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EPA SERIES 361

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MEMORANDUM

SUBJECT: Amitraz: Review of "Haircoat Distribution of R-28153 and Amitraz after a Single Topical Application to Dogs (MRID 468783-01)"

FROM: Wade Britton, MPH, Industrial Hygienist
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THROUGH: Catherine Eiden, Branch Chief
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This document serves as a data evaluation record for the amitraz exposure study, "Haircoat Distribution of R-28153 and Amitraz after a Single Topical Application to Dogs (MRID 468783-01)," submitted by Ft. Dodge Animal Health in support of the registration of a proposed amitraz pet spot-on product. The purpose of this study was to estimate the distribution of amitraz across a treated dog from a single application. A primary review of this study was conducted by Versar, Inc. under the guidance of HED (see Attachment). HED requested that the study be reviewed in a manner which focused, not on how amitraz distributed, but instead on the total residue that resulted from the application over the course of the study in the differing areas (zones) sampled. The following is a summary of the study and its findings.

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Study Title: Haircoat Distribution of R-28153 and Amitraz after a Single Topical Application to Dogs at 20 mg/kg of R-28153 and Amitraz

MRID: 468783-01

Author: Eric Lacoste

Study Completion Date: May 31, 2005

Sponsor: Fort Dodge Animal Health
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Report Identification: Avogadro Ref: A04852
Sponsor Ref: 0817-C-FR-03-04

Executive Summary

In the fall of 2004 a study was conducted in Avogadro, France examining the distribution of R-28153 and amitraz on the haircoat of dogs. A single topical application of a liquid mixed formulation test product containing 15% w/v R-28153, an antiparasitic against fleas, and 15% w/v amitraz, an antiparasitic against ticks was applied to each of six dogs. Hair samples were then collected at specified time intervals from five body zones of each dog for a period of 56 days after application. The Study Report presented the findings in micrograms active ingredient per gram of hair sample ($\mu\text{g ai/g}$) for each body zone of the dog tested. For risk assessment purposes, EPA requested that Versar present the results as milligrams active ingredient per square centimeter of area tested (mg/cm^2). In order to calculate the residue levels in mg/cm^2 EPA requested and obtained additional information regarding the body area of the field samplings from the Study Sponsor. EPA was informed that the shaved hair samples detailed. Due to the low residue levels the data are presented here in $\mu\text{g/cm}^2$.

Six dogs (3 males and 3 females) were treated topically at one spot on the midline of the back between the shoulder blades using an application rate of 20 mg active ingredient (ai) of R-28153 and 20 mg ai of amitraz per kg bodyweight. Application was made by emptying a syringe onto the skin after parting the hair. Hair samples were collected pre-application, and on Day 1, Day 2, Day 7, Day 14, Day 28, Day 42 and Day 56 after the application. Electric clippers were used to collect hair samples from five different sites on the dog: (1) lumbar zone; (2) thorax left side; (3) thorax right side; (4) middle of the back; and (5) top of the neck. A different site on the body zone was clipped at each sampling interval. The hair samples ranged in weight from 400 to 1200 mg, and were clipped from an area of 10 cm^2 for each sample. The samples were then stored frozen until analysis. The analytical method measured R-28153 (isomers Z and E) and amitraz by HPLC with UV detection. The limit of quantification (LOQ) was $0.1\ \mu\text{g/g}$ in dog hair for both amitraz and R-28153.

On each day of analysis, quality control samples were prepared in duplicate by fortifying control dog hair (untreated hair) at four concentrations ranging from 0.20 to 4.0 1,000 $\mu\text{g/g}$ of amitraz and R-28153. The overall average percent recovery for amitraz samples with residues in the range of 0.1 to 5 $\mu\text{g/g}$ was 99.5% (n=126). The overall average percent recovery for R-28153 samples with residues in the range of 0.1 to 5 $\mu\text{g/g}$ was 100.3% (n=126). The Study Report indicates an residue underestimation of 17% for amitraz and 28% for R-28153 in those samples with high levels requiring dilution. The Report does not state that they corrected any of the data for these lowered lab recoveries. No amitraz or R-28153 residues above the LOQ of 0.1 $\mu\text{g/g}$ were detected in the control dog hair samples. In the actual field samples, residues of the two analytes did not drop below the LOQ during the sampling period.

The average corrected amitraz concentration detected in the dog hair samples ranged from 0.133 $\mu\text{g/cm}^2$ (top of neck on Day 56) to 31.4 $\mu\text{g/cm}^2$ (middle of back on Days 7 and 14). The average corrected R-28153 concentration ranged from 0.369 $\mu\text{g/cm}^2$ (top of neck on Day 56) to 30.6 $\mu\text{g/cm}^2$ (middle of back on Day 14.)

The average percentage of the original amitraz application rate that were detected on 10 cm^2 sections of the dogs body ranged from from 0.001% (top of neck and right side on Day 56) to 0.271% (middle of back on Day 2). The average percentages detected of the original R-28153 applied ranged from 0.003% (top of neck on Day 56) to 0.159% (middle of back on Day 2.)

The results of this study demonstrate that amitraz is distributed in the haircoat in all body zones on the day after the application. Average levels peaked at Day 7 for the lumbar, thorax left side and thorax right side zones. The maximum average levels for the middle back and top of the neck zones peaked at Day 2 and Day 14, respectively. After reaching a maximum, the levels decreased, but were still detectable even at Day 56 for all dogs and all zones.

The results demonstrate that R-28153 is also distributed in the haircoat of the dog in all five body zones on the day after the application. Average levels peaked at Day 7 for the thorax right and left sides. Average levels peaked at Day 14 for the lumbar, middle back, and top of neck zones. After reaching a maximum, the levels decreased, but were still detectable even at Day 56 for all dogs and all zones.

Levels of R-28153 were higher than the levels of amitraz in the haircoat of the dogs from Day 28 to Day 56. The Study Authors postulate that this could be due to the fact R-28153 is more persistent on dog haircoat than amitraz.

Study Parameters

Six dogs (3 males and 3 females) ranging in age from 14.1 to 15.9 months were used in this study. The weight of the dogs at the beginning of the study ranged from 8.18 to 9.78 kg. The dogs were acclimated to their holding pens for 12 days prior to application of the test substance. Each dog was treated topically at one spot on the midline between the shoulder blades using an application rate of 20 mg ai/kg of R-28153 and 20 mg ai/kg amitraz. The Study Author stated that this application rate is the minimum commercial application rate. The actual application rates ranged from 19.7 to 20.9 mg ai/kg amitraz and from 20.3 to 21.4 mg ai/kg R-28153.

Hair samples were collected at pre-application, Day 1, Day 2, Day 7, Day 14, Day 28, Day 42 and Day 56 after application of R-28153 and amitraz. Electric clippers were used at five different sites on the dog: (1) lumbar zone; (2) thorax left side; (3) thorax right side; (4) middle of the back; and (5) top of the neck. An area of 10 cm^2 was clipped for each sample which resulted in approximately 500 milligrams of hair (range

400 to 1,200 mg per sample.) After collection, the hair samples were transferred directly into a labeled container, weighed and then placed in frozen storage (approximately -20°C) until analysis. The samples were stored frozen for approximately three months prior to analysis.

