

CHALLENGES ANALYSING MONITORING DATA FOR AN INSECTICIDE REGULATED UNDER DIFFERENT FRAMEWORKS: A CASE STUDY ON CYPERMETHRIN IN THE UK

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Background

Cypermethrin is a synthetic pyrethroid used as an insecticide in a wide range of products across various sectors, registered under the PPP (1107/2009), biocide (528/2012) and veterinary medicine (2001/82) regulatory frameworks. An important use in the UK is as an ectoparasiticide in veterinary medicines to treat sheep, cattle and horses. Its high toxicity and presence in surface water bodies led to it being classified as an EC priority substance in 2013. Public water quality monitoring in the UK has identified exceedances of the Environmental Quality Standard (EQS) (annual average and maximum allowable concentration) and this poster focusses on potential sources of cypermethrin within catchments driven by the veterinary use and compared these sources against surface water monitoring data for one sheep dominated catchment in the UK.

Veterinary medicine usage

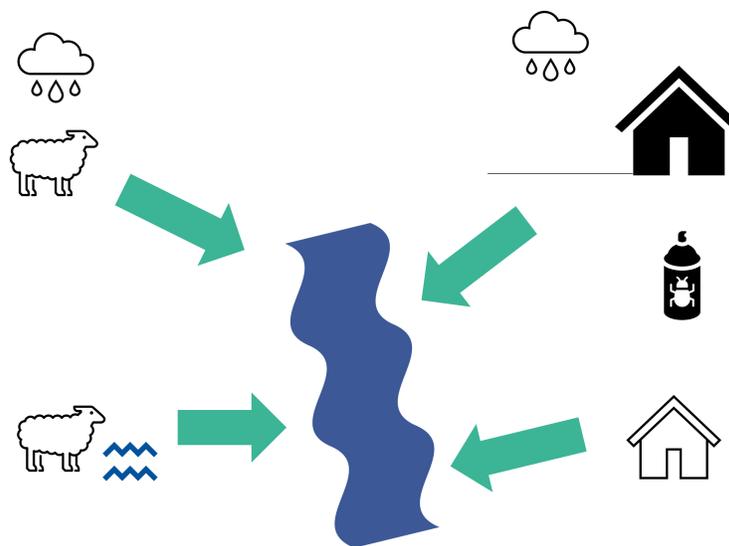
Horse (1 product) and cattle products (3 products) were considered minor as they made up <10% of total veterinary usage in the UK. Sheep products were the focus of this analysis and these products typically contain cypermethrin concentrations of 1.25% w/v.

Runoff from animal washoff

The model considers: number of sheep, rams and lambs (DEFRA, 2017), application rate for treatment of blowfly, proportion of flock treated each month within the catchment, proportion that washes off animal, 50% of animals experience washoff, proportion of managed grass adjacent to SW in catchment, runoff percentage from grassland and 100% washoff available for runoff. Less than 0.1 kg cypermethrin estimated to be potentially transported to surface water per year in England.

Washoff from sheep fording rivers

The model considers: number of sheep, rams and lambs (DEFRA, 2017), application rate for treatment of blowfly, washoff proportion adjusted from FERA³ to account for pour-ons and proportion of animals fording streams set to half proportion of managed grass adjacent to surface water. Less than 1 kg cypermethrin estimated to be potentially washed off to surface water per year in England.



Hardstanding runoff

The model considers: number of sheep, rams and lambs (DEFRA, 2017), application rate for treatment of blowfly, spillage rate from FERA¹, washoff from hard standing from FERA², 50% sheep treated and 100% connectivity of farmyards to surface water. 5-10 kg cypermethrin estimated to be potentially washed off to surface water per year in England.

Direct disposal

No user information available.

Animal housing - direct emission and runoff from waste spread to land

Biocide use in poultry housing possible, no further user information available. No data on manure spread to land available, considered minimal importance as poultry manure often incinerated in UK.

