

THE UK RODENTICIDE STEWARDSHIP REGIME: A MODEL FOR ANTICOAGULANT RISK MITIGATION?

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Abstract The UK Rodenticide Stewardship Regime has been implemented to promote the nation-wide adoption of best practice in rodent pest management, in particular the use of the second-generation anticoagulants (SGARs) by professionals. The main objective of the regime is to minimize exposure of non-target wildlife to these substances and to reduce the frequency and concentration of residues in the environment. The regime involves voluntary work by individuals and stakeholder organisations operating in six main work areas: best practice, regulatory, training and certification, point of sale compliance, monitoring and communication. This paper describes the development and implementation of the regime, outlines anticipated outcomes and offers the regime as a possible model to offset current common regulatory action, which is increasingly to impose restrictions on who can use rodenticides and where they can be applied, based on hypothetical risk assessments, with unknown potential detrimental effects on human and animal health and hygiene.

Key words Best practice, monitoring, wildlife, anticoagulant residues, risk hierarchy, IPM

INTRODUCTION

Anticoagulant rodenticides are the principal chemical intervention used for rodent pest management worldwide (Buckle and Eason, 2015). Therefore, these substances have an essential part to play globally in the maintenance of human health, well-being and prosperity and are equally important in animal health and hygiene. However, regulators in many jurisdictions, particularly in the European Union and the United States, have expressed concerns about anticoagulant rodenticides (USEPA, 2008; HSE, 2013; UBA, 2015), although the precise nature of these concerns differs depending on the authority involved. Also varied is the regulatory action now being implemented to mitigate these concerns. In the USA, risks to humans, particularly children, companion animals and non-target wildlife concern the Environmental Protection Agency (EPA) and restrictions in the availability of second-generation anticoagulants rodenticides (SGARs) to home-owners (amateurs) appears to be the main action implemented (USEPA, 2017). In Europe, concerns about risks to wildlife appear to predominate (HSE, 2013; Berny et al., 2014). Restrictions on amateur use of SGARs also feature prominently in EU Member State actions, although other measures such as the prevention of the use of long-term applications of rodenticides, sometimes called permanent baiting, and the restriction of some compounds to use only indoors are also applied. Whatever the exact nature of the regulatory action taken against anticoagulants in the US and the EU, a common outcome is the implementation of restrictions on who may use these essential products and where they can be applied. However, after the recent extensive reviews of these substances, regulators have universally decided that their continued use is required (Berny et al., 2014).

In the United Kingdom, the Competent Authority for biocides, the Health and Safety Executive (HSE), is principally concerned about the exposure of wildlife to SGARs (HSE, 2012). Researchers in the UK have provided a series of studies which demonstrates that current use patterns result in the exposure of a range of wildlife species, including some of high conservation value (Shore et al., 2015). The biology of the species affected show that exposure follows several different ecological pathways. Perhaps unique to the UK, however, is the wide distribution and severity of anticoagulant resistance (Buckle, 2013). This has resulted in the recent reversal of the regulatory position that for the past 30 years has restricted the uses of the most potent anticoagulants to indoors, to allow their more widespread use. To permit this new strategy to be implemented in the face of regulatory concern about SGARs, HSE has required the development and introduction of a rigorous regime of rodenticide stewardship (HSE 2017).

The regime, designed and co-ordinated by the Campaign for Responsible Rodenticide Use (CRRU) UK across all professional user sectors, is based on: 1) increasing awareness among users of the risks presented by the use of anticoagulants in some circumstances, 2) enhanced application of best practice among all professional user groups, 3) requirement for proof of competence at the point of sale to allow professionals to purchase anticoagulant rodenticide products, 4) application of an extensive framework of industry-funded monitoring measures and 5) a system of oversight from all relevant governmental bodies, permitting rapid adjustment of the regulatory strategy if necessary.

