

# “Split-back” Methodology for Characterizing Dislodgability of a Pesticide from Pet Fur

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## Abstract

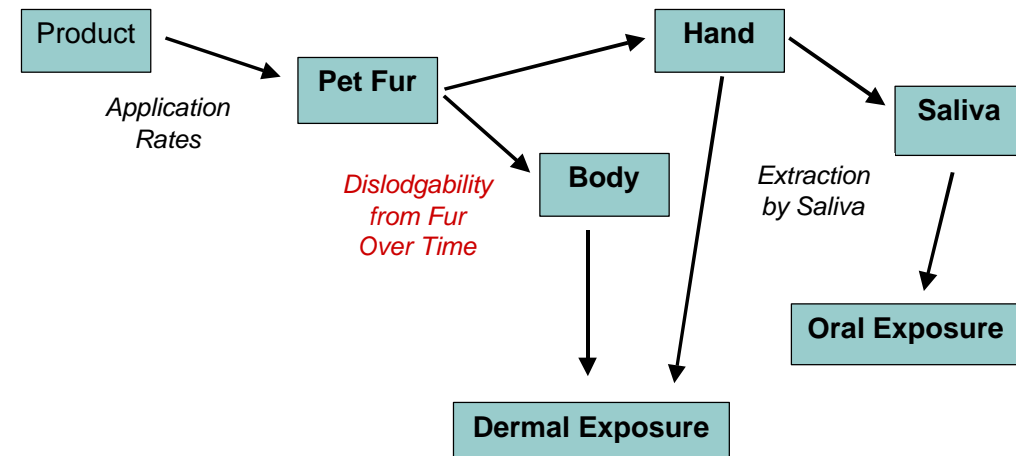
A new method for determining the dislodgability of pesticides from pet fur has been developed that provides a number of advantages. This method divides, or splits, the back of the animal into two sections. One section is used to determine the amount of pesticide that is dislodgable, the other section is used to determine the total residue on the animal's fur. Under this approach the test animal is treated with the pesticide. An imaginary line is then drawn down the back of the animal. One side of the back is stroked using a clean cotton glove and the glove is then analyzed for residues. On the other side of the animal's back, samples of fur are taken in order to determine the level of total residue present. This process is repeated at different periods after application. By measuring the actual residue on each animal, the inter-animal variation in the estimate of dislodgability is minimized. The estimates of the dislodgable fraction have been found to be very consistent across individual animals. In four studies, each using four dogs, the coefficient of variation in the estimates of the dislodgable fraction were found to be 0.2, 0.2, 0.4, and 0.7. This method also allows a determination of the rate of dissipation of the residue as well as the dislodgability over time. Because of the amount of fur required for the determination of dislodgable residues at multiple times after application, this approach may be limited to larger animals.

## Exposures to Pesticides Residues From the Use of Pet Products

- n The field of exposure Assessment is rapidly developing
- n EPA guidance has established an approach for assessing exposure to residues on pets
  - u Draft SOP for residential exposures
  - u Overview of Issues Related to the *Standard Operating Procedures For Residential Exposure Assessment*

## Exposure Chain of Events for Post Application Exposures to Pesticide Residues in Pet (Dog and Cat) Products

### Goals of the Assessment Approach



- n Determine the fraction of TCVP that is dislodgable
- n Determine how the fraction changes over time
- n Determine the impact of different products
  - u Powder
  - u Dip
  - u Aerosol
  - u Pump

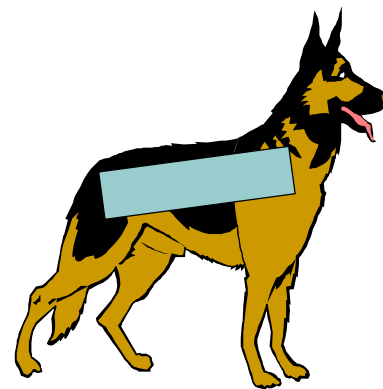
## Study Design

- n Four products
  - u Aerosol and pump spray (similar formulations-different method of application)
  - u Dip – Application of dilute solution
  - u Powder – Separate phase (solid)
- n Applied according to label directions
- n Each product studied separately
- n Four replicates
- n Differing hair lengths

## Study Design for Availability/Transferability

### MASS DISLODGED

One side stroked with gloved hand



### TOTAL MASS PRESENT

Residue levels measured in hair samples taken on opposite side



- n Mass of pesticide dislodged
  - u One side stroked five times using a cotton glove
  - u Area stroked determined by length of hand (fingertip to wrist) and length of stroke
  - u Residue extracted from glove
- n Total mass present
  - u Residue levels measured in hair samples taken on opposite side
  - u Samples taken from four different locations
  - u Residue measured per gram of hair
  - u Amount of hair per area shaved
- n Dislodgability determined by
  - u  $\text{Mass on glove} / (\text{Area stroked} \times \text{Mass of hair per unit area} \times \text{Residue per mass of hair})$