Sheep catchment

In the catchment selected 4 out of 5 monitoring events had HI-CIS isomers which are associated with cypermethrin veterinary medicine products. The catchment was ca. 160 km², ca. 37330 sheep grazing ca. 80 km² managed grass and ca. 50 km² rough grass. There was <0.2 km² cereals and oilseed rape crop.

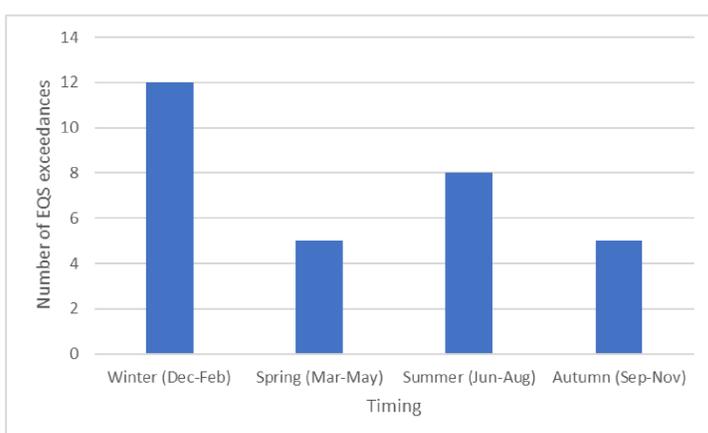


Figure 1. Timing of EQS exceedances through the year in the catchment

EQS exceedance

Most EQS exceedances occurred in winter contrasting with the typical usage period of the product suggesting washoff during winter storms via surface runoff from grassland or hardstandings.

The maximum concentration monitored in the catchment for the year would have required more than the maximum number of sheep in the catchment to ford the river on that day. Modelled surface runoff from grassland for the catchment was also much lower than the maximum concentration detected. Based on the model presented here, spillage during application was the most likely source for this event.

Analysis of monitored concentrations closer to the EQS could be driven by hardstanding runoff or possibly fording of sheep (>20 sheep).

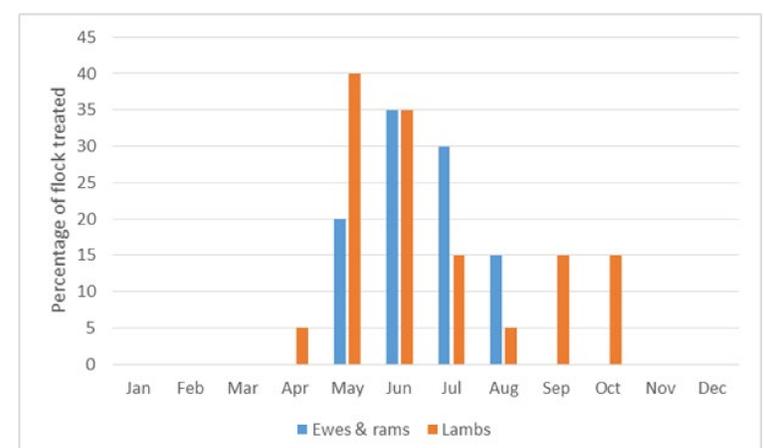


Figure 2. Percentage of sheep flock treated each month in the catchment

Conclusion

Analysis of likely sources suggest runoff from hardstanding is likely to dominate releases of cypermethrin to surface water for veterinary use. Analysis of surface water monitoring data from a sheep dominated catchment supports these findings. However, often catchments are not dominated by one source and multiple sources can lead to exceedances of the EQS. Processing wool containing cypermethrin residues can lead to releases from textile sources and use as a biocide to treat wood as a preservative or as an insecticide to treat crawling insects can be an alternative source. Use of cypermethrin as a biocide can be by amateurs as well as professionals and there is limited data on how professionals and amateurs use insecticides as well as limited data on how amateurs clean up after using biocides (insecticides and wood preservatives). Cleaning of bottles or brushes with water, for example, could contribute to EQS exceedances. It is, therefore, challenging to interpret surface water monitoring data for a substance that has multiple uses and from sources that may not have been considered during the original authorisation (e.g. spillages during use).