STRUCTURE AND IMPLEMENTATION OF THE UK RODENTICIDE STEWARDSHIP REGIME

Best Practice

The rigorous implementation of best practice is fundamental to the stewardship regime but this begs the question, 'what is best practice?' Several principles are applied in this respect. The long-standing maxim of an integrated approach to rodent pest management is always applicable. In other words no single intervention on its own is ever likely to provide a long-term solution to rodent problems. More innovative, however, is the consideration of a 'risk hierarchy' among rodent control interventions. All rodent control practices bring risks, with SGARs probably bringing the most severe. However, the concept of risk hierarchy promotes the use of those interventions likely to be fully effective but which incur the least risk. An appreciation of relative risks by rodenticide users is required. This does not mean that less risky methods must all be tried and those more risky only used when the former are found to fail. Rather, a plan is implemented which first considers all possible techniques and then uses those expected to be fully effective but considered to carry the least risk.

Is permanent baiting best practice? It is certainly a widely applied use of anticoagulant rodenticides. Our knowledge of the feeding patterns of some of the most contaminated UK wildlife species (Love et al., 2000), in terms of the proportion of individuals carrying residues, shows that this contamination is likely not caused by the consumption of poisoned target rodents but by exposure to contaminated non-target wild small mammals. There can be little doubt that large-scale application of rodenticides in the absence of extant pest infestations (i.e. permanent baiting) produces environmental risk, especially where permanent tamper-resistant bait boxes containing SGARs are employed outdoors with non-target small mammals present. Some EU regulators now apply a ban on permanent baiting, although some with permissible derogations (UBA, 2015). The paramount requirements of food hygiene, and the very high financial and reputational cost to manufacturers and pest control service providers of rodent detritus found in human food products, indicates that permanent baiting may sometimes be justified. A guideline is provided by CRRU UK explaining when permanent baiting may be used and how to conduct it with the least risk to the environment (CRRU UK, 2016a).

The fundamentals of best practice for implementation in the UK are now set out in a guideline (CRRU UK, 2015) which forms the basis for course content in all CRRU-approved training and certification schemes (see below). Since its publication it has been downloaded from the CRRU UK website over 8,000 times and 11,000 copies have been printed and distributed to users.

A requirement to reduce exposure to wildlife during rodenticide application is emphasised in another document recently published by CRRU UK which provides guidance on environmental risk assessments (CRRU UK, 2016b). This carries a recommendation that an assessment of risk to non-target animals should be conducted whenever anticoagulants are used outdoors.

Regulatory Considerations

The review of rodenticides (Product Type 14), under the requirements of the EU Biocidal Products Regulation (EU, 2012), requires the assessment of all technical data to support product authorisations. This process includes the use of environmental risk assessment models in which PEC/PNEC ratios are calculated. This ratio, the relationship between the predicted environmental concentration (PEC) and the predicted no-effect concentration (PNEC), must be less than one if there is to be no environmental concern. Anticoagulant PEC/PNEC ratios fail this test, some by very wide margins (Smith and Shore, 2015), hence the high degree of regulatory concern about these substances.

The transition in UK from products regulated under the Control of Pesticides Regulation (1989) to those authorised under stewardship conditions and the EU BPR took place on April 1 2016. The stewardship regime was in place from that date, when the first rodenticide products with ‘stewardship conditions’ labels came on to the market requiring proof of professional competence to permit purchase. A smooth transition was facilitated by CRRU UK and HSE to co-ordinate the timing of the stewardship-linked authorisations, and ensuring consistency and clarity of labels.

Training and Certification

Use of certification as proof of professional competence (PPC) to permit purchase of rodenticide products necessitates definition of what such certification comprises. A training framework was produced to lay out necessary course syllabus content, examination procedures and identify suitable independent certification awarding organisations (CRRU UK, 2016c). The framework identified 13 required topic areas to be included in all approved training for certification. It was subsequently necessary to audit all existing relevant certifications to see if they covered the required topic areas to permit approval. ‘Once only’ training is inadequate when knowledge and best practice evolves quickly and regulatory requirements change. Therefore a scheme for updating certificated personnel will be needed and this is often called Continuing Professional Development (CPD).

The timeline for introducing PPC was very challenging for one of the main rodenticide user groups – farmers. It was estimated that up to 100,000 farmers, previously permitted to purchase professional rodenticides, would have been disqualified from doing so because provision of training and certification could not be carried out in time. A means of temporary certification was therefore permitted through membership of a farm assurance scheme whose procedures included a published standard combining rigorous implementation of integrated rodent pest management, archived documentation of all interventions used on-farm and regular independent auditing of compliance with the standard (see Red Tractor Assurance for example, RTA, 2014).

