UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF CHEMICAL SAFETY
AND POLLUTION PREVENTION

MEMORANDUM

DATE: March 20, 2020

SUBJECT: Fipronil**:** Data Evaluation Record for Pet Residue Transfer Study, "Dislodgeable Residues of Fipronil Following Topical Application of Frontline® Spot-on Treatment to Dogs"

PC Code: 129121
Decision No.: 557038
Petition No.: NA
Assessment Type: Data Evaluation Record
TXR No.: NA
MRID No.: 44531203

DP Barcode: D455022
Registration No.: NA
Regulatory Action: Registration Review
Case No.: NA
CAS No.: 120068-37-3
40 CFR: NA

FROM: Wade Britton, MPH, Environmental Health Scientist
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This document serves as a data evaluation record (DER) for the fipronil pet residue transfer study, "Dislodgeable Residues of Fipronil Following Topical Application of Frontline® Spot-on Treatment to Dogs (MRID 44531203)," submitted in 1997 by Merial Limited in support of the registration of proposed fipronil cat and dog spot-on products. The study was conducted to measure the amount of fipronil that may be transferred from a cat or dog's hair coat following a single treatment of the spot-on product. A primary review of this study was conducted by Versar, Inc. under the guidance of HED and has been determined to be acceptable for application in risk assessment.

STUDY TYPE: Active Transfer; Animal Hair

TEST MATERIAL: The test material was Frontline® TopSpot™, a liquid pour-on insecticide for use on dogs. The product contains 100 mg/mL (9.7% w/v) of the active ingredient fipronil.

SYNONYMS: 1H-Pyrazole-3-carbonitrile, 5-amino-1-(2,6-dichloro-4-(trifluoromethyl)phenyl)-4 ((trifluoromethyl)sulfinyl)-; CAS No. 122068-37-3

CITATION:

Study Authors:	G. de Fontenay, J.F. Campagna, S. Suberville, Ph. Birckel, and A. Weil
Title:	*Dislodgeable Residues of FipronilFollowing Topical Application of Frontline® Spot-on Treatment to Dogs*
Report Date:	December 1, 1997
Performing Laboratories:	In-life phase - Merial, Toulouse, FRANCE Analytical phase - Chrysalis, L'Arbresle, FRANCE
Identifying Codes:	Study No. MET416; Chrysalis Study No. 817/024B; MRID 445312-03

SPONSOR: Merial Limited (formally Rhone Merieux, Inc.)
115 Transtech Drive
Athens, Georgia 30601

EXECUTIVE SUMMARY:

This review analyzes the report "*Dislodgeable Residues of Fipronil Following Topical Application of Frontline® Spot-on Treatment to Dogs*" submitted by Merial Limited. The purpose of the study, which was conducted in France, was to measure the dislodgeability of the test substance, Frontline®, over time from the haircoat of dogs treated with a spot-on formulation containing fipronil as the active ingredient.

The test substance was administered to six Beagle dogs by topical application to the back (between the shoulders) using ready-to-use pipettes intended for commercial application. Each dog received a maximum label specified application dose of 1.34 mL (131,722 µg ai) of the test product on Day 0. The subsequent field sampling consisted of stroking the entire body surface of the dog by taking 5 strokes along the body of the dog using the palmar surface of one hand, while wearing cotton gloves to collect the residues. Glove samples were collected from each dog prior to treatment and at 10 intervals following treatment (1 hr to 28 days).

The cotton gloves were analyzed for fipronil and its metabolites RM1502, RM1602, and M&B46513. The results were reported by the Registrant as µg/glove for each metabolite and also for total fipronil (sum of fipronil plus 2 metabolites) per glove. The metabolite M&B46513 was not included in the total fipronil value because all M&B46513 residues were less than the limit of quantitation (LOQ). The Registrant did not correct any of the residues for laboratory fortification recoveries less than 90%. In addition, the Registrant reported the percent of the applied dose that was dislodgeable at each sampling period after application.

Versar reported the results in terms of µg/glove and percentage of the applied dose for each analyte and for total fipronil (fipronil + RM1502 + RM1602). Versar corrected the RM1502 residues for an average laboratory fortification recovery of 88.4%. Versar did not correct any of the other analytes for laboratory

recoveries because the average recoveries were greater than 90%. When residues were reported as less than the LOQ, Versar used a value of ½ LOQ.

The metabolite M&B46513 was not detected in any sample. For all other analytes, the maximum residues were detected 4 hours after application. The levels remained at a steady-state between 8 hours and 2 days after application. The residues then decreased through the end of the sampling period. Residues remained above the LOQ 28 days after application.

The average fipronil residue detected on the glove dosimeter increased from 0.8% of the applied dose at 1 hour after application of the test substance to a maximum of 1.03% of the applied dose at 4 hours after the application of the test substance. The average residues then decreased to 0.453% of the applied dose at 8 hours after application and 0.481% of the applied dose at 1 day after application. At 2 days after application, the average residues were 0.445% of the applied dose. The average residues then declined to 0.0036% of the applied dose by 28 days after application.

The average RM1502 residues detected on the glove dosimeter increased from 0.00826% of the applied dose at 1 hour after application of the test substance to a maximum of 0.00898% of the applied dose at 4 hours after the application of the test substance. The average residues then decreased to 0.00346% of the applied dose at 2 days after application. On day 4 after application all residues were <LOQ. On Day 7 after application all residues except one were <LOQ. Residues then remained <LOQ through 28 days after application.

The average RM1602 residues detected on the glove dosimeter increased from 0.0278% of the applied dose at 1 hour after application of the test substance to a maximum of 0.0389% of the applied dose at 4 hours after the application of the test substance. The average residues then decreased to 0.0176% of the applied dose at 8 hours after application and 0.0214% of the applied dose at 1 day after application. At 2 days after application, the average residues were 0.0219% of the applied dose. The average residues then declined to 0.00199% of the applied dose by 28 days after application.

The average total fipronil residues detected on the glove dosimeter increased from 0.853% of the applied dose at 1 hour after application of the test substance to a maximum of 1.08% of the applied dose at 4 hours after the application of the test substance. The average residues then decreased to 0.475% of the applied dose at 8 hours after application and 0.506% of the applied dose at 1 day after application. At 2 days after application, the average residues were 0.470% of the applied dose. The average residues then declined to 0.0067% of the applied dose by 28 days after application.

Versar performed a dissipation kinetics analysis for fipronil, RM1602 and total fipronil. Versar did not conduct an analysis for M&B46513 and RM1502 because all of the M&B46513 residues were less than the LOQ and the majority of the RM1502 residues were <LOQ after day 2. Due to the biphasic nature of the percent dislodgeable residue decline, Versar used the individual residue data (percentage of applied dose) collected from 2 days after application through day 28. The half-lives calculated by Versar were 3.86 days ($R^2 = 0.942$) for fipronil, 8.16 days ($R^2 = 0.823$) for RM1602 and 4.42 days ($R^2 = 0.939$) for total fipronil.

The following issues of concern are noted:

- The post-application activity monitored in this study included stroking a dog five times with a hand. Current guidance for the conduct of pet residue transfer studies recommends 20 petting simulations, composed of 3 strokes each, or 60 total stroking procedures.

- The Study Author has not identified a use for the data collected in this study. It is unclear

how data presented as residue per glove could be used to estimate exposure in other scenarios.

- No information was provided on the fate of the product once it is applied.
- The strokes were collected from the same area of the dogs at each sampling interval (i.e., samples could not be collected from areas of the dog that had not already been wiped with a glove.) It is not known how this affects the percent dislodgeable residue of samples collected in subsequent sampling intervals.
- Cotton gloves were used to the collect the samples. No absorbency data were presented to quantify the difference between cotton gloves and bare hands, and residues of the metabolites in many of the cotton glove samples were less than the LOQ.
- The study was conducted with only one breed of dog.
- No field fortification samples were prepared or analyzed. Travel recovery, or storage stability samples were not prepared.
- Laboratory recovery samples were prepared; however, only one fortification level was used. For fipronil, the fortification level used (30 µg) was much lower than the majority of the residues detected in the field samples.
- The Study Report indicates that the method was validated; however, the results were not provided.
- The Report did not specify the length of time the samples were stored prior to analysis.
- The Study Report did not provide any details on instrument performance, calibration, or quantification of the analytical method.

COMPLIANCE: Signed and dated GLP, Quality Assurance, and Data Confidentiality statements were provided. The study sponsor waived claims of confidentiality within the scope of FIFRA Section 10(d) (1) (A), (B), or (C). The study sponsor and director stated that the study was conducted under EPA Good Laboratory Practice Standards (40 CFR part 160) with the following exception: Characterizations of the test substances and reference substances were not performed under GLP.

The study author stated that there were no influences, impacts or circumstances which might have impaired the integrity of the study.

