12/2/1993

DATA EVALUATION RECORD

1. **CHEMICAL:** Oxyfluorfen. Shaughnessey Number 111601.

2. **TEST MATERIAL:** RH-2915 Technical; lot # 2-3985: 72.5% active ingredient; a red-black solid.

3. **STUDY TYPE:** Avian Reproductive Study.
Species Tested: Mallard (Anas platyrhynchos).

4. **CITATION:** Piccirillo, V.J. 1982. One generation reproduction study in the mallard duck with RH-2915 technical. Conducted by Borriston Laboratories, Inc., Temple Hills, Maryland. Project No. 1005 (formerly 202-X). Submitted by Rohm and Haas Company, Spring House, Pennsylvania. MRID No. 4153012-05. 71-4(b)

5. **REVIEWED BY:**

Jeffrey L. Lincer, Ph.D.
President
Eco-Analysts, Inc.

Signature:

Date:

6. **APPROVED BY:**

Michael L. Whitten, M.S.
Wildlife Toxicologist
KBN Engineering and
Applied Sciences, Inc.

Signature: Richard L. Whitten

Date: 11/17/93

Henry T. Craven, M.S.
Supervisor, EEB/HED
USEPA

Signature: Norman J. Cook

Date: 12.02.93 Henry Craven 12/2/93

7. **CONCLUSIONS:** The study appears to be scientifically sound but does not fulfill the requirements for an avian reproductive test. Based on the data presented, it appears that 100 ppm (nominal concentration) RH-2915 had no effects on the reproductive capabilities of the mallard duck. The study has been classified as Supplemnetal. Because only one treatment group was tested the study cannot be up-graded to "Core" (as per conversaation with D. Mclane).

8. **RECOMMENDATIONS:** See Section 14 D.

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71-4(b) Avian Reproduction

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5. **REVIEWED BY:**

Jeffrey L. Lincer, Ph.D.
President
Eco-Analysts, Inc.

Signature: Michael L. Whitten For J.L. Lincer
Date: 5/29/91

6. **APPROVED BY:**

Michael L. Whitten, M.S.
Wildlife Toxicologist
KBN Engineering and
Applied Sciences, Inc.

Signature: Michael L. Whitten
Date: 5/29/91

Richard W. Tiffany 10/21/92

Henry T. Craven, M.S.
Supervisor, EEB/HED
USEPA

Signature: Henry T. Craven
Date: 10/2/93

7. **CONCLUSIONS:** The study appears to be scientifically sound but does not fulfill the requirements for an avian reproductive test. Based on the data presented, it appears that 100 ppm (nominal concentration) RH-2915 had no effects on the reproductive capabilities of the mallard duck.
(Supplemental)

8. **RECOMMENDATIONS:** See Section 14 D.

9. **BACKGROUND:**

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10. **DISCUSSION OF INDIVIDUAL TESTS:** N/A.

11. **MATERIALS AND METHODS:**

A. **Test Animals:** Sixty-four adult mallard ducks (Anas platyrhynchos), 16 males and 48 females, were selected for use in this study. These birds were selected from the flock maintained at Truslow Farms. The birds were six months of age upon arrival at the reproduction facility. All the birds were examined for physical defects and blood-tested for typhoid upon arrival. The birds were acclimated to the reproduction facility for 21 days prior to initiation of the study. While in quarantine both food (Agway Game Bird Breeder Ration) and water were provided ad libitum.

B. **Test System:** During the study the birds were housed (one male and three females) in pens with straw-covered concrete floors measuring 14' x 4' x 7'. During the twenty-one week exposure period the temperature ranged from 33°F-64°F and humidity ranged from 33%-77%. The light cycle was six hours of light and 18 hours of darkness per day. The frequency of bedding changes was reduced during the egg-laying cycle so that nesting would not be disrupted. On January 19, 1982, the light cycle was increased to 16 hours of light per day to induce egg laying. This light cycle was maintained throughout the remainder of the study. A light intensity of 6 foot candles at bird level was considered adequate by protocol. Light readings were taken at bird level near the feeder within each pen. At initiation, mean light intensity readings were 6.4 foot candles for the control group and 6.8 foot candles for the 100 ppm RH-2915 group. This light intensity induced early egg laying so the light intensity was reduced to 1-2 foot candles during Week 7 of the study.