Analytical Phase

The analytical method used in this study was validated and documented in Avogadro Study No. A04828. In this method, R-28153 (isomers Z and E) and amitraz were quantified by HPLC with UV detection. The limit of quantification (LOQ) was 0.1 µg/g in dog hair for both amitraz and R-28153. The method validation study determined an upper level of quantitation to be 5 µg/g.

Quality Control

Field fortification samples were not prepared for each sampling event. Control (untreated) dog hair samples were collected prior to the application of the test substance.

On each day of analysis, quality control samples were prepared in duplicate by fortifying control dog hair (untreated hair) at three concentrations ranging from 0.20 to 4.0 µg/g of amitraz and R-28153. A 1,000 µg/g fortification level was analyzed after commencement of the study because most of the residues were greater than the highest fortification level and required dilution in order to fall within the quantifiable range of the method. The method validation study determined an upper level of quantitation of the calibration curve to be 5 µg/g. Therefore, a fortification of 1,000 µg/g was performed with a dilution factor of 1,000 and was tested on triplicate samples. These results demonstrated an underestimation of 17% in levels for amitraz and 28% in levels for R-28153 for samples yielding very high residues. The Study Report does not specify which samples were diluted, or which samples could be considered to be very high, nor does it report that any of the field residues were corrected for these recovery values. Versar corrected the residues exceeding the method's upper limit of quantification (i.e., 5 µg/g). These are the samples that presumably required dilution of the final extract.

The storage stability of amitraz and R-28153 was determined over a three month period. Selected samples were pooled and assayed at 0, 1.5, 2 and 3 months of frozen storage. Recoveries of amitraz ranged from 91% (immediate analysis) to 149% (after 3 months.) Recoveries of R-28153 ranged from 81% (immediate analysis) to 147% (after 3 months.) The details of the storage stability study are available in the raw data, and were not presented in the Study Report.

Results and Calculations

There were no amitraz or R-28153 residues found above the LOQ (0.1 µg/g) in the control dog hair samples. In the actual field samples, residue levels of the two analytes did not drop below the LOQ during the sampling period.

Tables 1 and 2 provide a summary of the concurrent QC sample amitraz and R-28153 recoveries. The overall average percent recovery for amitraz samples within the 0.1 to 5.0 µg/g range was 99.5% ± 9.07 (n=126). The overall average percent recovery for R-28153 samples within the 0.1 to 5.0 µg/g range was 100.3% ± 8.38 (n=126). The average percent recovery for the three 1,000 µg/g amitraz samples was 83.3%. The average percent recovery for the three 1,000 µg/g R-28153 samples was 71.9%.

Tables 3 and 4 provide a summary of the uncorrected levels (µg/g) of amitraz and R-28153 detected in dog hair for each of five body zones at each sampling interval. The average amitraz concentration in each hair sample ranged from 1.63 µg/g (top of neck on Day 56) to 513 µg/g (middle of back on Day 2). The average

R-28153 concentration in each hair sample ranged from 4.20 µg/g (top of neck on Day 56) to 367 µg/g (middle of back on Day 2). This data has not been corrected for low recovery values.

Table 5 provides the weight and body area of each hair sample collection. This information was used to convert the residues from µg/g to µg/cm². Tables 6 and 7 provide a summary of the levels (µg/cm²) of amitraz and R-28153 in the dog hair for each of five body zones at each sampling interval. The µg/g concentration values (Tables 3 and 4) were converted to µg/cm² (Tables 6 and 7) using the area of each clipping (10 cm²) and the weight of each hair sample in grams as presented in Table 5. The data in these tables has been corrected for low recovery values (83% for amitraz and 72% for R-28153.) The following equation was used:

$$\text{Concentration } (\mu\text{g}/\text{cm}^2) = \text{Concentration } (\mu\text{g}/\text{g}) \times \text{Wt} \times \text{CF} / \text{A}$$

Where:
 Wt = weight of hair sample collected (mg)
 CF = conversion factor (0.001 g/mg)
 A = area of body surface sampled (10 cm²)

The average corrected amitraz concentration detected in the dog hair samples ranged from 0.133 µg/cm² (top of neck on Day 56) to 31.4 µg/cm² (middle of back on Days 7 and 14). The average corrected R-28153 concentration ranged from 0.369 µg/cm² (top of neck on Day 56) to 30.6 µg/cm² (middle of back on Day 14).

Tables 8 through 12 summarize the arithmetic mean and geomean amitraz concentrations (µg/cm²) for each body part and each sampling interval (Days 1 through 56). Average corrected amitraz residue concentrations ranged from 0.493 µg/cm² (Day 56) to 9.96 µg/cm² (Day 7) for the lumbar zone, from 1.01 µg/cm² (Day 42) to 11.6 µg/cm² (Day 7) for the left side of thorax, from 0.229 µg/cm² (Day 56) to 15.9 µg/cm² (Day 7) for the right side of thorax, from 1.68 µg/cm² (Day 56) to 31.4 µg/cm² (Days 7 and 14) for the middle of the back and from 0.133 µg/cm² (Day 56) to 4.89 µg/cm² (Day 14) for the top of the neck.

Tables 13 through 17 summarize the arithmetic mean and geomean R-28153 concentrations (µg/cm²) for each body part and each sampling interval (Days 1 through 56). Average R-28153 residue concentrations ranged from 1.82 µg/cm² (Day 56) to 12.3 µg/cm² (Day 14) for the lumbar zone, from 2.49 µg/cm² (Day 42) to 13.4 µg/cm² (Day 7) for the left side of thorax, from 3.94 µg/cm² (Day 56) to 18.7 µg/cm² (Day 7) for the right side of thorax, from 8.70 µg/cm² (Day 1) to 30.6 µg/cm² (Day 14) for the middle of the back and from 0.369 µg/cm² (Day 56) to 4.51 µg/cm² (Day 14) for the top of the neck.

Tables 18 and 19 summarize the arithmetic mean and geomean percentage of the original application rate detected on different sampling days per body zone for amitraz and R-28153, respectively. The arithmetic mean is also presented for the body zone percent concentration for each dog and for all dogs. The percentage of the original application rate that was detected on a particular body zone on a particular day was calculated using the following equation:

$$\text{Percentage of original application rate} = \text{Concentration} / \text{AR} \times 100\%$$

Where:
 Concentration = mg ai amitraz found on a 10 cm² area of the dog detected on a particular day after application
 AR = total amount of ai applied to the dog in mg ai per dog (mg/kg x kg dog weight)

The average percentage of the original amitraz application rate that were detected on 10 cm² sections of the dogs body ranged from from 0.001% (top of neck and right side on Day 56) to 0.271% (middle of back on Day 2). The average percentages detected of the original R-28153 applied ranged from 0.003% (top of neck on Day 56) to 0.159% (middle of back on Day 2.)