CONCURRENT EXPOSURE STUDY: Yes

WAS AIR SAMPLING CONDUCTED IN CONJUNCTION WITH SURFACE SAMPLING? No

GUIDELINE OR PROTOCOL FOLLOWED: The study was reviewed using applicable parts of the OPPTS Test Guidelines Series 875, Occupational and Residential Exposure Test Guidelines, Group B: 875.2300 (indoor surface residue) and 875.2400 (dermal exposure). A compliance checklist is

provided in Appendix A.

I. MATERIALS AND METHODS

A. MATERIALS

1. Test Material:

Active ingredient:	Fipronil
Formulation:	Frontline® TopSpot™, a 9.7% (w/v) liquid pour-on insecticide
Purity technical:	Not provided
Purity formulation:	9.83 w/v
Lot # technical:	Not provided
Lot # formulation:	M02463AY
CAS #(s):	122068-37-3
Other Relevant Information:	EPA Reg. No. 65331-3.

2. Relevance of Test Material to Proposed Formulation(s):

The test material appears to be the same product as the proposed formulation based on review of the product label for EPA Registration No. 65331-3.

B. STUDY DESIGN

1. Site Description:

Test location: The study was conducted at Chrysalis Preclinical Services in L'Arbresle, France. The animals were housed in individual pens (approximately 1.44 m^2) in one room at the test facility.

Meteorological Data: In the experimental room, the temperature ranged from 19 to 25°C, relative humidity was >40% and the lighting cycle was 12 hours light (artificial) and 12 hours dark.

Ventilation/Air-Filtration: The test room was air conditioned. There were a minimum of 8 air changes per hour.

2. Animal(s) Monitored:

Species/Breed: Beagle dogs

Number of animals in study: 6 (3 males and 3 females)

Age: 7 months at initiation of treatment

Body weight: 9.4 to 11.0 kg (20.7 to 24.3 lbs) at initiation of treatment

Feeding: The animals were fed a commercial diet (Diet A, Special Diet Services Ltd) that was analyzed for chemical and bacterial contaminants. Water was provided *ad libitum.* The water was analyzed at least once a year for chemical contaminants and at least twice a year for bacterial contaminants. No known contaminants were present in the

diet or water at levels which might have interfered with the study.

Health: The animals received a standard canine vaccination and anti-parasite treatment by the supplier, a clinical examination for ill-health on arrival, and a full clinical examination during the 12-week acclimation period.

During the study no animals died, there were no treatment-related clinical signs, and there were no treatment-related changes in body weight.

Surface Characteristics: Characteristics of the dog surface were not provided; thus, it is assumed that the hair coat was typical of Beagle dogs.

Other products used: None

3. <u>Physical State of Formulation as Applied</u>:

The test substance was applied using a ready-to-use disposable, snap top, plastic backed, pipette which delivers an entire pre-measured unit dose to each dog.

4. <u>Application Rates and Regimes</u>:

Residential or Commercial Applicator: Not specified in the Study Report

Application rate(s): 1.34 mL (134 ai) of the test product was applied per animal. According to the product label for Frontline (EPA Reg. No.: 65331-3), this amount is for a dog weighing between 23 and 44 pounds. The dogs in this study weighed between 21 and 24 pounds, thus the maximum label application rate was used.

Based on the test product containing 9.83% ai, each dose contained 131,722 µg ai (0.00029 lb ai).

Application Regime: All animals were treated once on Day 0 (March 25, 1997). The test substance was applied topically to the dogs between the shoulders.

Application Equipment: The test substance was applied using pipettes and was applied directly from commercially packaged and available supplies (pipettes).

5. <u>Transferable Residue Sampling Procedures</u>:

Method and Equipment: Dye-free 100% cotton gloves were used to collect residues at each sample time point. Except on Day 21, the same person was used as the "sampler" at all time points for all animals.

Sampling Procedure(s): The sampler stroked with his dominant hand the whole body surface of the animal using motions that run with the lay of the hair coat, beginning from the head and ending at the base of the tail. Stroking motions were conducted using the palmar surface of the gloved hand, with fingers held in close opposition to one another.

Five strokes were necessary to cover the whole body surface:
-1 stroke on the back

-1 stroke on the right flank
-1 stroke on the left flank
-1 stroke on the right side of the ventral zone
-1 stroke on the left side of the ventral zone

Surface area(s) sampled: The palmar surface area was not provided.

Sampling Time: The length of time to complete a single stroke or the entire stroking procedure was not provided.

Replicates per surface:

- Replicates per sampling time: Six dogs were sampled at each interval
- Number of sampling times: There were a total of 11 sampling intervals, including one sampling event prior to application

Times of sampling: Samples were collected prior to treatment, at 1, 4, and 8 hours after treatment and at 1, 2, 4, 7, 14, 21 and 28 days after treatment.

6. Sample Handling:

After sampling, each glove was wrapped in aluminum foil and placed in a closed plastic bag and labeled with Chrysalis study number, the animal number, and the sample time point. All gloves were immediately frozen at about -20°C and then sent with dry ice to the Study Sponsor after day 7, day 21, and day 28. The time the samples were stored prior to analysis was not provided.

7. Analytical Methodology:

Extraction method(s): In the first step, a cotton glove was stirred for 3 minutes in 150 mL of acetonitrile. The solvent was then filtered medium fast paper filters. An aliquot (1 mL) of the extract was evaporated to dryness under a nitrogen stream.

In the second step, the dry residue was dissolved in 200 µl of a mixture of Acetonitrile – ultra pure water (50:50 v/v) and washed with 200 µl of n-hexan. After shake and configuration, n-hexan was discarded, 80 µL were injected into the chromatograph.

Detection method(s): A high performance liquid chromatograph (HPLC) method was used for the analysis of fipronil, RM1602, RM 1502, and M&B46513. A summary of the typical operating conditions is in Table 1.

Table 1. Summary of Chromatograhic Operating Conditions

Column	Symmetry C18, 5 µm, 250 x 4.6 mm internal diameter with guard column Adsorbosphere C18, 5 µm (ALLTECH), 7.5 x 4.6 mm internal diameter
Mobile phase with low pressure gradient	Solvent A: methanol/acetonitrile (80:20, v/v)…71% Solvent B: Ultra pure water 29%
Pump flow rate	1.2 mL/min
Injector volume	80 µL
Injector type	Push loop
Detector wavelength	278 nm

Table 1. Summary of Chromatograhic Operating Conditions	
Detector rise time	5 s
Detector data rate	12 Hz
Detector run time	30 min
Retention time	Fipronil = 11.04 min RM1602 = 15.18 min RM 1502 = 12.79 min M&B46513 = 10.28 min

Method validation: According to the Study Report, the HPLC method used was validated in terms of specificity, extraction recovery, linearity, precision, accuracy, and limit of quantification. The results are reported in Report MET406, Rhone Merieux, 7/18/97.

The limit of quantitation (LOQ) was 3 µg per glove for each of the analytes.

Instrument performance and calibration: Instrument performance and calibration was not discussed in the Study Report.

Quantification: Quantification was not discussed in the Study Report.

8. <u>Quality Control</u>:

Lab Recovery: Each set of samples was run with triplicate fortified controls at one spike level. The concentration levels were 30 µg per glove for fipronil, RM1602 and RM 1502 and 3 µg for M&B46513.

Average recoveries were 95.6±2.0% for fipronil (n=18), 96.2±3.3% for RM1602 (n=18), 88.4±2.7% for RM1502, and 90.1±5.0% for M&B46513.

The use of unfortified laboratory control samples was not discussed in the Study Report.

Field blanks: One control sample was collected from each dog prior to treatment. Residues were <LOQ in each sample.

Field recovery: Field fortification samples were not prepared.

Formulation: According to the Certificate of Analysis, the test product contained 9.83% w/v fipronil.

Tank mix: Not applicable.

Travel Recovery: Travel recovery samples were not prepared.

Storage Stability: Storage stability samples were not prepared.

II. RESULTS AND CALCULATIONS

In this study, the test substance was administered to beagle dogs by topical application to the back using pipettes intended for commercial application. Residues were collected from treated dogs by stroking the dogs five times covering the entire body of the dog. Using cotton gloves, samples were collected from each dog at the following intervals: prior to treatment, at 1, 4, and 8 hours after treatment and at 1, 2, 4, 7, 14, 21, and 28 days after treatment. The samples were analyzed for fipronil and its metabolites (RM1502, RM1602, and M&B46513).

The results were reported by the Registrant in terms of µg/glove for each analyte and for total fipronil. Additionally, the Registrant reported the percentage of the applied dose for total fipronil. The Registrant calculated total fipronil as the sum of fipronil, RM1502 and RM1602. The metabolite M&B46513 was not included in the total fipronil value because all M&B46513 residues were less than the LOQ. The Registrant did not correct any of the residues for laboratory fortification recoveries less than 90%.

