CHARACTERISATION & FIELD EVALUATION OF SHEEP DIP CHEMICAL DISPOSAL

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1. Project aims

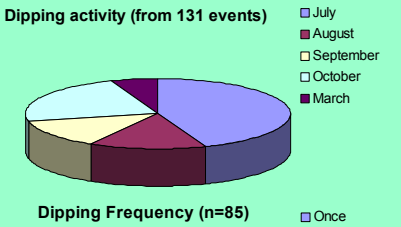
To characterise the treatment and disposal practices of sheep dip and the environmental fate and behaviour of sheep dip chemicals.

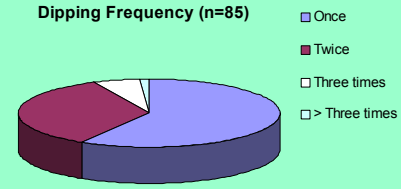
2. Background

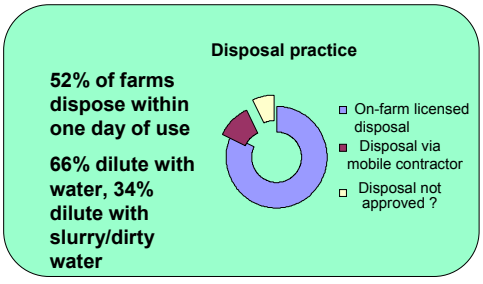
In the UK, sheep dipping is a common method of treatment for ectoparasites using either synthetic pyrethroid or organophosphate insecticides. Following treatment, the waste dipping solution is disposed of by applying to approved areas of land licensed by the UK Environment Agency on the basis that there is a low risk of groundwater contamination.

However limited information exists on dipping practices, products used and the fate and behaviour of the active substances following disposal to land. This study investigated on-farm treatment practices, and the degradation and sorption characteristics of the active substances in soil to indicate their potential for contamination of groundwater and/or surface water

3. Operator survey : Dipping/disposal







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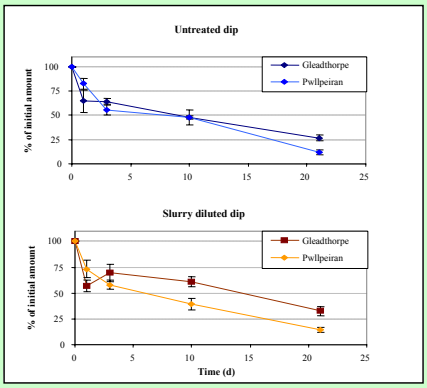
4. Soil Degradation Studies

- Waste sheep dip containing either high cis-cypermethrin or diazinon was provided from dipping events and frozen prior to use. Waste dip was either untreated or it had been treated on-farm with sodium hydroxide to inactivate the active substance.
- Soils were treated either with undiluted waste dip equivalent to the recommended field disposal rate of 5m^3 /ha or diluted with farmyard slurry at a rate of 20m^3 /ha.
- 40g (dry weight equivalent) soils moistened to 60% Water Holding Capacity, and incubated in microcosms at 20ºC for up to 21 days
- At Day 0, slurry treated soil samples were removed for analysis.
- At Day 1,3,10, 21, 50 ml distilled water was first added and leachate pulled through a filter under vacuum. Soils and leachate were analysed separately for the active substance.

5. Soil Degradation Results

DT_{50} (in days) for diazinon in two soil types

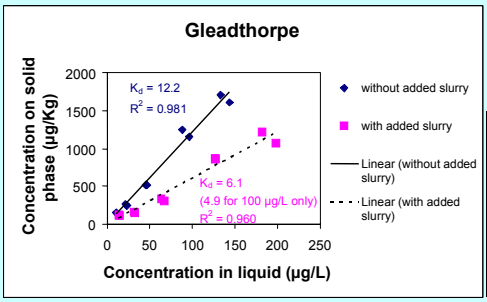
	Untreated	Slurry Diluted	Alkali treated
Gleadthorpe	13.5 (0.92)	16.9 (0.76)	None present
Pwllpeiran	7.5 (0.95)	8.4 (0.95)	None present



6. Soil Adsorption Studies

- Due to the strong adsorption of cypermethrin to soil, adsorption experiments were done with diazinon only.
- Adsorption was carried out in four contrasting soil types representative of locations where sheep dip is disposed .
- The influence of dissolved organic carbon (from slurry) on adsorption and desorption of diazinon was investigated.

7. Soil Adsorption Results



Comparison of distribution coefficient (Kd values L/kg) between the different soils and in the presence of animal manure slurry (No of data points in brackets)

	Gleadthorpe	Pwllpeiran (Manod type 2)	Rosemaund (Bromyard)	Redesdale (Walker)
TOC	2%	3.7%	1.7%	30%*
pH (0.01 M $CaCl_2$)	6.8	7.2	6.3	4.7
I: Kd no slurry	12.2 (10)	26.4 (10)	3.4 (11)	111 (4)
II: Kd with slurry	6.1 (10)	13.0 (2)	1.9 (2)	98 (2)
ratio I/II	2.0	2.0	1.8	1.1

8. Overall findings

- **Sheep dipping is a widespread practice in the UK, throughout summer and autumn.**
- **The active substances in used dip are largely associated with suspended and settled solids.**
- **Treating used dip with strong alkali (deactivation), dramatically reduces these concentrations**
- **Diazinon in used dip is readily degraded in soil. Slurry amendments did not appear to influence degradation kinetics.**
- **In contrast, aqueous slurry extracts appeared to reduce the Kd of diazinon in three out of 4 soils.**