Conclusion

The results of this study demonstrate that amitraz is distributed in the haircoat in all body zones on the day after the application. Average levels peaked at Day 7 for the lumbar, thorax left side and thorax right side zones. The maximum average levels for the middle back and top of the neck zones peaked at Day 2 and Day 14, respectively. After reaching a maximum, levels decreased, but were detectable even at Day 56 for all dogs and all zones.

The results demonstrate that R-28153 is also distributed in the haircoat of the dog in all five body zones on the day after the application. Average levels peaked at Day 7 for the thorax right and left sides. Average levels peaked at Day 14 for the lumbar, middle back, and top of neck zones. After reaching a maximum, levels decreased, but were detectable even at Day 56 for all dogs and all zones.

Levels of R-28153 were higher than the levels of amitraz in the haircoat of the dogs from Day 28 to Day 56. The Study Authors speculate that this could be due to the fact R-28153 is more persistent on dog haircoat than amitraz.

Issues

- *Presentation of data:* The residue levels are presented individually for the five specified body zones on the sampling days after application. The data for different body zones have not been averaged for all the dogs due to the differences in levels detected in the different body zones and dogs.
- *Type of residue detected:* Due to the porous nature of hair, it is possible that some of the residues detected after liquid extraction of the hair samples might be residues contained inside the hair shaft as well as those on the surface of the hair.
- *Method limits/correction of residue levels:* The analytical method was validated to be able to quantitate residues ranging between 0.1 µg/g and 5.0 µg/g. Most of the field samples had residue levels requiring dilution to fall within the quantifiable range. Therefore, after commencement of the analysis, fortification control samples of 1,000 µg/g were performed with a dilution factor of 1,000 and were analyzed on triplicate samples. The Study Report states that for field samples yielding very high residues, amitraz was underestimated by 17% and R-28153 was underestimated by 28%. The Study Report does not specify which samples were diluted, what dilution factor was used, or which samples contain what they consider very high residues. The Study Report does not mention correction of data for low recovery values. Versar corrected the data for the stated underestimations. The only fortification value analyzed which was greater than the 5.0 µg/g upper limit of quantitation was the 1,000 µg/g. Therefore all residue levels greater than 5.0 µg/g presumably required dilution and were corrected for decreased recovery values determined by the 1,000 µg/g fortification samples.
- *Z-isomer not quantifiable:* The Z isomer of R-28153 could not be quantified in the diluted samples which did not reach a value of 0.8 µg/g (i.e., concentration of the diluted values was below 0.8 µg/g). These samples quantify only the E-isomer. Many of the field samples required dilution; however, it is not possible given the data presented in the Study Report to identify which samples this phenomenon applies to. It is possible that part of the reason for the 28% underestimation of R-28153 in samples with very high residue levels relates to this phenomenon, but the Study Report does not mention this.

- *Storage stability inconsistency:* No field fortification samples were prepared, however, the researchers performed a storage stability study. Selected field samples were pooled and assayed at 0, 1.5, 2 and 3 months of frozen storage. Recoveries of amitraz ranged from 91% (immediate analysis) to 149% (after 3 months.) Recoveries of R-28153 ranged from 81% (immediate analysis) to 147% (after 3 months.) There is no explanation for the increase in recoveries as storage times increased. The details of the storage stability study are available in the raw data, and were not presented in the Study Report.

Table 1. Amitraz QC Concentration Recoveries						
Fortification Level (µg/g)	Concentration Range	n	Recovery	Overall Average Recovery	Std. Dev.	Geomean
0.2	81.5 to 121	42	101	99.5	9.07	98.7
0.8	80.2 to 114	42	100			
4	80.0 to 115	42	97.9			
Diluted Fortification (1000 dilution factor)						
1000	79.9 to 87.8	3	83.3			

Table 2. P.2813 QC Concentration Recoveries						
Fortification Level (µg/g)	Concentration Range	n	Recovery	Overall Average Recovery	Std. Dev.	Geomean
0.2	83.0 to 113	42	98.5	100.3	8.38	99.3
0.8	85.3 to 114	42	101			
4	91.1 to 130	42	101			
Diluted Fortification (1000 dilution factor)						
1000	69.0 to 74.2	3	71.9			

Table 3. Amitraz Concentration Found on Hair Samples in µg/g (uncorrected)										
Time of Sampling	Sampled Zones	Residue (µg/g of hair weight)						Avg Level per Body Zone (µg/g of hair weight)		
		Dog No. 930288	Dog No. 52314	Dog No. 149821	Dog No. 282911	Dog No. 79733	Dog No. 791240	Arithmetic Mean	Std Dev	Geomean
Day 0 (pre-application)	Lumbar Zone	ND	ND	ND	ND	ND	ND	NA	NA	NA
	Left Side	ND	ND	ND	ND	ND	ND	NA	NA	NA
	Right Side	ND	ND	ND	ND	ND	ND	NA	NA	NA
	Middle Back	ND	ND	ND	ND	ND	ND	NA	NA	NA
	Top of Neck	ND	ND	ND	ND	ND	ND	NA	NA	NA
Day 1	Lumbar Zone	28.9	91.7	156	27.5	51.2	28.6	63.9	51.3	50.5
	Left Side	56.6	53.9	42.3	6.3	60.6	46.7	44.4	19.8	36.3
	Right Side	63.4	655	31.3	16.0	105	48.6	153	248	68.8
	Middle Back	139	183	39.0	38.7	149	107	109	59.8	92.1
	Top of Neck	23.1	83.3	4.80	8.60	18.5	24.3	27.1	28.6	18.1
Day 2	Lumbar Zone	72.9	74.1	102	36.6	66.2	57.8	68.3	21.5	65.2
	Left Side	199	112	124	69.8	397	266	194	121	165
	Right Side	133	258	185	99.4	238	229	190	63.2	180
	Middle Back	192	2180	84.0	140	241	241	513	819	256
	Top of Neck	42.1	76.4	32.8	10.0	25.9	40.2	37.9	22.2	32.1
Day 7	Lumbar Zone	96.1	127	261	83.5	53.1	134	126	72.4	111
	Left Side	341	150	146	122	212	356	221	103	203
	Right Side	204	290	104	259	191	550	266	153	235
	Middle Back	358	648	225	244	318	1,272	511	403	415
	Top of Neck	67.1	47.5	15.3	45.0	69.0	67.2	51.9	20.8	46.6
Day 14	Lumbar Zone	76.1	41.0	192	138	65.7	170	114	61.5	98.7
	Left Side	182	49.6	50	125	145	383	156	123	121
	Right Side	74.8	114	189	191	233	498	217	149	181
	Middle Back	231	368	392	302	295	990	430	280	378
	Top of Neck	24.1	16.3	215	28.1	35.2	92.6	68.6	76.9	44.5
Day 28	Lumbar Zone	43.0	4.90	27.6	45.7	13.6	66.6	33.6	22.7	24.9
	Left Side	113	11.0	22.2	43.7	30.1	156	62.6	58.1	42.2
	Right Side	53.1	13.6	13.6	81.9	13.8	448	104	171	41.3
	Middle Back	181	27.1	32.8	226	52.9	309	138	118	91.7
	Top of Neck	11.0	2.00	10.0	12.8	6.80	24.3	11.2	7.48	8.80
Day 42	Lumbar Zone	11.8	2.90	3.10	6.10	5.10	66.4	15.9	25.0	7.76
	Left Side	22.2	1.30	2.20	11.1	3.60	56.5	16.2	21.3	7.23
	Right Side	23.0	1.20	2.00	16.6	6.60	76.2	20.9	28.4	8.79
	Middle Back	87.6	4.00	10.0	177	57.7	564	150	212	52.2
	Top of Neck	8.30	0.400	0.900	2.80	8.90	7.60	4.82	3.89	2.88
Day 56	Lumbar Zone	3.00	0.200	0.700	1.70	1.30	25.0	5.32	9.69	1.69
	Left Side	2.20	0.100	3.10	2.10	4.60	60.8	12.2	23.9	2.72
	Right Side	3.80	0.600	0.400	0.800	1.00	7.50	2.35	2.82	1.33
	Middle Back	10.9	0.300	1.50	4.70	11.4	83.9	18.8	32.2	5.30
	Top of Neck	1.30	0.100	0.100	0.200	0.600	7.50	1.63	2.91	0.476