Versar reported the results in terms of µg/glove and percentage of the applied dose for each analyte and for total fipronil (fipronil + RM1502 + RM1602). Versar corrected the RM1502 residues for an average laboratory fortification recovery of 88.4%. Versar did not correct any of the other analytes for laboratory recoveries because the average recoveries were greater than 90%. When residues were reported as less than the LOQ, Versar used a finite value of ½ LOQ. The results, except for metabolite M&B46513 which was not detected in any sample, are shown in Table 2 through 5. Additionally, Figures 1 through 4 show the average percentage of the applied dose at each interval.

The metabolite M&B46513 was not detected in any sample. For all other analytes, the maximum residues were detected 4 hours after application. The levels remained at a steady-state between 8 hours and 2 days after application. The residues then decreased through the end of the sampling period. Residues remained above the LOQ 28 days after application.

The average fipronil residues detected on the glove dosimeter increased from 0.8% of the applied dose at 1 hour after application of the test substance to a maximum of 1.03% of the applied dose at 4 hours after the application of the test substance. The average residues then decreased to 0.453% of the applied dose at 8 hours after application and 0.481% of the applied dose at 1 day after application. At 2 days after application, the average residues were 0.445% of the applied dose. The average residues then declined to 0.0036% of the applied dose by 28 days after application.

The average RM1502 residues detected on the glove dosimeter increased from 0.00826% of the applied dose at 1 hour after application of the test substance to a maximum of 0.00898% of the applied dose at 4 hours after the application of the test substance. The average residues then decreased to 0.00346% of the applied dose at 2 days after application. On day 4 after application all residues were <LOQ. On Day 7 after application all residues except one were <LOQ. Residues then remained <LOQ through 28 days after application.

The average RM1602 residues detected on the glove dosimeter increased from 0.0278% of the applied dose at 1 hour after application of the test substance to a maximum of 0.0389% of the applied dose at 4 hours after the application of the test substance. The average residues then decreased to 0.0176% of the applied dose at 8 hours after application and 0.0214% of the applied dose at 1 day after application. At 2 days after application, the average residues were 0.0219% of the applied dose. The average residues then declined to 0.00199% of the applied dose by 28 days after application.

The average total fipronil residues detected on the glove dosimeter increased from 0.853% of the applied dose at 1 hour after application of the test substance to a maximum of 1.08% of the applied dose at 4

hours after the application of the test substance. The average residues then decreased to 0.475% of the applied dose at 8 hours after application and 0.506% of the applied dose at 1 day after application. At 2 days after application, the average residues were 0.470% of the applied dose. The average residues then declined to 0.0067% of the applied dose by 28 days after application.

Residues of fipronil, RM1502, RM1602 and M&B46513 were not detected in any of the pre-application samples.

Versar performed a dissipation kinetics analysis for fipronil, RM1602, and total fipronil. Versar did not conduct an analysis for M&B46513 and RM1502 because all of the M&B46513 residues were less than the LOQ and the majority of the RM1502 residues were les than the LOQ after day 2. Due to the biphasic nature of the percent dislodgeable residue decline, Versar used the individual residue data (percentage of applied dose) collected from 2 days after application through day 28. The half-lives calculated by Versar were 3.86 days ($R^2 = 0.942$) for fipronil, 8.16 days ($R^2 = 0.823$) for RM1602 and 4.42 days ($R^2 = 0.939$) for total fipronil. The predicted values from the regression are shown in Tables 6, 7, and 8. It should be noted that the Day 0 predicted values were replaced with the worse-case value of all samples collected on Day 0 and the Day 1 predicted values were replaced with the actual average Day 1 value.

The Registrant did not perform a dissipation kinetics analysis.

III. DISCUSSION

A. LIMITATIONS OF THE STUDY:

The following issues of concern are noted:

- The post-application activity monitored in this study included stroking a dog five times with a hand. Current guidance for the conduct of pet residue transfer studies recommends 20 petting simulations, composed of 3 strokes each, or 60 total stroking procedures.

- The Study Author has not identified a use for the data collected in this study.

- No information was provided on the fate of the product once it is applied.

- The strokes were collected from the same area of the dogs at each sampling interval (i.e., samples could not be collected from areas of the dog that had not already been wiped with a glove.) It is not known how this affects the percent dislodgeable residue of samples collected in subsequent sampling intervals.

- Cotton gloves were used to the collect the samples. No absorbency data were presented to quantify the difference between cotton gloves and bare hands, and residues of the metabolites in many of the cotton glove samples were less than the LOQ.

- The study was conducted with only one breed of dog.

- No field fortification samples were prepared or analyzed. Travel recovery, or storage stability samples were not prepared.

- Laboratory recovery samples were prepared; however, only one fortification level was used.

For fipronil, the fortification level used (30 µg) was much lower than the majority of the residues detected in the field samples.

- The Study Report indicates that the method was validated; however, the results were not provided.
- The Report did not specify the length of time the samples were stored prior to analysis.
- The Study Report did not provide any details on instrument performance, calibration, or quantification of the analytical method.

B. CONCLUSIONS:

The Registrant and Versar calculated similar percentages of the applied dose dislodgeable for total fipronil. Slight differences are due to Versar's correction of the RM1502 data for the average laboratory recovery.

Table 2. Summary of Fipronil Residue and Percent of Applied Fipronil Dose Dislodged After Five Strokes

Interval (day)	Fipronil Residue			Percent of Applied Fipronil Dose Dislodged After 5 Strokes		
	Fipronil Residue[1] (µg/glove)	Average (µg/glove)	Standard Deviation (µg/glove)	% of applied dose dislodged[2]	Average (%)	Standard Deviation (%)
0.042 (1 hour)	230	1053	1552	0.175	0.80	1.18
	276			0.210		
	72.2			0.0548		
	4,115			3.12		
	1,208			0.917		
	415			0.315		
0.17 (4 hours)	893	1359	809	0.678	1.03	0.61
	805			0.611		
	512			0.390		
	2,733			2.07		
	1,506			1.14		
	1,703			1.29		
0.33 (8 hours)	578	597	198	0.439	0.453	0.150
	622			0.472		
	290			0.220		
	913			0.693		
	610			0.463		
	568			0.431		
1	698	633	152	0.530	0.481	0.115
	559			0.424		
	368			0.279		
	652			0.495		
	790			0.600		
	733			0.557		

Table 2. Summary of Fipronil Residue and Percent of Applied Fipronil Dose Dislodged After Five Strokes						
Interval (day)	Fipronil Residue			Percent of Applied Fipronil Dose Dislodged After 5 Strokes		
	Fipronil Residue[1] (µg/glove)	Average (µg/glove)	Standard Deviation (µg/glove)	% of applied dose dislodged[2]	Average (%)	Standard Deviation (%)
2	917	586	248	0.696	0.445	0.188
	321			0.244		
	806			0.612		
	495			0.376		
	649			0.493		
	326			0.248		
4	398	289	91.7	0.302	0.220	0.070
	211			0.160		
	297			0.226		
	228			0.173		
	201			0.153		
	401			0.304		
7	319	213	65.7	0.242	0.161	0.050
	206			0.156		
	225			0.171		
	160			0.122		
	235			0.178		
	130			0.0987		
14	59.5	47.2	18.5	0.0452	0.0358	0.0141
	57.8			0.0439		
	72.7			0.0552		
	28.4			0.0216		
	31.1			0.0236		
	33.5			0.0254		
21	32.1	20.6	8.71	0.0244	0.0156	0.00661
	18.3			0.0139		
	30.7			0.0233		
	16			0.0121		
	15.3			0.0116		
	11.1			0.0084		
28	7.91	4.68	2.45	0.0060	0.00355	0.00186
	4.08			0.0031		
	7.32			0.0056		
	3.7			0.0028		
	3.58			0.0027		
	1.5			0.0011		

1. The LOQ = 3.0 µg/glove. When residues were reported as less than the LOQ, Versar used a value of ½ LOQ (1.5 µg/glove) in the calculations.
2. % of applied dose dislodged = fipronil residue (µg/glove) / applied dose (131,722 µg) *100