Eggs were collected daily and stored at 65°F. At weekly intervals the eggs were removed from storage and placed in an incubator. During incubation the eggs were maintained at 99.9°F. On Day 0 of incubation the eggs were candled for eggshell cracks, on Day 14 for fertility and early death of embryos, and on Day 21 for embryo viability. On Day 23 the eggs were transferred to a hatcher. Turning frequency of eggs was six revolutions per day.

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On Day 7 of Weeks 1, 3, 7 and 9 of the egg laying phase all eggs collected were measured for eggshell thickness by cracking open the egg at the girth, washing out the contents and allowing the shells to dry for 48 hours. The thickness of the dried shell plus the membrane was measured at four points around the girth using a micrometer calibrated to 0.01 mm. Egg shell thickness is the mean of the four point measurements. Egg contents were saved frozen and forwarded to the sponsor for analysis.

Hatchlings were housed in clean wire brooder batteries measuring 28" x 32" x 11". The hatchlings were identified by color coding on the breast for group number and by toe punching (web of foot) for pen numbers. The hatchlings were observed for mortality and toxic effects for 14 days after hatching. During this period the hatchlings were fed Agway Game Bird Starter Feed and water ad libitum. Temperature inside the testing facility ranged from 76°F-98°F and humidity ranged from 39%-65%. The light cycle was 17 hours of light and seven hours of darkness per day.

C. **Dosage:** Birds received a 100 ppm test dosage or a control diet ad libitum during the eleven week pre-laying period and a ten-week laying cycle.

The test material, RH-2915 Technical (Lot 2-3985, TD 81-441), was used in the formulation of premixes which were prepared at Borriston Laboratories. Premixes were prepared every two weeks. The final diet preparation using the premixes was accomplished at Truslow Farms. The premixes were adjusted to a 100% active ingredient basis using a 72.5% active ingredient value supplied by the sponsor and were formulated as follows: appropriate amounts of RH-2915 were weighed and heated to better liquify for 2 to 3 minutes. Corn oil was added and the solution was stirred for two to three minutes on a Corning magnetic stirrer. This solution was then added to the appropriate amounts of basal diet to achieve the required parts per million (ppm) concentration of the premix, and blended for one hour in a Hobart C-100-T mixer. After mixing, the premix was divided into two 300 gram aliquots, sealed in Kapak bags, and stored frozen until shipment to Truslow Farms for the final mixing. Two separate premix packages were prepared in this manner so that one package would be used for Week

1 after mixing and the second package would be used for Week 2 after mixing. Thus, finished diets were prepared fresh weekly and the premix used may be two weeks old. The samples were submitted to the sponsor for analysis. The control diet was prepared in the same manner as the 100 ppm RH-2915 diet except that no RH-2915 was added. Appropriate amounts of basal diet were weighed and approximately three kilograms of this preweighed basal diet were mixed for one minute with the premix supplied by Borriston Laboratories. The remaining amount of the preweighed basal diet was added and the feed was mixed for 20 minutes in a Dayton mixer. The premixes from Borriston were stored frozen at Truslow Farms until use.

D. **Design:** Upon arrival at the reproduction facility. the birds were randomly assigned to clean pens and identified with uniquely numbered leg bands. At the end of the 21-day quarantine period the mallards were assigned to the either a control or 100 ppm group.

Adult birds were observed twice daily for mortality, moribundity and toxic effects. Individual body weights were recorded at Week 0, Week 10, and Week 21 (termination). All parental birds were sacrificed, necropsied, and examined for gross pathological changes upon completion of the laying cycle. Eggs were collected daily and groups placed in an incubator at weekly intervals. Hatchlings were observed twice daily for mortality, moribundity, and toxic effect.

E. **Statistics:** Statistical methods were not provided.

12. **REPORTED RESULTS:**

Parental Data

Mortality and Observations

One female in the 100 ppm group died during the study. This death was considered incidental and not related to treatment. No other parental deaths occurred during this study. In addition, no signs of toxicity were observed in parental birds.