Table 4. R-28153 - Concentration Found on Hair Samples in $\mu\text{g/g}$ (uncorrected)										
Time of Sampling	Sampled Zones	Composite Residue ($\mu\text{g/g}$)						Ave. Level Per Body Zone ($\mu\text{g/g}$)		
		Dog No. 930288	Dog No. 132414	Dog No. 49821	Dog No. 189011	Dog No. 77713	Dog No. 791249	Arithmetic Mean	Std. Dev.	Geomean
Day 0 (pre-application)	Lumbar Zone	ND	ND	ND	ND	ND	ND	NA	NA	NA
	Left Side	ND	ND	ND	ND	ND	ND	NA	NA	NA
	Right Side	ND	ND	ND	ND	ND	ND	NA	NA	NA
	Middle Back	ND	ND	ND	ND	ND	ND	NA	NA	NA
	Top of Neck	ND	ND	ND	ND	ND	ND	NA	NA	NA
Day 1	Lumbar Zone	28.3	75.5	182	24.5	42.2	22.6	62.5	61.6	45.7
	Left Side	46.4	50.1	77.5	13.1	47.5	63.8	49.7	21.6	43.9
	Right Side	54.5	480	49.3	19.1	81.2	50.0	122	176	68.1
	Middle Back	155	237	47.2	50.8	128	115	122	70.8	105
	Top of Neck	16.2	53.3	4.60	7.10	14.5	19.6	19.2	17.6	14.1
Day 2	Lumbar Zone	71.7	84.4	124	42.4	55.1	49.9	71.3	30.1	66.7
	Left Side	172	93.6	119	100	279	216	163	73.7	150
	Right Side	105	203	220	102	167	197	166	51.2	158
	Middle Back	201	1,223	116	192	170	303	367	424	256
	Top of Neck	31.9	54.6	37.6	16.1	22.6	35.5	33.1	13.3	30.8
Day 7	Lumbar Zone	97.9	129	225	93.8	60.0	140	124	56.8	114
	Left Side	276	150	166	139	215	372	220	90.2	206
	Right Side	165	275	139	273	168	605	271	174	236
	Middle Back	387	460	319	315	267	425	362	74.0	356
	Top of Neck	55.4	36.8	20.7	53.0	63.6	76.3	51.0	19.7	47.1
Day 14	Lumbar Zone	121	50.6	248	128	134	210	149	70.3	133
	Left Side	235	70.7	62.2	158	277	391	199	127	161
	Right Side	131	128	263	220	343	549	272	158	238
	Middle Back	276	398	360	349	259	446	348	71.3	342
	Top of Neck	31.2	18.1	75.2	41.2	59.3	109	55.7	33.1	47.4
Day 28	Lumbar Zone	64.1	9.90	51.2	73.9	59.8	116	62.6	34.5	50.6
	Left Side	172	15.3	50.0	82.3	151	279	125	96.1	87.8
	Right Side	98.3	14.4	35.7	189	112	220	112	81.5	78.6
	Middle Back	278	88.8	67.7	352	152	478	236	162	187
	Top of Neck	16.4	4.50	16.9	25.1	25.5	38.9	21.2	11.6	17.7
Day 42	Lumbar Zone	22.9	1.50	6.80	13.7	32.4	120	32.8	44.0	15.2
	Left Side	49.4	2.70	5.30	35.3	7.70	104	34.1	39.1	16.5
	Right Side	48.9	25.5	5.90	74.9	75.4	144	62.4	48.2	42.6
	Middle Back	173	142	45.1	217	162	325	177	92.0	152
	Top of Neck	16.5	2.60	3.20	6.50	120	12.2	26.8	45.9	10.5
Day 56	Lumbar Zone	14.8	0.800	2.80	6.40	15.5	57.0	16.2	20.9	7.57
	Left Side	74.4	0.800	40.0	12.3	144	262	88.9	99.1	32.2
	Right Side	22.4	16.0	2.50	103	22.5	26.2	32.1	35.7	19.5
	Middle Back	25.1	296	14.3	54.2	54.8	237	113	121	64.9
	Top of Neck	4.00	0.700	0.800	0.900	3.70	15.1	4.20	5.55	2.20

Table 5. Weight of Hair Sample Collections (mg)								
Time of Sampling	Sampled Zones	Dog No. 830285	Dog No. 152114	Dog No. 149871	Dog No. 289011	Dog No. 774733	Dog No. 791249	Area Sampled (cm ²)
Day 0 (pre-application)	Lumbar Zone	790	660	890	800	580	590	10
	Left Side	530	460	430	410	528	510	10
	Right Side	560	460	410	490	500	520	10
	Middle Back	820	410	810	760	550	550	10
	Top of Neck	710	470	530	490	560	670	10
Day 1	Lumbar Zone	880	760	660	510	530	730	10
	Left Side	500	440	580	480	480	540	10
	Right Side	510	450	450	500	430	570	10
	Middle Back	550	460	610	630	550	430	10
	Top of Neck	430	420	480	520	540	420	10
Day 2	Lumbar Zone	770	610	420	630	580	520	10
	Left Side	390	440	410	470	450	410	10
	Right Side	500	370	480	420	420	410	10
	Middle Back	520	500	480	430	470	470	10
	Top of Neck	470	560	410	470	430	510	10
Day 7	Lumbar Zone	700	550	710	710	580	640	10
	Left Side	430	500	410	480	410	430	10
	Right Side	460	460	400	450	490	570	10
	Middle Back	460	530	550	580	420	520	10
	Top of Neck	520	500	430	600	520	610	10
Day 14	Lumbar Zone	700	630	680	610	490	480	10
	Left Side	430	470	400	540	380	420	10
	Right Side	550	560	450	440	420	440	10
	Middle Back	700	800	620	600	520	540	10
	Top of Neck	850	570	610	590	500	530	10
Day 28	Lumbar Zone	780	470	530	640	480	700	10
	Left Side	760	520	470	560	530	670	10
	Right Side	480	580	560	560	550	650	10
	Middle Back	580	480	800	640	590	640	10
	Top of Neck	570	500	540	820	530	650	10
Day 42	Lumbar Zone	980	860	710	620	580	700	10
	Left Side	580	520	520	490	460	520	10
	Right Side	770	490	450	600	530	450	10
	Middle Back	740	520	850	500	510	630	10
	Top of Neck	730	510	570	730	490	850	10
Day 56	Lumbar Zone	980	572	880	1100	710	770	10
	Left Side	1150	910	830	930	520	870	10
	Right Side	1140	890	810	870	830	780	10
	Middle Back	1180	1030	720	880	760	690	10
	Top of Neck	870	1025	720	1100	570	680	10