Table 3. Summary of RM-1502 Residue and Percent of Applied Dose Dislodged After 5 Strokes							
Interval (day)	RM-1502 Residue (µg/glove)				% of Applied Dose Dislodged After 5 Strokes		
	RM1502 Residue[1] (µg/glove)	Corrected RM1502 Residue[2] (µg/glove)	Average (µg/glove)	Standard Deviation (µg/glove)	% of applied dose[3]	Average (%)	Standard Deviation (%)
0.042 (1 hour)	1.5	1.5	10.9	18.1	0.0011	0.00826	0.01373
	1.5	1.5			0.0011		
	1.5	1.5			0.0011		
	41.7	47.17			0.0358		
	8.93	10.10			0.0077		
	3.09	3.50			0.0027		
0.17 (4 hours)	7.89	8.93	11.8	6.1	0.0068	0.00898	0.00464
	6.84	7.74			0.0059		
	4.42	5.00			0.0038		
	19.6	22.17			0.0168		
	11.2	12.67			0.0096		
	12.8	14.48			0.0110		
0.33 (8 hours)	5.53	6.26	5.5	2.1	0.0047	0.00418	0.00158
	4.98	5.63			0.0043		
	1.5	1.5			0.0011		
	6.71	7.59			0.0058		
	5.01	5.67			0.0043		
	5.65	6.39			0.0049		
1	5.22	5.90	5.0	1.8	0.0045	0.00378	0.00137
	4.14	4.68			0.0036		
	1.5	1.5			0.0011		
	4.71	5.33			0.0040		
	5.72	6.47			0.0049		
	5.26	5.95			0.0045		
2	6.91	7.82	4.6	2.7	0.0059	0.00346	0.00202
	1.5	1.5			0.0011		
	6	6.79			0.0052		
	3.67	4.15			0.0032		
	4.91	5.55			0.0042		
	1.5	1.5			0.0011		
4	1.5	1.5	1.5	0.0	0.0011	0.00114	0.00000
	1.5	1.5			0.0011		
	1.5	1.5			0.0011		
	1.5	1.5			0.0011		
	1.5	1.5			0.0011		
	1.5	1.5			0.0011		
7	3.81	4.31	2.0	1.1	0.0033	0.00149	0.00087
	1.5	1.5			0.0011		
	1.5	1.5			0.0011		
	1.5	1.5			0.0011		
	1.5	1.5			0.0011		
	1.5	1.5			0.0011		

Table 3. Summary of RM-1502 Residue and Percent of Applied Dose Dislodged After 5 Strokes							
Interval (day)	RM-1502 Residue (µg/glove)				% of Applied Dose Dislodged After 5 Strokes		
	RM1502 Residue[1] (µg/glove)	Corrected RM1502 Residue[2] (µg/glove)	Average (µg/glove)	Standard Deviation (µg/glove)	% of applied dose[3]	Average (%)	Standard Deviation (%)
14	1.5	1.5	1.5	0.0	0.0011	0.00114	0.00000
	1.5	1.5			0.0011		
	1.5	1.5			0.0011		
	1.5	1.5			0.0011		
	1.5	1.5			0.0011		
	1.5	1.5			0.0011		
21	1.5	1.5	1.5	0.0	0.0011	0.00114	0.00000
	1.5	1.5			0.0011		
	1.5	1.5			0.0011		
	1.5	1.5			0.0011		
	1.5	1.5			0.0011		
	1.5	1.5			0.0011		
28	1.5	1.5	1.5	0.0	0.0011	0.00114	0.00000
	1.5	1.5			0.0011		
	1.5	1.5			0.0011		
	1.5	1.5			0.0011		
	1.5	1.5			0.0011		
	1.5	1.5			0.0011		

1. The LOQ = 3.0 µg/glove. When residues were reported as less than the LOQ, Versar used a value of ½ LOQ (1.5 µg/glove) in the calculations.
2. The RM1502 residues were corrected for an average laboratory recovery of 88.4%.
3. % of applied dose dislodged = Corrected RM1502 residue (µg/glove) / applied dose (131,722 µg) *100

Table 4. Summary of RM-1602 Residue and Percent of Applied Dose Dislodged After 5 Strokes						
Interval (day)	RM-1602 Residue (µg/glove)			% of Applied Dose Dislodged After 5 Strokes		
	RM1602 Residue[1] (µg/glove)	Average (µg/glove)	Standard Deviation (µg/glove)	% of applied dose[2]	Average (%)	Standard Deviation (%)
0.042 (1 hour)	10.4	36.7	52.7	0.0079	0.0278	0.0400
	9.56			0.0073		
	1.5			0.0011		
	140			0.1063		
	44.1			0.0335		
	14.5			0.0110		
0.17 (4 hours)	33.4	51.3	28.3	0.0254	0.0389	0.0215
	29.8			0.0226		
	20.5			0.0156		
	94.8			0.0720		
	61.4			0.0466		
	67.8			0.0515		
0.33 (8 hours)	22.3	23.2	6.5	0.0169	0.0176	0.00491
	24.6			0.0187		
	12.7			0.0096		
	33			0.0251		
	23.2			0.0176		
	23.4			0.0178		
1	30.8	28.3	5.8	0.0234	0.0214	0.00444
	24.7			0.0188		
	20			0.0152		
	25.3			0.0192		
	33.8			0.0257		
	34.9			0.0265		
2	43.2	28.8	10.9	0.0328	0.0219	0.00826
	17.4			0.0132		
	41			0.0311		
	21.7			0.0165		
	28.3			0.0215		
	21.4			0.0162		
4	20.5	16.6	3.6	0.0156	0.0126	0.00274
	13.5			0.0102		
	16.5			0.0125		
	11.3			0.0086		
	17.5			0.0133		
	20			0.0152		
7	21.5	17.0	3.7	0.0163	0.0129	0.00284
	16.6			0.0126		
	17.7			0.0134		
	10.2			0.0077		
	17.1			0.0130		
	18.7			0.0142		

Table 4. Summary of RM-1602 Residue and Percent of Applied Dose Dislodged After 5 Strokes						
Interval (day)	RM-1602 Residue (µg/glove)			% of Applied Dose Dislodged After 5 Strokes		
	RM1602 Residue[1] (µg/glove)	Average (µg/glove)	Standard Deviation (µg/glove)	% of applied dose[2]	Average (%)	Standard Deviation (%)
14	8.97	8.32	3.2	0.0068	0.0063	0.00243
	9.91			0.0075		
	11			0.0084		
	3.67			0.0028		
	5.05			0.0038		
	11.3			0.0086		
21	7.65	6.04	1.7	0.0058	0.00458	0.00127
	5.47			0.0042		
	8.15			0.0062		
	3.59			0.0027		
	5.28			0.0040		
	6.08			0.0046		
28	4.62	2.62	1.3	0.0035	0.00199	0.00101
	1.5			0.0011		
	3.57			0.0027		
	3.02			0.0023		
	1.5			0.0011		
	1.5			0.0011		

1. The LOQ = 3.0 µg/glove. When residues were reported as less than the LOQ, Versar used a value of ½ LOQ (1.5 µg/glove) in the calculations.
2. % of applied dose dislodged = RM1602 residue (µg/glove) / applied dose (131,722 µg) *100

Table 5. Summary of Total Fipronil Residue and Percent of Applied Dose Dislodged After 5 Strokes						
Interval (days)	Total Fipronil Residue (µg/glove)			% of Applied Dose Dislodged After 5 Strokes		
	Total Fipronil Residue[1] (µg/glove)	Average (µg/glove)	Standard Deviation (µg/glove)	% of applied dose[2]	Average (%)	Standard Deviation (%)
0.042 (1 hour)	242	1100	1623	0.184	0.835	1.2322
	287			0.218		
	75.2			0.0571		
	4302			3.27		
	1262			0.958		
	433			0.329		
0.17 (4 hours)	935	1422	843	0.710	1.079	0.6398
	843			0.640		
	538			0.408		
	2850			2.16		
	1580			1.20		
	1785			1.36		
0.33 (8 hours)	607	626	206	0.460	0.475	0.15665
	652			0.495		
	304			0.231		
	954			0.724		
	639			0.485		
	598			0.454		
1	735	667	159	0.558	0.506	0.12056
	588			0.447		
	390			0.296		
	683			0.518		
	830			0.630		
	774			0.587		
2	968	619	261	0.735	0.470	0.19840
	340			0.258		
	854			0.648		
	521			0.395		
	683			0.518		
	349			0.265		
4	420	307	95	0.319	0.233	0.07177
	226			0.172		
	315			0.239		
	241			0.183		
	220			0.167		
	423			0.321		
7	345	231	69	0.262	0.176	0.05230
	224			0.170		
	244			0.185		
	172			0.130		
	254			0.193		
	150			0.114		

Table 5. Summary of Total Fipronil Residue and Percent of Applied Dose Dislodged After 5 Strokes						
Interval (days)	Total Fipronil Residue (µg/glove)			% of Applied Dose Dislodged After 5 Strokes		
	Total Fipronil Residue[1] (µg/glove)	Average (µg/glove)	Standard Deviation (µg/glove)	% of applied dose[2]	Average (%)	Standard Deviation (%)
14	70.0	57.0	20.7	0.0531	0.0433	0.01574
	69.2			0.0525		
	85.2			0.0647		
	33.6			0.0255		
	37.7			0.0286		
	46.3			0.0351		
21	41.3	28.1	10.1	0.0313	0.0214	0.00763
	25.3			0.0192		
	40.4			0.0306		
	21.1			0.0160		
	22.1			0.0168		
	18.7			0.0142		
28	14.0	8.80	3.66	0.0107	0.00668	0.00278
	7.1			0.00537		
	12.4			0.00941		
	8.2			0.00624		
	6.6			0.00500		
	4.5			0.00342		