Body Weight

Tabular data provided the individual and mean parental body weights at Weeks 1, 10 and 21 (termination). No treatment related effects on body weight were observed. Body weights for male birds from both the control group and the treatment

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group showed little or no change from initiation through termination of the study. Female control birds showed no appreciable change in body weight from initiation through Week 10 and a slight increase in body weight from Week 10 through termination. Body weights for female birds at 100 ppm showed increases in body weight from initiation through Week 10 and from week 10 through termination.

Food Consumption

Mean and total pen food consumption data were provided. Food consumption in the 100 ppm group was significantly lower than in the control group during weeks 3, 12, and 20. No other food consumption values were statistically different from the control. No food aversion or palatability problems were noted. A 30% drop in food consumption was seen in the control group from Week 3 to Week 4 which returned to normal on Week 5. The reason for this decrease is not known.

Egg and Offspring Data

Eggs Laid and Cracked

The mean number of eggs laid per pen was 171.4 and 167.4, respectively, for the control and RH-2915 group. The incidence of eggs cracked per eggs laid was also comparable; 0.73% and 1.12% for the control and RH-2915 groups, respectively.

Embryo Viability and Hatchling Survival

Comparison of data regarding embryo viability and hatchability showed no differences between the control and the treatment group. The data for both groups in this study were well within the normal historical control ranges for this species except for the 14-day Survivors/Eggs Hatched. The survivability of the hatchlings was exceptionally good in this study; 98.8% (Control) and 99.9% (100 ppm). The number of 14-day hatchlings per hen is 39.25 and 35.36 for the control and treatment group, respectively.

No distinct differences in mean body weights of the 14-day hatchlings were observed between the control and treated group (Table 5). In addition, no signs of treatment related toxicity were observed in the hatchlings.

Egg Shell Thickness

No effect on egg shell thickness was observed when comparing the 100 ppm RH-2915 group to the control; 0.401 mm vs 0.401 mm, respectively.

Gross Pathology
Upon completion of the egg laying cycle, parental birds were necropsied and the following gross observations were noted:

Group 1 (0 ppm) - One bird with pale liver (#120 female) Light weight and early molt was noted in one bird (#102 female). Six birds not in production, otherwise normal.

Group 2 (100 ppm) - One bird with pale liver (#144 female) Six birds not in production, otherwise normal.

No treatment related findings were observed.

13. **STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:**
"Based on the results of this study, environmental levels of up to 100 ppm RH-2915 Technical are not considered to present a hazard to the reproductive capacity of the Mallard duck. No adverse findings were observed in parental birds and the reproductive parameters and indices were comparable between the treated group and the control group."

Regarding quality assurance measures, I.J. Morici indicated in a memo dated October 25, 1982 to Dr. T.D. Rogerson that the report had been reviewed by the Quality Assurance Unit and himself. In his judgement, the study "was scientifically sound and may be submitted to EPA for regulatory purposes." With the exception of proposed QA practices for sample collection (Appendix 3), no details were provided. No GLP statement was provided.

14. **REVIEWER'S DISCUSSION AND INTERPRETATION OF STUDY RESULTS:**

A. **Test Procedure:** This test was carried out in 1982, prior to the publication of both the current Subdivision E Guidelines and the relevant SEP. For the record, however, the following is noted:

(1) Only two test groups were used; one control and one treatment group (vs. a minimum of three groups, SEP pg. 3). This was, however, a repeat study which may account for the deviation.

(2) One male and three females per pen were used (vs. two males and five females per pen, SEP pg 3). Apparently, this issue has already been the subject of some correspondence between the

applicant and the EPA (see October 26, 1982 letter from Morici to Rogerson). The applicant contends that the protocols for the repeat studies were sent to the EPA for approval prior to the study initiation. The reviewer is not in a position to comment further on this issue.

(3) The temperature ranged from 33°F-64°F and the humidity from 33%-77% (vs. 70°F and 55%, respectively, SEP pg.3).

(4) Body weights were taken at weeks 1, 10, and 21 (termination) vs. biweekly up to eight weeks or to the onset of egg laying (SEP pg.4).

(5) Corn oil was used as a vehicle but the relative amount of this substance was not verifiable (vs. the recommended amount of one or two percent, SEP pg.4).

(6) Collected eggs were stored at 65°F (vs 61°F, SEP pg.5).

(7) No statistical methods were provided (SEP pg.8).