## Advantages

- n Each dog serves as its own “control”
- n Samples taken at multiple times
- n Tracks both the total amount and the dislodgable fraction
- n Effect of hair length investigated

## Study Design

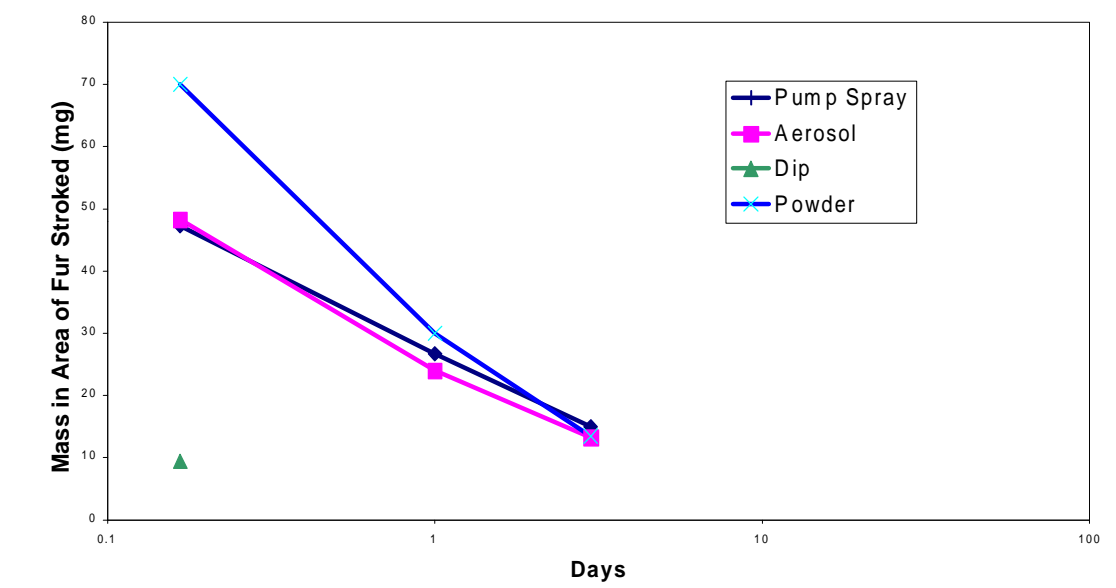
- n Products evaluated
  - u Pump, Aerosol, Powder, and Dip
- n Time after treatment
  - u Measured at 4 hr, 1 day, 3 day, 7 day and 14 days
- n Inter-individual variation
  - u Four replicates per product
- n Effect of hair length
  - u Two lengths were studied

## Findings

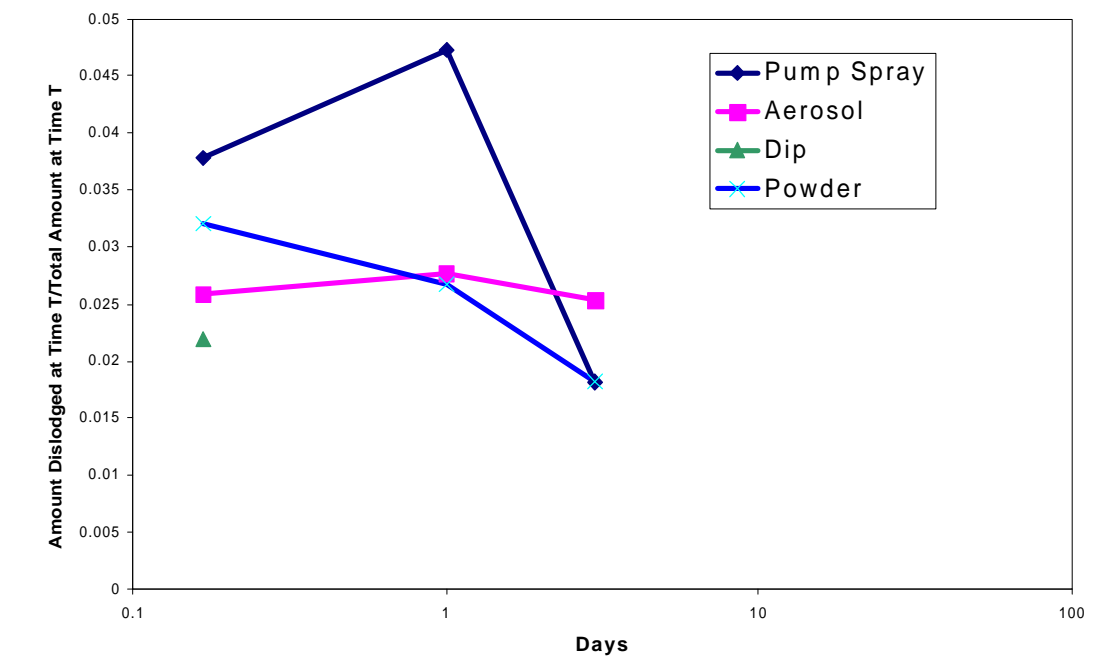
Pump Spray		
Dog	Total Residue (mg/in <sup>2</sup> )	Hair Length
992F	69.142	Long
253F	29.295	Short
1089F	55.001	Short
311F	35.868	Short
Average	47.326	
Aerosol		
Dog	Total Residue (mg/in <sup>2</sup> )	Hair Length
252F	34.935	Short
274M	73.745	Long
334F	45.417	Short
981M	39.004	Short
Average	48.275	
Dip		
Dog	Total Residue (mg/in <sup>2</sup> )	Hair Length
269M	5.914	Long
304F	5.505	Short
278F	13.550	Short
267M	12.833	Short
Average	9.450	
Powder		
Dog	Total Residue (mg/in <sup>2</sup> )	Hair Length
259M	47.040	Short
272F	59.999	Short
275F	84.854	Long
278M	87.503	Short
Average	69.849	