Table 6. Amitraz Concentration Found on Hair Samples in µg/cm²

Time of Sampling	Sampled Zones	Corrected Residue Level (µg/cm ²)						Avg. Level for Body Zone (µg/cm ²)		
		Dog No. 930288	Dog No. 152314	Dog No. 149921	Dog No. 288011	Dog No. 774733	Dog No. 791349	Arithmetic Mean	Std. Dev.	Geometric
Day 0 (pre-application)	Lumbar Zone	ND	ND	ND	ND	ND	ND	NA	NA	NA
	Left Side	ND	ND	ND	ND	ND	ND	NA	NA	NA
	Right Side	ND	ND	ND	ND	ND	ND	NA	NA	NA
	Middle Back	ND	ND	ND	ND	ND	ND	NA	NA	NA
	Top of Neck	ND	ND	ND	ND	ND	ND	NA	NA	NA
Day 1	Lumbar Zone	3.05	8.37	12.3	1.68	3.26	2.51	5.20	4.22	4.04
	Left Side	3.40	2.85	2.95	0.363	3.49	3.03	2.68	1.16	2.19
	Right Side	3.88	35.4	1.69	0.960	5.43	3.33	8.44	13.3	3.99
	Middle Back	9.17	10.1	2.86	2.93	9.84	5.50	6.74	3.41	5.90
	Top of Neck	1.19	4.20	0.230	0.537	1.20	1.23	1.43	1.42	0.984
Day 2	Lumbar Zone	6.74	5.43	5.14	2.77	4.61	3.61	4.72	1.40	4.53
	Left Side	9.34	5.89	6.08	3.94	21.5	13.1	9.96	6.48	8.47
	Right Side	7.95	11.4	10.7	5.01	12.0	11.3	9.73	2.71	9.33
	Middle Back	12.0	131	4.84	7.20	13.6	13.6	30.3	49.4	14.7
	Top of Neck	2.38	5.14	1.61	0.564	1.34	2.46	2.25	1.58	1.82
Day 7	Lumbar Zone	8.08	8.39	22.2	7.12	3.70	10.3	9.96	6.38	8.61
	Left Side	17.6	9.02	7.20	7.05	10.4	18.4	11.6	5.10	10.8
	Right Side	11.3	16.0	4.97	14.0	11.2	37.6	15.9	11.3	13.2
	Middle Back	19.7	41.2	14.9	17.0	16.0	79.4	31.4	25.5	25.3
	Top of Neck	4.19	2.85	0.790	3.24	4.31	4.92	3.38	1.48	2.94
Day 14	Lumbar Zone	6.39	3.10	15.7	10.1	3.86	9.79	8.16	4.69	7.01
	Left Side	9.39	2.80	2.40	8.08	6.63	19.3	8.10	6.16	6.34
	Right Side	4.94	7.64	10.2	10.1	11.7	26.3	11.8	7.48	10.3
	Middle Back	19.4	35.3	29.2	21.7	18.4	64.2	31.4	17.3	28.3
	Top of Neck	2.46	1.12	15.8	1.99	2.11	5.89	4.89	5.58	3.20
Day 28	Lumbar Zone	4.03	0.230	1.76	3.51	0.784	5.60	2.65	2.07	1.71
	Left Side	10.3	0.687	1.25	2.94	1.92	12.5	4.94	5.12	2.92
	Right Side	3.06	0.947	0.914	5.51	0.911	34.9	7.71	13.5	2.78
	Middle Back	12.6	1.56	3.15	17.3	3.75	23.8	10.4	9.02	6.76
	Top of Neck	0.753	0.100	0.648	1.26	0.433	1.90	0.848	0.640	0.608

Table 6. Amitraz Concentration Found on Hair Samples in µg/cm²

Time of Sampling	Sampled Zones	Corrected Residue Level (µg/cm ²)						Avg Level Per Body Zone (µg/cm ²)		
		Deg No. 930288	Deg No. 132314	Deg No. 149821	Deg No. 289011	Deg No. 774743	Deg No. 791249	Arithmetic Mean	Std Dev	Geomean
Day 42	Lumbar Zone	1.39	0.249	0.220	0.454	0.355	5.58	1.37	2.11	0.640
	Left Side	1.55	0.068	0.114	0.653	0.166	3.53	1.01	1.35	0.407
	Right Side	2.13	0.059	0.090	1.20	0.420	4.12	1.33	1.57	0.534
	Middle Back	7.78	0.208	1.02	10.6	3.53	42.6	11.0	16.0	3.72
	Top of Neck	0.727	0.020	0.051	0.204	0.524	0.776	0.384	0.336	0.200
Day 56	Lumbar Zone	0.294	0.011	0.062	0.187	0.092	2.31	0.493	0.896	0.142
	Left Side	0.253	0.009	0.257	0.195	0.239	6.35	1.22	2.52	0.237
	Right Side	0.433	0.053	0.032	0.070	0.083	0.702	0.229	0.276	0.120
	Middle Back	1.54	0.031	0.108	0.414	1.04	6.95	1.68	2.65	0.499
	Top of Neck	0.113	0.010	0.007	0.022	0.034	0.612	0.133	0.238	0.040

¹Values greater than 5.0 µg/g in Table 3 required correction. Amitraz corrected for 83% recovery.
 Residue Level (µg/cm²) = Corrected Level (µg/g) x weight of hair sample (mg) x 0.001 (g/mg) / area sampled (10 cm²)

Table 7. R-28153 - Concentration Found on Hair Samples in $\mu\text{g}/\text{cm}^2$