(8) No table of diet composition was provided; therefore, it could not be reviewed (SEP pg.10).

B. **Statistical Analysis**: The registrant should ensure that future reports contain details on statistical methodology. Statistical analyses of reproductive parameters were performed by the reviewer (attached) using a computer program based on the EEB Bigbird program.

The results of these analyses generally matched those reported by the authors. The reviewer's analyses resulted in the following significant differences between the control and treatment group: (1) The ratio of 14-day old survivors/eggs hatched was higher in the treatment group than in the control; (2) the weight of 14-day old chicks was lower in the treatment group than in the control group during week 1, and higher in the treatment group than in the control group during weeks 4 and 5; (3) Food consumption was lower in the treatment group than in the control group during weeks 12 and 20 (the author reported significant differences

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during weeks 3, 12, and 20).

C. **Discussion/Results:** The significant differences between treatment and control groups mentioned above are not considered to be treatment-related.

The EEB cannot conclude this based on stat. analy

Although a number of deviations from what is now required by the guidelines and the SEP were noted, most do not indicate fatal flaws in the methodology. One issue does, however, stand out: the use of only two (vs. at least three) test groups. Since this study was a requested repeat study, an examination of historical documentation will be necessary to determine if EPA authorized this.

Based on that data presented, it appears that 100 ppm RH-2915 Technical does not present a hazard to the reproductive capability of the mallard duck. The study is scientifically sound but does not fulfill the requirements for an avian reproductive test, since only one treatment group was tested.

D. **Adequacy of the Study:**

(1) **Classification:** Supplemental.

(2) **Rationale:** The study was conducted using only one treatment group and as such fails to satisfy the data requirement in that a no-effect level was determined.

(3) **Repairability:** N/A

15. **COMPLETION OF ONE-LINER:** Yes; May 5, 1991.

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ONE LINER SHEET

Shaughnessey No. 111601 Chemical Name Oxyfluorfen Chemical Class _____ Page 1 of 1

Study/Species/Lab Succession	Chemical % Active	Group	Dose(ppm)	Effected/Parameters	Mort. (%)	%CH2 Inh	Reviewer/ Date	Validation Status
Avian Reproduction,		Group	Dose(ppm)	Effected/Parameters	Mort. (%)	%CH2 Inh		
Species: Mallard (Anas platyrhynchos)		Control	0	none	0	--		
	72.5	Treatment	100	none	3	--	Lincer/ 5-5-91	Suppl.
Lab: Borriston		Treatment II						
		Treatment III						
MRID # Acc: 4153012-05		Study Duration:						
		Comments:						

May 5, 1991

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analysis of [redacted] data

General Linear Models Procedure

Dependent Variable: RESPONSE
Weight: WT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	9134.07261154	9134.07261154	10.23	0.0064
Error	14	12505.08482110	893.22034436		
Corrected Total	15	21639.15743264			

R-Square	C.V.	Root MSE	RESPONSE Mean
0.422109	34.43544	29.88679214	86.79078901

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	1	9134.07261154	9134.07261154	10.23	0.0064

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	1	9134.07261154	9134.07261154	10.23	0.0064

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		89.21180639 B	86.10	0.0001	1.03613809
TRT	CONTROL	-4.53464430 B	-3.20	0.0064	1.41804594
	100 ppm	0.00000000 B	.	.	.

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

analysis of nh/el data

General Linear Models Procedure

Dependent Variable: RESPONSE
Weight: WT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	13917.50215625	13917.50215625	2.38	0.1456
Error	14	82029.50853379	5859.25060956		
Corrected Total	15	95947.01069005			

R-Square	C.V.	Root MSE	RESPONSE Mean
0.145054	140.6564	76.54574194	54.42036746

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	1	13917.50215625	13917.50215625	2.38	0.1456

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	1	13917.50215625	13917.50215625	2.38	0.1456

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		52.12725981 B	24.92	0.0001	2.09185101
TRT	CONTROL	4.53269272 B	1.54	0.1456	2.94101112
	100 ppm	0.00000000 B	.	.	.

