Comments provided by: Barn Owl Trust, UK - National NGO

General information

Brodifacoum, flocoumafen, difethialone, difenacoum, and bromadiolone are highly toxic second generation anticoagulant rodenticides (SGARs) listed on Annex 1 of the Biocides Product Directive (BPD). According to the harmonised classification and labelling (CLP00) approved by the European Union, this substance is "fatal if swallowed, is fatal in contact with skin, causes damage to organs through prolonged or repeated exposure, and is very toxic to aquatic life with long lasting effects". All SGARs have PEC/PNEC greater than one for both primary and secondary poisoning (UK-HSE 2012a) and should therefore be banned from use across the EU.

Warfarin, Chlorophacinone, and Coumatetralyl are first generation anticoagulant rodenticides (FGARs) classed by the EU (along with SGARs) as 'toxic for reproduction'. FGARs and SGARs are here-in referred to as Anti Vitamin K Anticoagulants (AVKs).

AVKs have contaminated the food chains of bird-eating predators, insectivorous mammals, and scavengers as well as those that feed mainly on small mammals. AVKs are found in 89% of Sparrowhawks Accipiter nisus (Walker et. al. 2015) and 87% of Barn Owls Tyto alba (Walker et. al. 2014), 70% of Red Kites Milvus milvus (Hughes et. al. 2013), 56% of Hedgehogs Erinaceus europaeus (Dowding et. al. 2010), 30% of Weasels Mustela nivalis and 23% of Stoats Mustela erminea (McDonald 1998), and 20% of Tawny Owls Strix aluco (Walker et.al. 2008). Most contaminated birds and mammals contain sub-lethal levels of AVK(s), the effects of which are unknown, and some contain lethal levels and die as a direct result (Walker et. al. 2014).

Domestic animals are also contaminated: poisonings from ingesting rodenticides are one of the most common types of toxicities seen in pet veterinary practices in both small and large animals (Greenlee, 2010).

Rats feed mainly on high-protein foods stored and/or used by man in ways that are accessible to rats (Harris and Yalden 2008). The burrows in which they live are generally within man-made environments and under man-made item such as floors, foundations, and rubbish. Rat infestations in and around farm buildings mainly occur where feed is constantly available in ways that are accessible to rats. Rat infestations in open countryside mainly occur where man provides constant food sources for farm animals such as free range pigs. Large rat infestations also occur where food is provided for pheasants released for the purpose of 'sport'.

Killing rats can only reduce populations for short periods. Where ever food and harbourage are provided by man, rat numbers will soon recover and reach the maximum carrying capacity of the environment. Repeated use of AVKs results in the build-up of resistance (DEFRA 2002) (hence the increasing toxicity of poisons) and the widespread contamination of non-target species. The only long-term solution is to reduce the rodent carrying capacity of the environment by reducing access to food and harbourage. Research conducted by the UK Central Science Laboratory showed that the removal of harbourage alone is as effective (in reducing rodent numbers) as using poison (Lambert et.al. 2003).

The new Stewardship Scheme for AVKs in the UK clearly states that "the rodent carrying capacity of sites should always be reduced through improvements in environmental management" (CRRU 2015). However, this scheme is not compulsory and its Code of Best Practice merely asks users to "consider" alternatives to AVK use (CRRU 2015) rather than telling them to use alternatives before resorting to AVKs.

Alternative Identity and Properties

The principal alternative to AVKs described here-in is Environmental Management and, where killing is necessary, the alternative described is Electrocution.

Environmental Management means reducing the rodent carrying capacity of the environment by preventing or reducing access to food and harbourage.