Point of Sale Compliance

The responsibility for ensuring compliance with PPC at point of sale resides with product authorisation holders, although this obligation is relayed down the distribution chain to all retail outlets via formal signed declarations of intent. Failure to apply rigorous PPC at point of sale risks manufacturers losing authorisations and retailers the ability to sell the products in question. Auditing of compliance with

point of sale checks is to be carried out by an organisation that is independent of all interested parties. Implementation of point of sale checks at all outlets from which anticoagulants are sold to professionals was one of the challenges overcome by the stewardship regime.

Monitoring

The principle purpose of the regime is to reduce wildlife exposure and, therefore, the main monitoring tool will be an annual assessment of the degree of contamination of a sentinel species, the barn owl (*Tyto alba*) (Table 1; CRRU, 2017). This species was chosen because of the long-term data set made available by the work of the Centre for Ecology & Hydrology, (Shore et al., 2015) and because the predatory behaviour of barn owls is typical of several other species which use the same prey resources. Residues in barn owl livers tell us much about the degree of contamination but nothing about the status of the species and any possible effects of exposure on its distribution and abundance. Therefore, a project is also in place, conducted in conjunction with the Barn Owl Conservation Network, to monitor the annual breeding success of selected UK barn owl populations. Although about 90% of UK barn owls are thought to carry residues of one or more SGAR (Shore et al. 2015), the UK barn owl population has nevertheless been increasing, both in terms of the numbers of breeding pairs and their geographical spread (Balmer et al., 2015). The same holds true for several other UK species of predatory bird, including buzzard (*Buteo buteo*) and red kite (*Milvus milvus*), that are commonly contaminated with SGARs.

Table 1. Numbers of UK barn owls found with and without residues of second-generation anticoagulant rodenticides (SGARs). Among the total of 100 birds collected and analysed in 2015, 94% carried residues of one or more SGAR. From Walker et.al. (2016).

	broma- diolone	difenacoum	brodifacoum	flocoumafen	difethialone
Non-detected	23	28	47	98	90
Detected	77	72	53	2	10
% detected	77%	72%	53%	3%	10%

Reducing wildlife exposure is to be achieved through improved use practices (see above). A Knowledge, Attitudes and Practice (KAP) survey was therefore conducted in 2015 to gather information on levels of training, knowledge and adoption of best practice prior to stewardship implementation. KAP surveys will be repeated periodically to monitor progress among the three main user communities in the UK, pest control professionals in the public and private sectors, farmers and gamekeepers.

Communication

A fundamental focus of the regime has been on effective communication with all professional rodenticide users to improve their understanding of the causes of wildlife contamination and how it might be prevented. The necessities of best practice, reasons for the implementation of the stewardship regime, the various critical time points within its adoption, such as the introduction of point-of-sale competence checks for purchase of professional rodenticides, and progress towards key monitoring goals have all been the subject of nation-wide communications in all user communities.

CONCLUSIONS

Regulatory concern about, and therefore regulatory pressure on, anticoagulant rodenticides is unlikely to reduce in the near future. Indeed, a recent decision by the Risk Assessment Committee of the European Chemicals Agency looks set to reduce the active ingredient concentration in many widely-used products from 50 ppm to less than 30 ppm, with unknown effects on efficacy and resistance development, due in this case to hypothetical human health risks (ECHA, 2014). Until demonstrably safer, and equally effective active substances come to the market, and this is unlikely to happen in the foreseeable future (Buckle and Smith, 2015), we must find ways to use these essential biocides whilst minimizing risk, both to human health and the environment. The approach adopted in the UK rodenticide stewardship regime may be capable of wider application. It applies requirements upon all professional users for training and certification to promote more comprehensive use of best practice. Proof of competence is required when products are purchased. Clear objectives are set for success, within a realistic time-frame. Comprehensive monitoring, within projects covering all intended objectives, permits progress to be studied against expectation and, consequently, regulation to be modified if necessary in timely fashion. The regime has permitted, for the time being at least, an expansion of the use of SGARs in the UK, mainly to combat resistance development and spread, at a time when regulators in many other jurisdictions are moving in the opposite direction, based on hypothetical and desk-based risk assessments, with unpredictable outcomes for human and animal health and hygiene.

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