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

analysis of nh/le data

General Linear Models Procedure

Dependent Variable: RESPONSE
Weight: WT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	9977.33990751	9977.33990751	1.09	0.3137
Error	14	127893.88832057	9135.27773718		
Corrected Total	15	137871.22822807			

R-Square	C.V.	Root MSE	RESPONSE Mean
0.072367	146.5350	95.57864687	65.22582767

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	1	9977.33990751	9977.33990751	1.09	0.3137

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	1	9977.33990751	9977.33990751	1.09	0.3137

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		63.02275903 B	21.49	0.0001	2.93290921
TRT	CONTROL	4.26444211 B	1.05	0.3137	4.08052194
	100 ppm	0.00000000 B	.	.	.

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

analysis of level data

General Linear Models Procedure

Dependent Variable: RESPONSE
Weight: WT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	54.41960872	54.41960872	0.03	0.8752
Error	14	29800.54103414	2128.61007387		
Corrected Total	15	29854.96064286			

R-Square	C.V.	Root MSE	RESPONSE Mean
0.001823	55.00591	46.13686242	83.87619326

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	1	54.41960872	54.41960872	0.03	0.8752

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	1	54.41960872	54.41960872	0.03	0.8752

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		84.03757093 B	59.83	0.0001	1.40455042
TRT	CONTROL	-0.31252915 B	-0.16	0.8752	1.95461344
	100 ppm	0.00000000 B	.	.	.

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

analysis of ve/es data

General Linear Models Procedure

Dependent Variable: RESPONSE
Weight: WT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	5913.66139214	5913.66139214	0.91	0.3560
Error	14	90875.01249839	6491.07232131		
Corrected Total	15	96788.67389053			

R-Square	C.V.	Root MSE	RESPONSE Mean
0.061099	112.1017	80.56719135	71.86971841

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	1	5913.66139214	5913.66139214	0.91	0.3560

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	1	5913.66139214	5913.66139214	0.91	0.3560

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		70.30967220 B	30.62	0.0001	2.29630302
TRT	CONTROL	3.07936336 B	0.95	0.3560	3.22619739
	100 ppm	0.00000000 B	.	.	.

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

analysis of [redacted] data

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General Linear Models Procedure

Dependent Variable: RESPONSE
Weight: WT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	51.11135307	51.11135307	0.17	0.6843
Error	14	4150.33639759	296.45259983		
Corrected Total	15	4201.44775066			

R-Square	C.V.	Root MSE	RESPONSE Mean
0.012165	23.37698	17.21779893	73.65279166

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	1	51.11135307	51.11135307	0.17	0.6843

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	1	51.11135307	51.11135307	0.17	0.6843

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		73.51382760 B	156.24	0.0001	0.47053003
TRT	CONTROL	0.27468460 B	0.42	0.6843	0.66153566
	100 ppm	0.00000000 B	.	.	.

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

analysis of hs data

General Linear Models Procedure

Dependent Variable: RESP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	1.62694760	1.62694760	2.08	0.1711
Error	14	10.94282828	0.78163059		
Corrected Total	15	12.56977588			

R-Square	C.V.	Root MSE	RESP Mean
0.129433	8.428521	0.88409875	10.48937029

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	1	1.62694760	1.62694760	2.08	0.1711

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	1	1.62694760	1.62694760	2.08	0.1711

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		10.17049065 B	32.54	0.0001	0.31257611
TRT	CONTROL	0.63775928 B	1.44	0.1711	0.44204937
	100 ppm	0.00000000 B	.	.	.

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

square root transformation

analysis of nh data

General Linear Models Procedure

Dependent Variable: RESP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	1.93248732	1.93248732	2.44	0.1403
Error	14	11.07278697	0.79091335		
Corrected Total	15	13.00527428			

R-Square	C.V.	Root MSE	RESP Mean
0.148593	8.450711	0.88933310	10.52376693

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	1	1.93248732	1.93248732	2.44	0.1403

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	1	1.93248732	1.93248732	2.44	0.1403

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		10.17623210 B	32.36	0.0001	0.31442673
TRT	CONTROL	0.69506966 B	1.56	0.1403	0.44466655
	100 ppm	0.00000000 B	.	.	.