Time of Sampling	Sampled Zones	Collected Residue Level ($\mu\text{g}/\text{cm}^2$)					Avg Level ¹ Per Body Zone ($\mu\text{g}/\text{cm}^2$)			
		Dog No. 930288	Dog No. 152314	Dog No. 149821	Dog No. 289011	Dog No. 774733	Dog No. 791249	Arithmetic Mean	Std Dev	Geomean
Day 0 (pre-application)	Lumbar Zone	ND	ND	ND	ND	ND	ND	NA	NA	NA
	Left Side	ND	ND	ND	ND	ND	ND	NA	NA	NA
	Right Side	ND	ND	ND	ND	ND	ND	NA	NA	NA
	Middle Back	ND	ND	ND	ND	ND	ND	NA	NA	NA
	Top of Neck	ND	ND	ND	ND	ND	ND	NA	NA	NA
Day 1	Lumbar Zone	3.46	7.98	16.7	1.74	3.11	2.29	5.88	5.73	4.23
	Left Side	3.23	3.07	6.25	0.875	3.17	4.79	3.56	1.82	3.06
	Right Side	3.87	30.0	3.09	1.33	4.86	3.96	7.86	10.9	4.57
	Middle Back	11.9	15.2	4.00	4.45	9.81	6.90	8.70	4.39	7.75
	Top of Neck	0.969	3.11	0.221	0.513	1.09	1.14	1.18	1.02	0.868
Day 2	Lumbar Zone	7.68	7.16	7.26	3.72	4.44	3.61	5.64	1.92	5.36
	Left Side	9.31	5.73	6.76	6.56	17.5	12.3	9.69	4.52	8.94
	Right Side	7.27	10.4	14.7	5.96	9.78	11.2	9.89	3.08	9.49
	Middle Back	14.6	85.1	7.74	11.5	11.1	19.8	24.9	29.7	17.0
	Top of Neck	2.09	4.25	2.14	1.05	1.35	2.52	2.23	1.13	2.02
Day 7	Lumbar Zone	9.53	9.86	22.2	9.26	4.84	12.5	11.4	5.85	10.3
	Left Side	16.5	10.4	9.44	9.27	12.2	22.2	13.4	5.11	12.7
	Right Side	10.6	17.6	7.71	17.1	11.4	48.0	18.7	14.8	15.4
	Middle Back	24.8	33.9	24.4	25.4	15.6	30.8	25.8	6.29	25.1
	Top of Neck	4.01	2.56	1.24	4.42	4.60	6.47	3.88	1.80	3.45
Day 14	Lumbar Zone	11.8	4.43	23.5	10.8	9.13	14.0	12.3	6.36	10.9
	Left Side	14.1	4.62	3.46	11.9	14.6	22.8	11.9	7.16	9.81
	Right Side	10.0	9.98	16.5	13.5	20.0	33.6	17.3	8.88	15.7
	Middle Back	26.9	44.3	31.0	29.1	18.7	33.5	30.6	8.40	29.6
	Top of Neck	3.69	1.43	6.38	3.38	4.12	8.06	4.51	2.35	3.95
Day 28	Lumbar Zone	6.95	0.647	3.77	6.58	3.99	11.3	5.55	3.64	4.14
	Left Side	18.1	1.11	3.27	6.41	11.2	26.0	11.0	9.55	7.04
	Right Side	6.56	1.16	2.78	14.71	8.57	19.9	8.95	7.18	6.13
	Middle Back	22.4	5.93	7.53	31.3	12.5	42.6	20.4	14.5	16.0

Table 7. R-28153 - Concentration Found on Hair Samples in $\mu\text{g}/\text{cm}^2$

Time of Sampling	Sampled Zones	Corrected Residue Level ¹ ($\mu\text{g}/\text{cm}^2$)				Dog No. 774733 No. 791249	Arithmetic Mean	Std Dev.	Avg. Level, Per Body Zone ($\mu\text{g}/\text{cm}^2$)
		Dog No. 940288	Dog No. 152314	Dog No. 149821	Dog No. 289011				
Day 42	Top of Neck	1.30	0.225	1.27	2.86	1.88	3.52	1.19	1.38
	Lumbar Zone	3.12	0.129	0.671	1.18	2.61	11.7	4.28	1.46
	Left Side	3.98	0.140	0.383	2.41	0.493	7.54	2.89	1.11
	Right Side	5.24	1.74	0.369	6.25	5.56	8.98	3.14	3.19
	Middle Back	17.8	10.2	5.33	15.1	11.5	28.4	7.96	13.0
Day 56	Top of Neck	1.68	0.133	0.182	0.660	8.17	1.44	3.07	0.825
	Lumbar Zone	2.02	0.046	0.246	0.979	1.53	6.10	2.23	0.770
	Left Side	11.9	0.073	4.62	1.59	10.4	31.7	11.6	3.58
	Right Side	3.55	1.98	0.203	12.4	2.60	2.84	4.32	2.25
	Middle Back	4.12	42.4	1.43	6.63	5.79	22.7	15.9	7.76
	Top of Neck	0.348	0.072	0.058	0.099	0.211	1.43	0.530	0.187

¹ Values greater than $5.0 \mu\text{g}/\text{g}$ in Table 4 required correction. R-28153 corrected for 72% recovery.
Residue Level ($\mu\text{g}/\text{cm}^2$) = Corrected Level ($\mu\text{g}/\text{g}$) x weight of hair sample (mg) x 0.001 (g/mg) / area sampled (10 cm^2)

Time of Sampling	Sampled Zones	Arithmetic Mean ($\mu\text{g}/\text{cm}^2$)	Std Dev ($\mu\text{g}/\text{cm}^2$)	Geomean ($\mu\text{g}/\text{cm}^2$)
Day 1	Lumbar Zone	5.20	4.22	4.04
Day 2	Lumbar Zone	4.72	1.40	4.53
Day 7	Lumbar Zone	9.96	6.38	8.61
Day 14	Lumbar Zone	8.16	4.69	7.01
Day 28	Lumbar Zone	2.65	2.07	1.71
Day 42	Lumbar Zone	1.37	2.11	0.640
Day 56	Lumbar Zone	0.493	0.896	0.142

Time of Sampling	Sampled Zones	Arithmetic Mean ($\mu\text{g}/\text{cm}^2$)	Std Dev ($\mu\text{g}/\text{cm}^2$)	Geomean ($\mu\text{g}/\text{cm}^2$)
Day 1	Left Side	2.68	1.16	2.19
Day 2	Left Side	9.96	6.48	8.47
Day 7	Left Side	11.6	5.10	10.8
Day 14	Left Side	8.10	6.16	6.34
Day 28	Left Side	4.94	5.12	2.92
Day 42	Left Side	1.01	1.35	0.407
Day 56	Left Side	1.22	2.52	0.237

Time of Sampling	Sampled Zones	Arithmetic Mean ($\mu\text{g}/\text{cm}^2$)	Std Dev ($\mu\text{g}/\text{cm}^2$)	Geomean ($\mu\text{g}/\text{cm}^2$)
Day 1	Right Side	8.44	13.3	3.99
Day 2	Right Side	9.73	2.71	9.33
Day 7	Right Side	15.9	11.3	13.2
Day 14	Right Side	11.8	7.48	10.3
Day 28	Right Side	7.71	13.5	2.78
Day 42	Right Side	1.33	1.57	0.534
Day 56	Right Side	0.229	0.276	0.120