Pump Spray		
Dog	Fraction Dislodgable	Hair Length
992F	0.025	Long
253F	0.075	Short
1089F	0.025	Short
311F	0.026	Short
Average	0.038	
Aerosol		
Dog	Fraction Dislodgable	Hair Length
252F	0.029	Short
274M	0.035	Long
334F	0.012	Short
981M	0.029	Short
Average	0.026	
Dip		
Dog	Fraction Dislodgable	Hair Length
269M	0.022	Long
304F	0.023	Short
278F	0.026	Short
267M	0.017	Short
Average	0.022	
Powder		
Dog	Fraction Dislodgable	Hair Length
259M	0.041	Short
272F	0.032	Short
275F	0.022	Long
278M	0.033	Short
Average	0.032	

## Fraction of Applied Dose Remaining Over Time

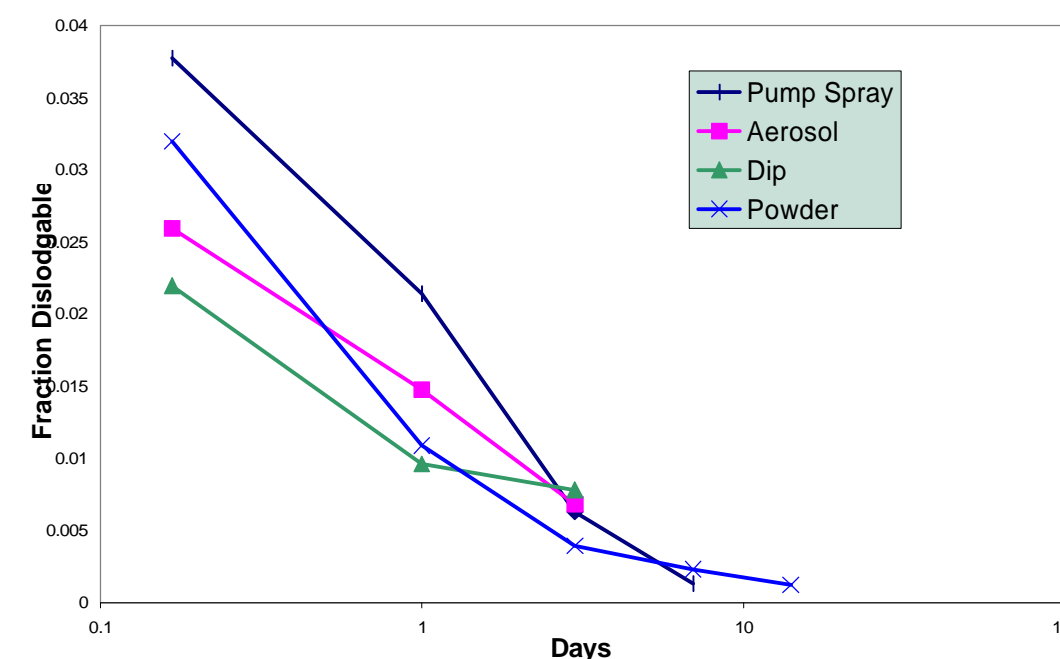


## Fraction of Remaining Residues Dislodged Over Time



	Long Haired Dog	Average of Short Haired Dogs	Ratio
Pump Spray	0.025	0.042	0.6
Aerosol	0.035	0.023	1.5
Dip	0.022	0.022	1.0
Powder	0.022	0.035	0.6
Average			0.9

## Fraction of Applied Dose Dislodged Over Time



## Findings

- n Products
  - u The results were similar for each of the four products, 2.2-3.8% at 4 hrs
- n Time after treatment
  - u Fraction dislodged declined over time, dropping by a factor of 2 for the first day
- n Inter-individual variation
  - u Estimates of dislodgability in each test were within a factor of 2 for each individual
- n Effect of hair length
  - u Hair length did not appear to affect the amount dislodged

## Future Research

- n Repeat study using bare hand
- n Lower detection limits
- n More frequent measurements of residues