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

square root transformation

analysis of le data

General Linear Models Procedure

Dependent Variable: RESP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.61828306	0.61828306	1.08	0.3168
Error	14	8.03013501	0.57358107		
Corrected Total	15	8.64841808			

R-Square	C.V.	Root MSE	RESP Mean
0.071491	6.475881	0.75735135	11.69495506

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	1	0.61828306	0.61828306	1.08	0.3168

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	1	0.61828306	0.61828306	1.08	0.3168

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		11.49837762 B	42.94	0.0001	0.26776414
TRT	CONTROL	0.39315489 B	1.04	0.3168	0.37867568
	100 ppm	0.00000000 B	.	.	.

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

square root transformation

analysis of ve data

General Linear Models Procedure

Dependent Variable: RESP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.60514564	0.60514564	0.96	0.3432
Error	14	8.80009750	0.62857839		
Corrected Total	15	9.40524314			

R-Square	C.V.	Root MSE	RESP Mean
0.064341	6.728330	0.79282936	11.78344908

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	1	0.60514564	0.60514564	0.96	0.3432

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	1	0.60514564	0.60514564	0.96	0.3432

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		11.58897131 B	41.34	0.0001	0.28030751
TRT	CONTROL	0.38895554 B	0.98	0.3432	0.39641468
	100 ppm	0.00000000 B	.	.	.

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

square root transformation

analysis of es data

General Linear Models Procedure

Dependent Variable: RESP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.10226395	0.10226395	0.15	0.7009
Error	14	9.31227185	0.66516227		
Corrected Total	15	9.41453580			

R-Square	C.V.	Root MSE	RESP Mean
0.010862	6.543490	0.81557481	12.46391157

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	1	0.10226395	0.10226395	0.15	0.7009

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	1	0.10226395	0.10226395	0.15	0.7009

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		12.38396473 B	42.95	0.0001	0.28834924
TRT	CONTROL	0.15989367 B	0.39	0.7009	0.40778741
	100 ppm	0.00000000 B	.	.	.

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

square root transformation

analysis of ec data.

General Linear Models Procedure

Dependent Variable: RESP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.03289490	0.03289490	0.05	0.8232
Error	14	8.88863593	0.63490257		
Corrected Total	15	8.92153083			

R-Square	C.V.	Root MSE	RESP Mean
0.003687	79.48610	0.79680773	1.00244916

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	1	0.03289490	0.03289490	0.05	0.8232

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	1	0.03289490	0.03289490	0.05	0.8232

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		1.047791543 B	3.72	0.0023	0.28171408
TRT	CONTROL	-0.090684762 B	-0.23	0.8232	0.39840387
	100 ppm	0.000000000 B	.	.	.

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

square root transformation

analysis of el data

General Linear Models Procedure

Dependent Variable: RESP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.09405621	0.09405621	0.13	0.7231
Error	14	10.07318193	0.71951299		
Corrected Total	15	10.16723814			

R-Square	C.V.	Root MSE	RESP Mean
0.009251	6.529965	0.84824112	12.98997874

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	1	0.09405621	0.09405621	0.13	0.7231

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	1	0.09405621	0.09405621	0.13	0.7231

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		12.91330728 B	43.06	0.0001	0.29989852
TRT	CONTROL	0.15334293 B	0.36	0.7231	0.42412056
	100 ppm	0.00000000 B	.	.	.

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

square root transformation

KBN - EPA STUDY
COMPOUND: RH-2915 TECHNICAL, BOB~~WHITE QUAIL~~ Mallard Duck

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ANALYSIS OF FOOD CONSUMPTION DATA
REPEATED MEASURES

GENERAL LINEAR MODELS PROCEDURE
REPEATED MEASURES ANALYSIS OF VARIANCE
TESTS OF HYPOTHESES FOR BETWEEN SUBJECTS EFFECTS

SOURCE	DF	TYPE III SS	MEAN SQUARE	F VALUE	PR > F
TRT	1	19.57502976	19.57502976	4.14	0.0613
ERROR	14	66.22541667	4.73038690		

analysis of food consumption data

General Linear Models Procedure

Dependent Variable: RESP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	411.07562500	411.07562500	4.14	0.0613
Error	14	1390.73375000	99.33812500		
Corrected Total	15	1801.80937500			

R-Square	C.V.	Root MSE	RESP Mean
0.228146	13.59850	9.96685131	73.29375000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	1	411.07562500	411.07562500	4.14	0.0613

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	1	411.07562500	411.07562500	4.14	0.0613

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		68.22500000 B	19.36	0.0001	3.52381407
TRT	CONTROL	10.13750000 B	2.03	0.0613	4.98342565
	100 ppm	0.00000000 B	.	.	.

