granted an authorisation.

Anticoagulant and cholecalciferol-based rodenticides do not meet the normal criteria for authorisation because of risks to wild birds and mammals through primary and secondary poisoning.

Disproportionate negative impacts on society

Derogations in Article 19(5) of GB BPR and EU BPR set additional criteria that allow biocidal products to be authorised even when they do not meet the normal criteria for authorisation.

Anticoagulant and cholecalciferol-based rodenticide products are authorised in this way because it has previously been determined that not authorising them would result in disproportionate negative impacts for society when compared to the risks to human health, animal health or the environment arising from their authorised use.

Assessments of disproportionate negative impacts on society typically consider economic costs (cost of using alternative control methods and any reduction in efficacy of control), population level impacts on human health (costs of healthcare and wider economic impacts) and the environment (loss/decline of species).

Biocidal products authorised using this derogation must be subject to appropriate risk mitigation measures to ensure that exposure to humans and the environment is minimised.

Comparative assessment of biocidal products

Where a biocidal product contains an active substance that is a candidate for substitution, a comparative assessment against other authorised biocidal products and non-chemical controls that are available for the same use must be carried out before the product can be authorised or renewed.

Article 23 of GB and EU BPR requires a comparative assessment to determine, for each of a product's uses, if:

a. other authorised biocidal products, non-chemical controls or prevention methods already exist that:

i. present a significantly lower overall risk for human health, animal health and the environment;

ii. are sufficiently effective; and

iii. present no other significant economic or practical disadvantages.

b. the chemical diversity of the active substances is adequate to minimise the occurrence of resistance in the target organism.

Where all of these criteria are demonstrated to be met, supply and use of a biocidal product containing an active substance that is a candidate for substitution must be restricted or prohibited.

Regulatory history of rodenticides

Anticoagulant rodenticides

All anticoagulants work in the same way – by interfering with vitamin K metabolism to disrupt the blood clotting process. They are the most commonly used rodenticides in the UK and around the world. Those that remain available for use in the UK are the FGAR coumatetralyl (first available in the UK in early 1950s) and SGARs brodifacoum, bromadiolone, difenacoum, difethialone and flocoumafen (developed in the 1970s and 80s).

Before the introduction of EU biocides regulations, anticoagulant rodenticides were regulated under the Control of Pesticides Regulations (COPR) (legislation.gov.uk), introduced in 1986 in GB and NI. Based on assessments carried out at the time, the Advisory Committee on Pesticides approved professional anticoagulant products for use as follows:

- brodifacoum – indoors only
- bromadiolone – indoors and outdoors
- coumatetralyl – indoors and outdoors
- difenacoum – indoors and outdoors
- difethialone – not available
- flocoumafen – indoors only

In 2012, brodifacoum and flocoumafen products were approved for professional use ‘in and around buildings’ in some specific cases where there were concerns about public health impacts from uncontrolled rodent infestations.

Anticoagulant active substance approvals under EU biocides regulations began to be granted from 2007. The first authorisations began to be granted in the UK in 2010, initially only for indoor and outdoor around building use by professionals. With the introduction of stewardship in 2016, authorised professional uses were extended as follows:

- brodifacoum – indoor, outdoor around buildings, and sewers
- bromadiolone – indoor, outdoor around buildings, outdoor open areas and waste dumps, and sewers
- coumatetralyl – indoor, outdoor around buildings, outdoor open areas
- difenacoum – indoor, outdoor around buildings, outdoor open areas and waste dumps, and sewers
- difethialone – indoor, outdoor around buildings, outdoor open areas and waste dumps, and sewers
- flocoumafen – indoor, outdoor around buildings, and sewers

Membership of the CRRU UK regime was made a condition of authorisation for professional use products. Access to the UK market was no longer permitted for product authorisation holders without membership.

The anticoagulant active substances were reassessed under EU BPR after 5 years and the approvals were renewed in 2017, followed by reassessment and renewal of the anticoagulant products.

Cholecalciferol
Cholecalciferol is otherwise known as vitamin D3. As a rodenticide, it works by disrupting calcium regulation, leading to abnormal levels of calcium to enter the bloodstream and hypercalcification of soft tissues.

Cholecalciferol products were approved under COPR for professional use indoors and outdoors.

Industry did not originally support cholecalciferol for approval under EU biocides regulations and products were removed from the market in 2006. It was later supported and approved under EU BPR in 2019, with product authorisations granted in the UK from 2020 for indoor, outdoor around buildings, and outdoor open area and waste dump uses by professional users.

Current regulatory status of rodenticides

Anticoagulant rodenticides
Anticoagulant rodenticide active substances are being considered for renewal under EU BPR, where decisions continue to be applicable in Northern Ireland. Work is ongoing, but early indications suggest that anticoagulant rodenticides will remain approved in the EU.

Under GB BPR, HSE prioritised assessing the anticoagulant rodenticide products for renewal ahead of the renewal of the active substances they contain, so that any outcomes could be more quickly implemented on the regulation of their supply and use.

To ensure that decisions about the authorisation of rodenticide products are informed by the latest available information, HSE brought forward the consultation normally undertaken

at the active substance renewal stage. The information received will be used to inform the regulatory decisions taken by HSE. Terms and conditions relating to stewardship are applied to product authorisations for rodenticides in scope of stewardship. HSE will therefore consider the operation of the CRRU UK regime and the conclusions reached in GOG's report as part of reaching evidence-based regulatory decisions to comply with the requirements of GB BPR, and alongside a wide-range of other factors including the required assessments described in the product authorisation section.

Where it is considered necessary, HSE may decide to seek fundamental changes to the existing arrangements that form the CRRU UK regime, or the underpinning policies which have previously concluded that stewardship continues to play a role in managing risks arising from rodenticide use.

Cholecalciferol

Cholecalciferol is currently being considered for renewal under EU BPR, where decisions continue to be applicable in Northern Ireland. Work is ongoing, but early indications suggest that cholecalciferol will remain approved in the EU.

Under GB BPR, HSE prioritised assessing cholecalciferol products for renewal ahead of the renewal of the active substance they contain, so that any outcomes could be more quickly implemented on the regulation of their supply and use. These assessments are still at an early stage.

Further information

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First published November 2026.

Published by the Health and Safety Executive on behalf of the Government Oversight Group for Rodenticide Stewardship.