Time of Sampling	Sampled Zones	Arithmetic Average ($\mu\text{g}/\text{cm}^2$)	Std Dev ($\mu\text{g}/\text{cm}^2$)	Geomean ($\mu\text{g}/\text{cm}^2$)
Day 1	Middle Back	6.74	3.41	5.90
Day 2	Middle Back	30.3	49.4	14.7
Day 7	Middle Back	31.4	25.5	25.3
Day 14	Middle Back	31.4	17.3	28.3
Day 28	Middle Back	10.4	9.02	6.76
Day 42	Middle Back	11.0	16.0	3.72
Day 56	Middle Back	1.68	2.65	0.499

Table 12. Average Ambient Concentration on Top of Neck

Time of Sampling	Sampled Zones	Arithmetic Mean (µg/cm ²)	Std Dev (µg/cm ²)	Geomean (µg/cm ²)
Day 1	Top of Neck	1.43	1.42	0.984
Day 2	Top of Neck	2.25	1.58	1.82
Day 7	Top of Neck	3.38	1.48	2.94
Day 14	Top of Neck	4.89	5.58	3.20
Day 28	Top of Neck	0.848	0.640	0.608
Day 42	Top of Neck	0.384	0.336	0.200
Day 56	Top of Neck	0.133	0.238	0.040

Table 13. Average R-28153 Concentration on Lumbar Zone

Time of Sampling	Sampled Zones	Arithmetic Mean (µg/cm ²)	Std Dev (µg/cm ²)	Geomean (µg/cm ²)
Day 1	Lumbar Zone	5.88	5.73	4.23
Day 2	Lumbar Zone	5.64	1.92	5.36
Day 7	Lumbar Zone	11.4	5.85	10.3
Day 14	Lumbar Zone	12.3	6.36	10.9
Day 28	Lumbar Zone	5.55	3.64	4.14
Day 42	Lumbar Zone	3.23	4.28	1.46
Day 56	Lumbar Zone	1.82	2.23	0.770

Table 14. Average R-28153 Concentration on Left Side

Time of Sampling	Sampled Zones	Arithmetic Mean (µg/cm ²)	Std Dev (µg/cm ²)	Geomean (µg/cm ²)
Day 1	Left Side	3.56	1.82	3.06
Day 2	Left Side	9.69	4.52	8.94
Day 7	Left Side	13.4	5.11	12.7
Day 14	Left Side	11.9	7.16	9.81
Day 28	Left Side	11.0	9.55	7.04
Day 42	Left Side	2.49	2.89	1.11
Day 56	Left Side	10.0	11.6	3.58

Table 15. Average R-28153 Concentration on Right Side

Time of Sampling	Sampled Zones	Arithmetic Mean (µg/cm ²)	Std Dev (µg/cm ²)	Geomean (µg/cm ²)
Day 1	Right Side	7.86	10.9	4.57
Day 2	Right Side	9.89	3.08	9.49
Day 7	Right Side	18.7	14.8	15.4
Day 14	Right Side	17.3	8.88	15.7
Day 28	Right Side	8.95	7.18	6.13
Day 42	Right Side	4.69	3.14	3.19
Day 56	Right Side	3.94	4.32	2.25

Time of Sampling	Sampled Zones	Arithmetic Mean ($\mu\text{g}/\text{cm}^2$)	Std Dev ($\mu\text{g}/\text{cm}^2$)	Geomean ($\mu\text{g}/\text{cm}^2$)
Day 1	Middle Back	8.70	4.39	7.75
Day 2	Middle Back	24.9	29.7	17.0
Day 7	Middle Back	25.8	6.29	25.1
Day 14	Middle Back	30.6	8.40	29.6
Day 28	Middle Back	20.4	14.5	16.0
Day 42	Middle Back	14.7	7.96	13.0
Day 56	Middle Back	13.8	15.9	7.76

Time of Sampling	Sampled Zones	Arithmetic Mean ($\mu\text{g}/\text{cm}^2$)	Std Dev ($\mu\text{g}/\text{cm}^2$)	Geomean ($\mu\text{g}/\text{cm}^2$)
Day 1	Top of Neck	1.18	1.02	0.868
Day 2	Top of Neck	2.23	1.13	2.02
Day 7	Top of Neck	3.88	1.80	3.45
Day 14	Top of Neck	4.51	2.35	3.95
Day 28	Top of Neck	1.84	1.19	1.38
Day 42	Top of Neck	2.04	3.07	0.825
Day 56	Top of Neck	0.369	0.530	0.187

Table 18 - Amitraz - Percentage of Original Application Rate Detected On Different Sampling Days Per Body Zone										
	Dog No. 940288	Dog No. 152314	Dog No. 149821	Dog No. 289011	Dog No. 774533	Dog No. 791240	Arithmetic Mean	Std Dev	Geomean	
Day 1	Lumbar Zone	0.017	0.046	0.082	0.009	0.018	0.013	0.031	0.028	0.023
	Left Side	0.018	0.016	0.019	0.002	0.019	0.015	0.015	0.007	0.012
	Right Side	0.021	0.195	0.011	0.005	0.030	0.017	0.047	0.073	0.022
	Middle Back	0.050	0.056	0.019	0.016	0.055	0.028	0.037	0.018	0.033
	Top of Neck	0.006	0.023	0.002	0.003	0.007	0.006	0.008	0.008	0.006
	AVERAGE (considering all zones)	0.022	0.067	0.027	0.007	0.026	0.016	0.027	0.027	0.019
Day 2	Lumbar Zone	0.036	0.030	0.034	0.015	0.026	0.018	0.027	0.008	0.025
	Left Side	0.051	0.032	0.040	0.022	0.120	0.067	0.055	0.035	0.047
	Right Side	0.043	0.063	0.070	0.028	0.067	0.058	0.055	0.016	0.052
	Middle Back	0.065	0.720	0.032	0.040	0.076	0.069	0.167	0.271	0.082
	Top of Neck	0.013	0.028	0.011	0.003	0.007	0.013	0.012	0.009	0.010
	AVERAGE (considering all zones)	0.042	0.175	0.037	0.022	0.059	0.045	0.063	0.068	0.044
Day 7	Lumbar Zone	0.044	0.046	0.147	0.039	0.021	0.052	0.058	0.045	0.048
	Left Side	0.095	0.050	0.048	0.039	0.058	0.094	0.064	0.024	0.060
	Right Side	0.061	0.088	0.033	0.078	0.063	0.192	0.086	0.055	0.074
	Middle Back	0.107	0.227	0.098	0.094	0.089	0.406	0.170	0.127	0.142
	Top of Neck	0.023	0.016	0.005	0.018	0.024	0.025	0.018	0.007	0.016
	AVERAGE (considering all zones)	0.066	0.085	0.066	0.054	0.051	0.154	0.079	0.052	0.068
Day 14	Lumbar Zone	0.035	0.017	0.104	0.056	0.022	0.050	0.047	0.032	0.039
	Left Side	0.051	0.015	0.016	0.045	0.037	0.098	0.044	0.031	0.036
	Right Side	0.027	0.042	0.068	0.056	0.065	0.134	0.065	0.037	0.058
	Middle Back	0.105	0.194	0.193	0.121	0.103	0.328	0.174	0.086	0.159
	Top of Neck	0.013	0.006	0.104	0.011	0.012	0.030	0.029	0.038	0.018
	AVERAGE (considering all zones)	0.046	0.055	0.097	0.058	0.048	0.128	0.072	0.045	0.062
Day 28	Lumbar Zone	0.022	0.001	0.012	0.019	0.004	0.029	0.015	0.011	0.010
	Left Side	0.056	0.004	0.008	0.016	0.011	0.064	0.026	0.026	0.016
	Right Side	0.017	0.005	0.006	0.031	0.005	0.178	0.040	0.068	0.016
	Middle Back	0.068	0.009	0.021	0.096	0.021	0.121	0.056	0.046	0.038
	Top of Neck	0.004	0.001	0.004	0.007	0.002	0.010	0.005	0.003	0.003
	AVERAGE (considering all zones)	0.033	0.004	0.010	0.034	0.009	0.080	0.028	0.031	0.017
Day 42	Lumbar Zone	0.008	0.001	0.001	0.003	0.002	0.028	0.007	0.011	0.004
	Left Side	0.008	0.0004	0.001	0.004	0.001	0.018	0.005	0.007	0.002
	Right Side	0.012	0.0003	0.001	0.007	0.002	0.021	0.007	0.008	0.003
	Middle Back	0.042	0.001	0.007	0.059	0.020	0.218	0.058	0.081	0.021