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

analysis of food consumption data

WEEK=12

General Linear Models Procedure

Dependent Variable: RESP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	5.29000000	5.29000000	12.12	0.0037
Error	14	6.11000000	0.43642857		
Corrected Total	15	11.40000000			

R-Square	C.V.	Root MSE	RESP Mean
0.464035	16.51569	0.66062741	4.00000000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	1	5.29000000	5.29000000	12.12	0.0037

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	1	5.29000000	5.29000000	12.12	0.0037

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		3.425000000 B	14.66	0.0001	0.23356706
TRT	CONTROL	1.150000000 B	3.48	0.0037	0.33031370
	100 ppm	0.000000000 B	.	.	.

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

analysis of food consumption data

WEEK=20

General Linear Models Procedure

Dependent Variable: RESP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	1.89062500	1.89062500	10.88	0.0053
Error	14	2.43375000	0.17383929		
Corrected Total	15	4.32437500			

R-Square	C.V.	Root MSE	RESP Mean
0.437202	10.63963	0.41694039	3.91875000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	1	1.89062500	1.89062500	10.88	0.0053

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	1	1.89062500	1.89062500	10.88	0.0053

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		3.575000000 B	24.25	0.0001	0.14741069
TRT	CONTROL	0.687500000 B	3.30	0.0053	0.20847019
	100 ppm	0.000000000 B	.	.	.

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

analysis of 14-day survivor weight data

General Linear Models Procedure

Dependent Variable: RESP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	30	155530.62525000	4713.04925000	18.62	0.0001
Error	126	31889.12450001	253.08828968		
Corrected Total	159	187419.74975001			

R-Square	C.V.	Root MSE	RESP Mean
0.829852	6.758859	15.90874884	235.37625000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	1	300.85225000	300.85225000	1.19	0.2777
WEEK	9	110578.81350000	12286.53483333	48.55	0.0001
CAGE(TRT)	14	33492.04550000	2392.28896429	9.45	0.0001
TRT*WEEK	9	11158.91400000	1239.87933333	4.90	0.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	1	300.85225000	300.85225000	1.19	0.2777
WEEK	9	110578.81350000	12286.53483333	48.55	0.0001
CAGE(TRT)	14	33492.04550000	2392.28896429	9.45	0.0001
TRT*WEEK	9	11158.91400000	1239.87933333	4.90	0.0001

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		209.3950000 B	28.55	0.0001	7.33357086
TRT	CONTROL	14.0225000 B	1.35	0.1788	10.37123537
	100 ppm	0.0000000 B	.	.	.
WEEK	1	-18.5625000 B	-2.33	0.0212	7.95437442
	2	-62.7500000 B	-7.89	0.0001	7.95437442
	3	-14.1500000 B	-1.78	0.0777	7.95437442
	4	-16.2875000 B	-2.05	0.0427	7.95437442
	5	27.9250000 B	3.51	0.0006	7.95437442
	6	1.1250000 B	0.14	0.8878	7.95437442
	7	24.2625000 B	3.05	0.0028	7.95437442
	8	19.3125000 B	2.43	0.0166	7.95437442
	9	23.9750000 B	3.01	0.0031	7.95437442
	10	0.0000000 B	.	.	.
CAGE(TRT)	45 CONTROL	28.8300000 B	4.05	0.0001	7.11460877
	46 CONTROL	-8.4900000 B	-1.19	0.2350	7.11460877
	47 CONTROL	-7.7300000 B	-1.09	0.2793	7.11460877
	48 CONTROL	18.6400000 B	2.62	0.0099	7.11460877
	49 CONTROL	12.1200000 B	1.70	0.0909	7.11460877
	50 CONTROL	4.9800000 B	0.70	0.4852	7.11460877

analysis of 14-day survivor weight data

WEEK=1

General Linear Models Procedure

Dependent Variable: RESP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	3769.96000000	3769.96000000	18.18	0.0008
Error	14	2903.44000000	207.38857143		
Corrected Total	15	6673.40000000			

R-Square	C.V.	Root MSE	RESP Mean
0.564923	6.126778	14.40099203	235.05000000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	1	3769.96000000	3769.96000000	18.18	0.0008

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	1	3769.96000000	3769.96000000	18.18	0.0008

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		219.7000000 B	43.15	0.0001	5.09151956
TRT	CONTROL	30.7000000 B	4.26	0.0008	7.20049601
	100 ppm	0.0000000 B	.	.	.