1. Total Fipronil Residue (µg/glove) = Fipronil residue (µg/glove) + Corrected RM1502 residue (µg/glove) + RM1602 residue (µg/glove).
2. % of applied dose dislodged = Total Fipronil residue (µg/glove) / applied dose (131,722 µg) *100

Table 6. Fipronil - Predicted Percent of Applied Dose Dislodgeable (derived from regression curve – Appendix A)	
Days After Application	% of Applied Dose Dislodgeable
0	1.03[a]
1	0.481[b]
2	0.355
3	0.297
4	0.248
5	0.207
6	0.173
7	0.145
8	0.121
9	0.101
10	0.0843
11	0.070
12	0.0589
13	0.0492
14	0.0411
15	0.0343
16	0.0287
17	0.0240
18	0.0200
19	0.0167
20	0.0140

a Day 0 Predicted Value = Worse Case Value Of All Samples Collected on Day 0
b Day 1 Predicted Value = Actual Average Day 1 Value

Table 7. RM-1602 - Predicted Percent of Applied Dose Dislodgeable (derived from regression curve – Appendix A)	
Days After Application	% of Applied Dose Dislodgeable
0	0.0389[a]
1	0.0214[b]
2	0.0180
3	0.0165
4	0.0152
5	0.0139
6	0.0128
7	0.0118
8	0.0108
9	0.00992
10	0.00911
11	0.00837
12	0.00769
13	0.00706
14	0.00649
15	0.00596
16	0.00547
17	0.00503
18	0.00462
19	0.00424
20	0.00390

a Day 0 Predicted Value = Worse Case Value Of All Samples Collected on Day 0
b Day 1 Predicted Value = Actual Average Day 1 Value

Table 8. Total Fipronil - Predicted Percent of Applied Dose Dislodgeable (derived from regression curve – Appendix A)	
Days After Application	% of Applied Dose Dislodgeable
0	1.079[a]
1	0.506[b]
2	0.354
3	0.302
4	0.258
5	0.221
6	0.189
7	0.161
8	0.138
9	0.118
10	0.101
11	0.0861
12	0.0736
13	0.0629
14	0.0538
15	0.0460
16	0.0393
17	0.0336
18	0.0287
19	0.0245
20	0.0210

a Day 0 Predicted Value = Worse Case Value Of All Samples Collected on Day 0
b Day 1 Predicted Value = Actual Average Day 1 Value