Table 19. R-28153 - Percentage of Original Application Rate Detected On Different Sampling Days Per Body Zone

	Dog No. 930388	Dog No. 152314	Dog No. 149821	Dog No. 289011	Dog No. 774793	Dog No. 791249	Arithmetic Mean	Std Dev.	Geomean
Day 1	Lumbar Zone	0.018	0.043	0.107	0.009	0.017	0.011	0.034	0.038
	Left Side	0.017	0.016	0.040	0.005	0.017	0.024	0.020	0.012
	Right Side	0.020	0.161	0.020	0.007	0.026	0.020	0.042	0.059
	Middle Back	0.063	0.081	0.026	0.024	0.053	0.034	0.047	0.023
	Top of Neck	0.005	0.017	0.001	0.003	0.006	0.006	0.006	0.005
AVERAGE (considering all zones)									
Day 2	Lumbar Zone	0.041	0.038	0.047	0.020	0.024	0.018	0.031	0.012
	Left Side	0.049	0.031	0.043	0.035	0.095	0.061	0.053	0.024
	Right Side	0.038	0.056	0.094	0.032	0.053	0.056	0.055	0.022
	Middle Back	0.077	0.457	0.050	0.062	0.060	0.099	0.134	0.159
	Top of Neck	0.011	0.023	0.014	0.006	0.007	0.013	0.012	0.006
AVERAGE (considering all zones)									
Day 7	Lumbar Zone	0.050	0.053	0.142	0.050	0.026	0.062	0.064	0.040
	Left Side	0.087	0.056	0.061	0.050	0.067	0.111	0.072	0.023
	Right Side	0.056	0.094	0.049	0.092	0.062	0.239	0.099	0.071
	Middle Back	0.131	0.182	0.157	0.137	0.085	0.153	0.141	0.033
	Top of Neck	0.021	0.014	0.008	0.024	0.025	0.032	0.021	0.009
AVERAGE (considering all zones)									
Day 14	Lumbar Zone	0.069	0.080	0.083	0.071	0.053	0.119	0.079	0.035
	Left Side	0.062	0.024	0.151	0.058	0.050	0.070	0.069	0.043
	Right Side	0.074	0.025	0.022	0.064	0.080	0.114	0.063	0.035
	Middle Back	0.053	0.054	0.106	0.072	0.109	0.167	0.094	0.044
	Top of Neck	0.142	0.238	0.199	0.157	0.102	0.167	0.167	0.047
AVERAGE (considering all zones)									
Day 28	Lumbar Zone	0.070	0.070	0.104	0.074	0.073	0.112	0.084	0.036
	Left Side	0.037	0.003	0.024	0.035	0.022	0.056	0.030	0.018
	Right Side	0.096	0.006	0.021	0.035	0.061	0.130	0.058	0.047
	Middle Back	0.035	0.006	0.018	0.079	0.047	0.099	0.047	0.036
	Top of Neck	0.118	0.032	0.048	0.169	0.068	0.212	0.108	0.072
AVERAGE (considering all zones)									
Day 42	Lumbar Zone	0.007	0.001	0.008	0.015	0.010	0.018	0.010	0.006
	Left Side	0.058	0.010	0.024	0.067	0.041	0.103	0.051	0.036
	Right Side	0.016	0.001	0.004	0.006	0.014	0.058	0.017	0.021
AVERAGE (considering all zones)									
Day 42	Left Side	0.021	0.001	0.002	0.013	0.003	0.038	0.013	0.014
	Right Side	0.028	0.009	0.002	0.034	0.030	0.045	0.025	0.016

Table 19 - R-38153 - Percentage of Original Application Rate Detected on Different Sampling Days Per Body Zone¹

	Dog No. 930288	Dog No. 152314	Dog No. 149821	Dog No. 289011	Dog No. 774733	Dog No. 791249	Arithmetic Mean	Std. Dev.	Geometric
Middle Back	0.094	0.055	0.034	0.081	0.062	0.142	0.078	0.037	0.071
Top of Neck	0.009	0.001	0.001	0.004	0.045	0.007	0.011	0.017	0.005
AVERAGE (considering all zones)	0.034	0.013	0.009	0.028	0.031	0.058	0.029	0.021	0.021
Lumbar Zone	0.011	0.0002	0.002	0.005	0.008	0.030	0.009	0.011	0.004
Left Side	0.063	0.0004	0.030	0.009	0.057	0.158	0.053	0.057	0.020
Right Side	0.019	0.011	0.001	0.067	0.014	0.014	0.021	0.023	0.012
Middle Back	0.022	0.228	0.009	0.036	0.032	0.113	0.073	0.084	0.042
Top of Neck	0.002	0.0004	0.0004	0.001	0.001	0.007	0.002	0.003	0.001
AVERAGE (considering all zones)	0.023	0.048	0.008	0.023	0.022	0.064	0.032	0.036	0.016

¹ The percentages of the original application rate detected on a particular day on a specific body zone = (mg ai detected on a particular day and on a particular 10 cm² area on the dog / total ai applied to dog (mg ai/kg x kg body weight of dog) * 100



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