Technical Feasibility

• Urban, rural, and agricultural buildings containing food can be made rodent-proof by the installation of vent grilles and close-fitting doors with steel kick boards.
• Food can be kept in rodent-proof containers.
• Farm animals can be denied constant access to high protein foods and only fed discrete meals that they clear.
• Animal feed containers can be designed and positioned so as to reduce food availability to rats.
• Animal housing can be designed so that it does not provide harbourage for rats (e.g. elevated poultry houses and pig arcs with no floor).
• Animal feeding stations can be positioned away from cover so as to increase natural predation of rats.
• Cover (vegetation and rubbish) around farm buildings can be removed so as to increase natural predation of rats.
• The public can be educated to not drop food and provided with adequate rodent-proof containers for food waste.
• Low numbers of rats in the countryside can be tolerated.
• Rats in large sewers (where they provide a useful service by consuming waste) can be tolerated.
• The use of AVKs for 'sport' (i.e the feeding of released game birds) can be banned. Alternatively, bird food can be provided away from cover.
• Rats in sewage pipes can be automatically removed and humanely killed by electrocution (e.g. http://www.wisecon.dk/wisetrap.html) as is common in Denmark.
• Where rats must be killed above ground, this can be done humanely using automated electrocution devices (e.g. http://www.wisecon.dk/wisebox.html).
• Electrocution devices are available as mains electricity powered, battery powered (suitable for use in remote locations), or solar powered.

<u>Function</u>

The function performed by the alternative is avoidance of human-induced rat infestations and the removal of anticoagulant rodenticides from eco systems.

<u>Technology Required</u>

No changes in technology are required as the process of Environmental Management is already well established (see for example Insect and rodent control through environmental management: a community action programme, World Health Organization). Additionally, humane automatic rat-killing devices are widely available

(see for example Non-chemical Rodent Control by Science and Advice for Scottish Agriculture).

With the current widespread availability of rodenticides there is little or no incentive for improved environmental management. Yet, environmental management is the only way of achieving sustainable rodent control.

Benefits

According to German researchers Plenge-Bönig and Schmolz (2014), "the benefits of sustainable rodent management will be a reduction of rodenticide exposure to the environment, prevention of resistance and long-term economical savings."

Economic Feasibility

Once it is known that anticoagulant rodenticides will be banned in Europe, designers and manufacturers will have an incentive to include rodent control features in their products. The additional costs are small. For example, rodent-proofing existing buildings by the addition of modified doors, vents, and drains will be cheaper than using poisons, especially in the long term. The cost difference between a new building and a new rodent-proof building are negligible. The purchase cost of high-tech rat electrocution devices may be higher than the cost of poison in the short term. However, in the long term the combined cost of environmental management and the maintenance of electrocution devices will be far cheaper than using rodenticides and much better for ecosystems.

Hazards and Risks of the Alternative

Rodenticides are designed to kill and are extremely hazardous. There are no hazards or risks associated with improved environmental management. Wisebox, Wisetrap, Victor multi-kill, and Rat Zapper electrocution devices are safe when used in accordance with simple instructions.

Data sources

- A full list of references is provided.
- Product data sources are as follows:

Wisetrap/Wisebox http://www.wisecon.dk/

Victor Muti-kill and Rat Zapper http://www.victorpest.co.uk/

- List of Non-chemical Rodent Control products by Science and Advice for Scottish Agriculture http://www.sasa.gov.uk/document-library/non-chemical-rodent-control
- Insect and rodent control through environmental management: a community action programme. World Health Organization (1991). Retrieved 09/02/2015 from https://extranet.who.int/iris/restricted/bitstream/10665/38143/1/9241544112_eng_part1.pdf and https://extranet.who.int/iris/restricted/bitstream/10665/38143/2/9241544112_eng_part2.pdf

Availability

Conversion to improved Environmental Management is a process that can be performed by anyone; public authorities, architects and designers, building managers, waste

managers, animal keepers, food producers, processors, wholesalers and retailers, as well as farmers and other land managers. Where necessary, pest controllers that provide advice on humane and effective control methods (such as the Humane Wildlife Deterrence Association) can be consulted.
Humane electrocution devices are widely available to buy on the internet from as little as 40 GBP.

Conclusion on suitability and availability of the alternative
The current situation is not sustainable. Rats are increasingly resistant to anticoagulant rodenticides which as becoming ever-more toxic. Wildlife contamination is widespread and increasing. Non-target wild animals, birds and pets are being killed by rodenticides including species of high conservation concern.

Given the widespread availability of rodenticides, there is currently little or no incentive for designers and managers to adopt the principals of improved environmental management. Yet, it is the only way of achieving sustainable rodent control..

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