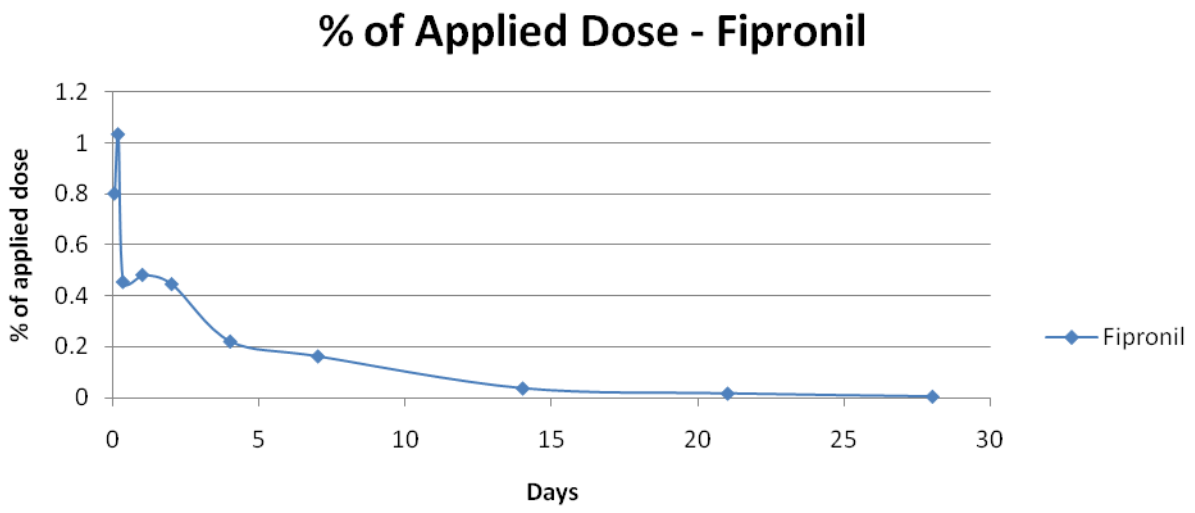


FIGURE 1

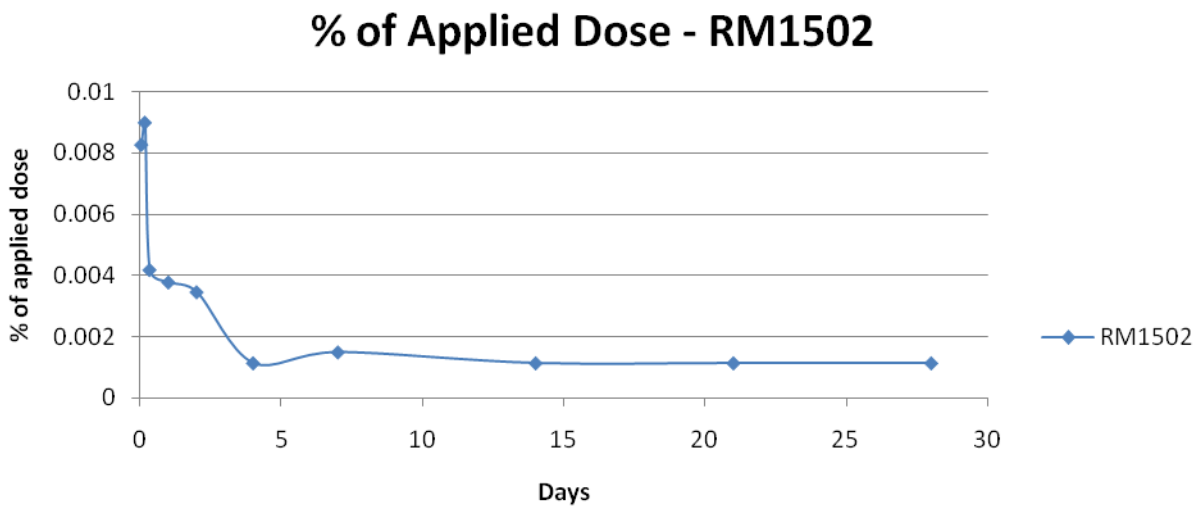


FIGURE 2

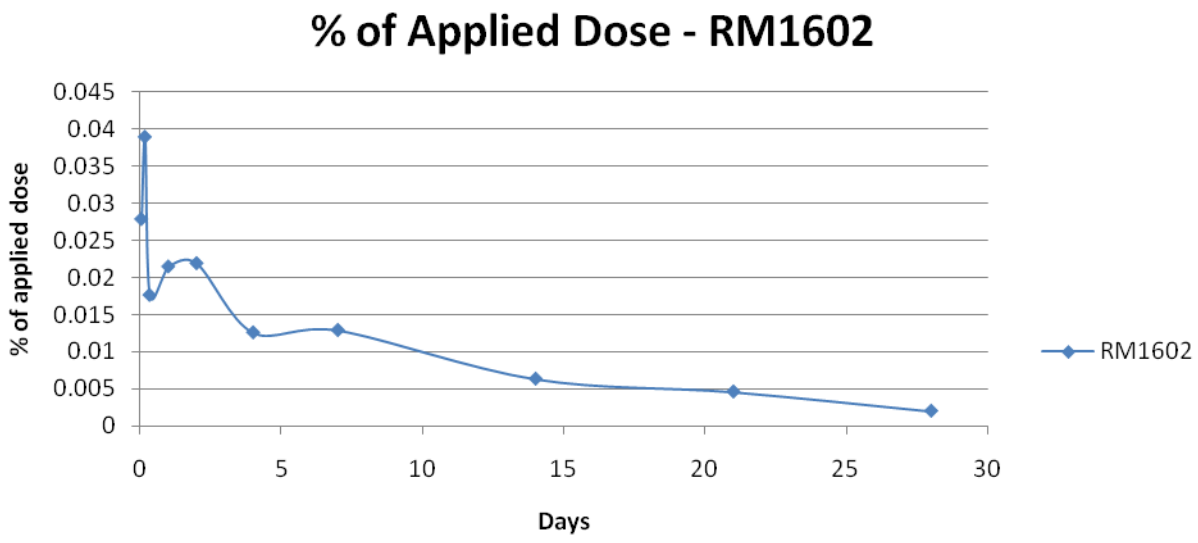


FIGURE 3

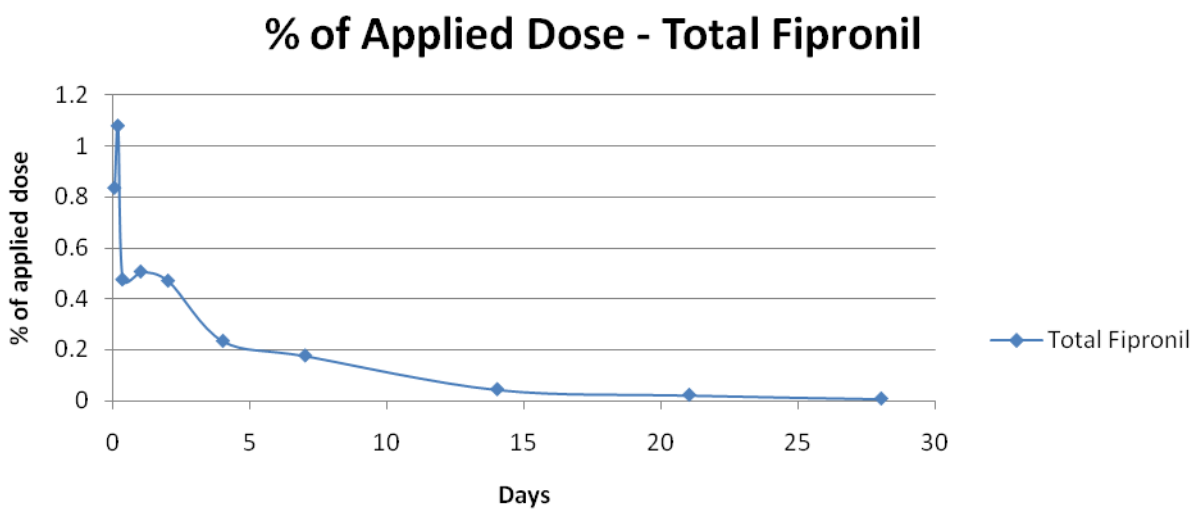


FIGURE 4

Appendix A

Compliance Checklist

COMPLIANCE CHECKLIST

This compliance checklist is based on applicable parts of the OPPTS Test Guidelines Series 875, Occupational and Residential Exposure Test Guidelines, Group B: 875.2300 (indoor surface residue) and OPPTS Test Guidelines Series 875, Occupational and Residential Exposure Test Guidelines, Group B: 875.2400 (dermal exposure).

1. *The test substance must be the typical end use product of the active ingredient.* This criterion was met.

2. *The production of metabolites, breakdown products, or the presence of contaminants of potential toxicologic concern, should be considered on a case-by-case basis.* This criterion was met.

3. *Indoor surface residue studies should be conducted under ambient conditions similar to those encountered during the intended use season, and should represent reasonable worst case conditions.* This criterion was met.

4. *Ambient conditions (i.e., temperature, barometric pressure, ventilation) should be monitored.* This criterion was met.

5. The *end use product should be applied by the application method recommended on the label. Information that verifies that the application equipment (e.g., sprayer) was properly calibrated should be included.* This criterion was met.

6. *The application rate used in the study should be provided and should be the maximum rate specified on the label. However, monitoring following application at a typical application rate is more appropriate in certain cases.* This criterion was met.

7. *If multiple applications are made, the minimum allowable interval between applications should be used.* This criterion does not apply. Only one application was made.

8. *Indoor surface residue (ISR) data should be collected from several different types of media (e.g., carpeting, hard surface flooring, counter tops, or other relevant materials).* This criterion was not met. Only one breed of dog was monitored.

9. *Sampling should be sufficient to characterize the dissipation mechanisms of the compound (e.g., three half-lives or 72 hours after application, unless the compound has been found to fully dissipate in less time; for more persistent pesticides, longer sampling periods may be necessary). Sampling intervals may be relatively short in the beginning and lengthen as the study progresses. Background samples should be collected before application of the test substance occurs.* This criterion was met.

10. *Triplicate, randomly collected samples should be collected at each sampling interval for each surface type.* This criterion was met. Six replicates were collected.

11. *Samples should be collected using a suitable methodology (e.g., California Cloth Roller, Polyurethane Roller, Drag Sled, Coupons, Wipe Samples, Hand Press, vacuum cleaners for dust and debris, etc.) for indoor surfaces.* It is uncertain if this criterion was met. Samples were collected using cotton gloves and five strokes.

12. *Samples should be stored in a manner that will minimize deterioration and loss of analytes between collection and analysis. Information on storage stability should be provided.* This criterion was not met. Information on storage stability was not provided.

13. *Validated analytical methods of sufficient sensitivity are needed. Information on method efficiency (residue recovery), and limit of quantitation (LOQ) should be provided.* This criterion was partially met. An LOQ was provided; however, the method validation results were not reported.

14. *Information on recovery samples must be included in the study report. A complete set of field recoveries should consist of at least one blank control sample and three or more each of a low-level and high-level fortification. These fortifications should be in the range of anticipated residue levels in the field study.* This criterion was not met. Field fortification samples were not prepared.

15. *Raw residue data must be corrected if appropriate recovery values are less than 90 percent.* This criterion was not met. Samples were not corrected for recoveries. There were no field fortification samples collected.

16. *The monitoring period should be of sufficient duration to result in reasonable detectability on dosimeters. Monitoring should be conducted before residues have dissipated beyond the limit of quantification. Baseline samples should be collected before the exposure activity commences.* These criteria were partially met. Background samples were collected from each dog prior to application and analyzed. These residues were <LOQ. Residues from samples collected after application of the test substance were above the LOQ in most of the samples analyzed for fipronil, RM1602 and RM1502. No residues of M&B46513 were detected any samples.

17. *Activities monitored must be clearly defined and representative of typical practice.* This criterion was partially met. The activity of stroking a dog is a typical post-application activity; however, only five strokes per replicate were conducted in this study.

18. *Sufficient control samples should be collected.* This criterion was met. A control sample was collected from each dog prior to the application event.

Appendix B

Regressions

Regression Analysis: Summary Output for Fipronil

Regression Statistics	
Multiple R	0.970341
R Square	0.941562
Adjusted R^2	0.939843
Standard Error	0.431889
Observations	36

ANOVA

	df	*SS*	*MS*	*F*	*Signif. F*
Regression	1	102.1829	102.1829	547.81364	1.51061E-22
Residual	34	6.34197	0.186529		
Total	35	108.5248			

	Coeff.	*Std. Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-0.6762	0.120996	-5.58857	2.951E-06	-0.922089793	-0.430302185
Slope	-0.17971	0.007678	-23.4054	1.511E-22	-0.195313201	-0.164105623

Half Life = 3.857044 Days

Predicted DFR Levels

Time (Days)	Residue (% of applied dose)
0	1.03*
1	0.481**
2	0.355008
3	0.296614
4	0.247825
5	0.207061
6	0.173002
7	0.144545
8	0.12077
9	0.100905
10	0.084307
11	0.07044
12	0.058853
13	0.049173
14	0.041084
15	0.034327
16	0.02868
17	0.023963
18	0.020021
19	0.016728
20	0.013976

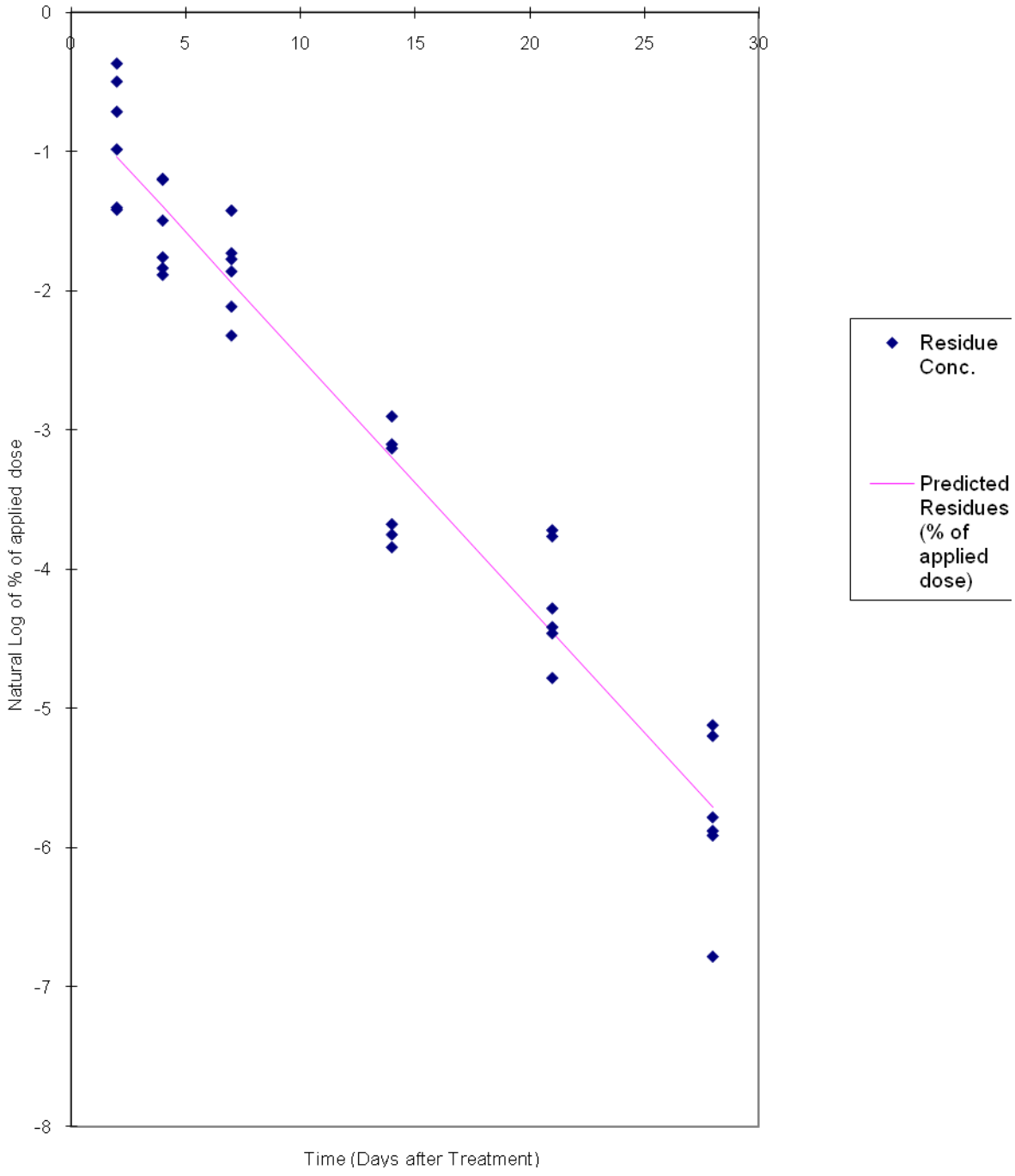
Time (Days)	Residue (% of applied dose)
21	0.0116775
22	0.0097567
23	0.0081518
24	0.006811
25	0.0056906
26	0.0047546
27	0.0039725
28	0.0033191
29	0.0027732
30	0.002317
31	0.0019359
32	0.0016175
33	0.0013514
34	0.0011291
35	0.0009434

*** Day 0 Predicted Value = Worse Case Value Of All Samples Collected on Day 0 (4 hr Value)**
****Day 1 Predicted Value = Actual Average Day 1 Value**

Regression Analysis: Means and CVs for Fipronil

Days after Last Treatment	Residues (% of applied dose)	Mean (% of applied dose)	Standard Deviation (% of applied dose)	Coefficient of Variation (%)
2	0.696163	0.445	0.188	42.3
	0.243695			
	0.611895			
	0.375791			
	0.492704			
	0.247491			
4	0.302152	0.22	0.0696	31.6
	0.160186			
	0.225475			
	0.173092			
	0.152594			
	0.304429			
7	0.242177	0.161	0.0499	31
	0.15639			
	0.170814			
	0.121468			
	0.178406			
	0.098693			
14	0.045171	0.0358	0.0141	39.3
	0.04388			
	0.055192			
	0.021561			
	0.02361			
	0.025432			
21	0.02437	0.0156	0.00661	42.4
	0.013893			
	0.023307			
	0.012147			
	0.011615			
	0.008427			
28	0.006005	0.00355	0.00186	52.4
	0.003097			
	0.005557			
	0.002809			
	0.002718			
	0.00114			

Regression Analysis: Log of % of Applied Dose vs. Time for Fipronil



Regression Analysis: Summary Output for RM1602

Regression Statistics	
Multiple R	0.90698
R Square	0.822612
Adjusted R^2	0.817395
Standard Error	0.380302
Observations	36

ANOVA

	df	*SS*	*MS*	*F*	*Signif. F*
Regression	1	22.80388	22.80388	157.67071	2.53827E-14
Residual	34	4.917413	0.14463		
Total	35	27.7213			

	Coeff.	*Std. Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-3.84951	0.106544	-36.1308	1.037E-28	-4.066036221	-3.632990431
Slope	-0.0849	0.006761	-12.5567	2.538E-14	-0.098635777	-0.071155804

Half Life = 8.164683 Days

Predicted DFR Levels

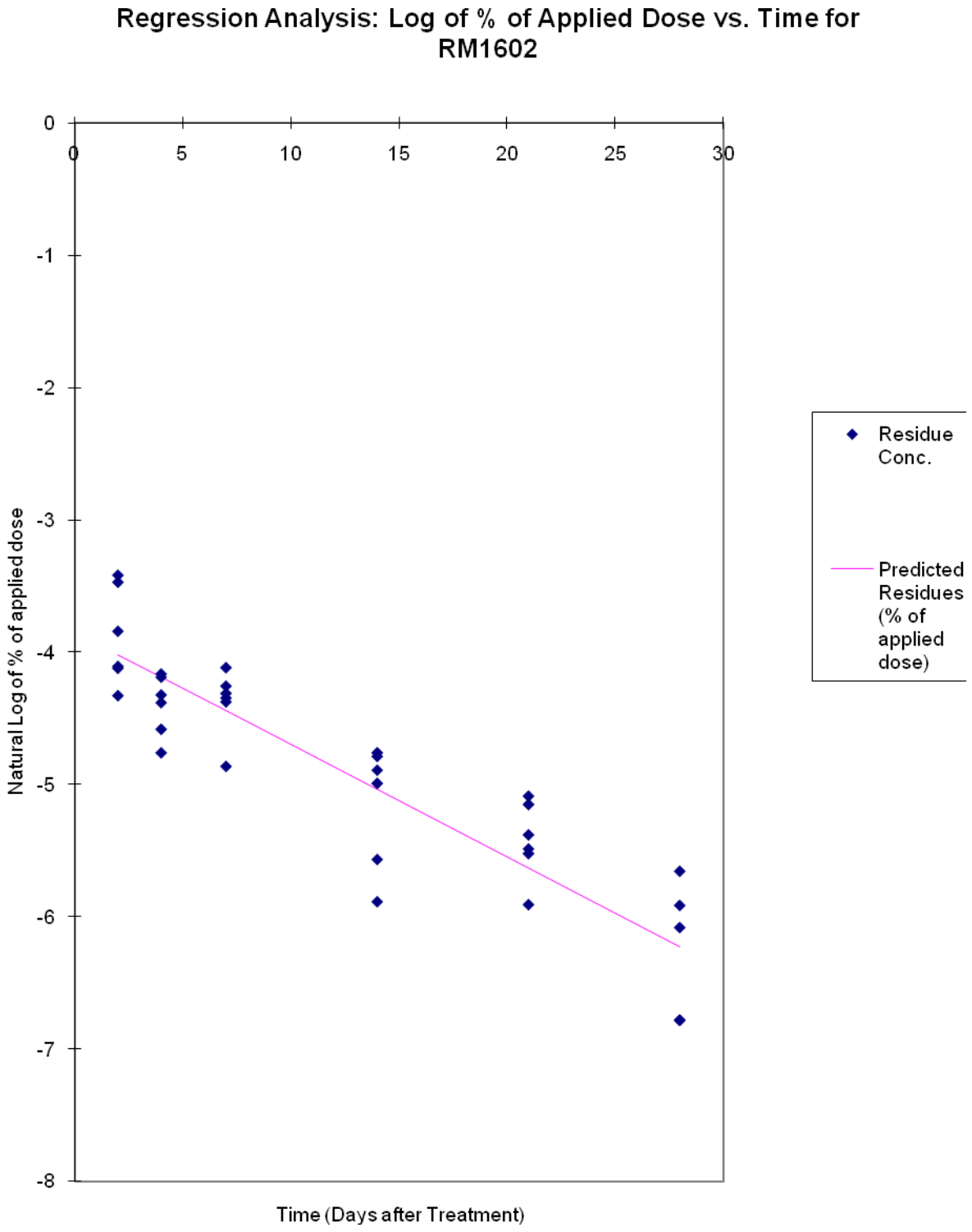
Time (Days)	Residue (% of applied dose)
0	0.0389*
1	0.0214**
2	0.017965
3	0.016503
4	0.01516
5	0.013926
6	0.012793
7	0.011751
8	0.010795
9	0.009916
10	0.009109
11	0.008368
12	0.007687
13	0.007061
14	0.006486
15	0.005958
16	0.005473
17	0.005028
18	0.004619
19	0.004243
20	0.003897

Time (Days)	Residue (% of applied dose)
21	0.0035802
22	0.0032888
23	0.0030212
24	0.0027753
25	0.0025494
26	0.0023419
27	0.0021513
28	0.0019762
29	0.0018153
30	0.0016676
31	0.0015318
32	0.0014072
33	0.0012926
34	0.0011874
35	0.0010908

*** Day 0 Predicted Value = Worse Case Value Of All Samples Collected on Day 0 (4 hr Value)**
****Day 1 Predicted Value = Actual Average Day 1 Value**

Regression Analysis: Means and CVs for RM1602

Days after Last Treatment	Residues (% of applied dose)	Mean (% of applied dose)	Standard Deviation (% of applied dose)	Coefficient of Variation (%)
2	0.032796	0.0219	0.00826	37.7
	0.01321			
	0.031126			
	0.016474			
	0.021485			
	0.016246			
4	0.015563	0.0126	0.00274	21.8
	0.010249			
	0.012526			
	0.008579			
	0.013286			
	0.015183			
7	0.016322	0.0129	0.00284	22
	0.012602			
	0.013437			
	0.007744			
	0.012982			
	0.014197			
14	0.00681	0.00631	0.00243	38.5
	0.007523			
	0.008351			
	0.002786			
	0.003834			
	0.008579			
21	0.005808	0.00458	0.00127	27.7
	0.004153			
	0.006187			
	0.002725			
	0.004008			
	0.004616			
28	0.003507	0.00199	0.00101	50.7
	0.0			
	0.00271			
	0.002293			
	0.0			
	0.0			


Regression Analysis: Log of % of Applied Dose vs. Time for RM1602
0
5
10
15
20
25
30
0
-1
-2
-3
-4
-5
-6
-7
-8
Natural Log of % of applied dose
Time (Days after Treatment)
Residue Conc.
Predicted Residues (% of applied dose)

Regression Analysis: Summary Output for Total Fipronil

Regression Statistics	
Multiple R	0.969272
R Square	0.939489
Adjusted R^2	0.937709
Standard Error	0.384154
Observations	36

ANOVA

	df	*SS*	*MS*	*F*	*Signif. F*
Regression	1	77.90163	77.90163	527.88127	2.73509E-22
Residual	34	5.017521	0.147574		
Total	35	82.91915			

	Coeff.	*Std. Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-0.72604	0.107623	-6.74614	9.408E-08	-0.944754316	-0.507322779
Slope	-0.15691	0.006829	-22.9757	2.735E-22	-0.170790737	-0.143032455

Half Life = 4.417438 Days

Predicted DFR Levels

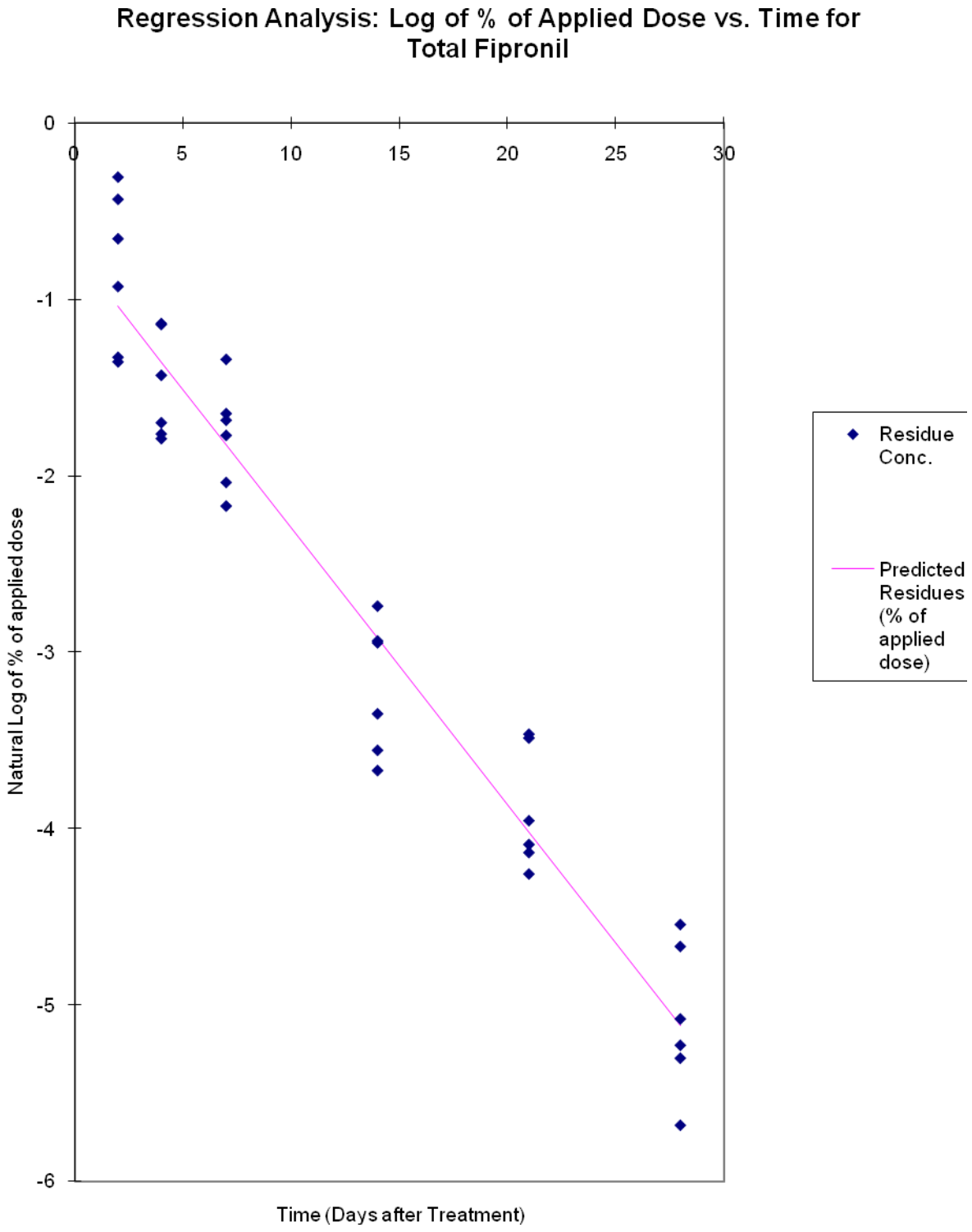
Time (Days)	Residue (% of applied dose)
0	1.0794*
1	0.506**
2	0.353504
3	0.302168
4	0.258287
5	0.220778
6	0.188717
7	0.161311
8	0.137886
9	0.117862
10	0.100746
11	0.086115
12	0.07361
13	0.06292
14	0.053783
15	0.045972
16	0.039296
17	0.03359
18	0.028712
19	0.024542
20	0.020978

Time (Days)	Residue (% of applied dose)
21	0.0179318
22	0.0153277
23	0.0131018
24	0.0111992
25	0.0095728
26	0.0081826
27	0.0069944
28	0.0059786
29	0.0051104
30	0.0043683
31	0.0037339
32	0.0031917
33	0.0027282
34	0.002332
35	0.0019933

*** Day 0 Predicted Value = Worse Case Value Of All Samples Collected on Day 0 (4 hr Value)**
****Day 1 Predicted Value = Actual Average Day 1 Value**

Regression Analysis: Means and CVs for Total Fipronil

Days after Last Treatment	Residues (% of applied dose)	Mean (% of applied dose)	Standard Deviation (% of applied dose)	Coefficient of Variation (%)
2	0.734894	0.47	0.198	42.2
	0.258043			
	0.648174			
	0.395417			
	0.518406			
	0.264876			
4	0.318853	0.233	0.0718	30.8
	0.171573			
	0.23914			
	0.182809			
	0.167018			
	0.320751			
7	0.261771	0.176	0.0523	29.7
	0.170131			
	0.18539			
	0.13035			
	0.192527			
	0.114028			
14	0.053119	0.0433	0.0157	36.4
	0.052542			
	0.064682			
	0.025485			
	0.028583			
	0.03515			
21	0.031316	0.0213	0.00763	35.8
	0.019184			
	0.030633			
	0.016011			
	0.016763			
	0.014181			
28	0.010651	0.00668	0.00278	41.6
	0.0			
	0.009406			
	0.00624			
	0.0			
	0.0			


Regression Analysis: Log of % of Applied Dose vs. Time for Total Fipronil
0
-1
-2
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-4
-5
-6
0
5
10
15
20
25
30
Natural Log of % of applied dose
Time (Days after Treatment)
Residue Conc.
Predicted Residues (% of applied dose)