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

analysis of 14-day survivor weight data

WEEK=4

General Linear Models Procedure

Dependent Variable: RESP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	2711.80562500	2711.80562500	7.19	0.0179
Error	14	5280.25375000	377.16098214		
Corrected Total	15	7992.05937500			

R-Square	C.V.	Root MSE	RESP Mean
0.339312	9.294114	19.42063290	208.95625000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	1	2711.80562500	2711.80562500	7.19	0.0179

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	1	2711.80562500	2711.80562500	7.19	0.0179

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		221.9750000 B	32.33	0.0001	6.86623061
TRT	CONTROL	-26.0375000 B	-2.68	0.0179	9.71031645
	100 ppm	0.0000000 B	.	.	.

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

WEEK=5

General Linear Models Procedure

Dependent Variable: RESP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	2366.82250000	2366.82250000	4.94	0.0432
Error	14	6703.78750000	478.84196429		
Corrected Total	15	9070.61000000			

R-Square	C.V.	Root MSE	RESP Mean
0.260933	8.614293	21.88245791	254.02500000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	1	2366.82250000	2366.82250000	4.94	0.0432

Source	DF	Type III SS	Mean Square	F Value	Pr >
TRT	1	2366.82250000	2366.82250000	4.94	0.0432

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		266.1875000 B	34.41	0.0001	7.73661719
TRT	CONTROL	-24.3250000 B	-2.22	0.0432	10.94122896
	100 ppm	0.0000000 B	.	.	

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

General Linear Models Procedure

Dependent Variable: THICK

Tests of Hypotheses using the Type III MS for CAGE(TRT) as an error term

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	1	0.00008879	0.00008879	0.08	0.7828

COMPOUND: RH-2915 TECHNICAL, ~~BOBWHITE QUAIL~~ Mallard Duck

COVARIATE ANALYSIS OF ADULT BODY WEIGHT DATA

ADDED TRT*SEX INTERACTION

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: POST

TESTS OF HYPOTHESES USING THE TYPE III MS FOR CAGE(TRT) AS AN ERROR TERM

SOURCE	DF	TYPE III SS	MEAN SQUARE	F VALUE	PR > F
TRT	1	3707.05271422	3707.05271422	0.35	0.5627

TESTS OF HYPOTHESES USING THE TYPE III MS FOR SEX*CAGE(TRT) AS AN ERROR TERM

SOURCE	DF	TYPE III SS	MEAN SQUARE	F VALUE	PR > F
TRT*SEX	1	19691.68581258	19691.68581258	3.63	0.0775

ANALYSIS OF EGG/EL DATA
TRANSFORMED, WITH WEIGHTS

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: RESPONSE
WEIGHT: WT

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F
MODEL	1	328.51861035	328.51861035	0.17	0.6901
ERROR	14	27749.93964205	1982.13854586		
CORRECTED TOTAL	15	28078.45825240			

R-SQUARE	C.V.	ROOT MSE	RESPONSE MEAN
0.011700	993.9020	44.52121456	4.47943708

SOURCE	DF	TYPE I SS	MEAN SQUARE	F VALUE	PR > F
TRT	1	328.51861035	328.51861035	0.17	0.6901

SOURCE	DF	TYPE III SS	MEAN SQUARE	F VALUE	PR > F
TRT	1	328.51861035	328.51861035	0.17	0.6901

PARAMETER		ESTIMATE	T FOR H0: PARAMETER=0	PR > |T|	STD ERROR OF ESTIMATE
INTERCEPT		4.831746114 B	3.97	0.0014	1.21668097
TRT	CONTROL	-0.696394958 B	-0.41	0.6901	1.71057702
	100 PPM	0.000000000 B	.	.	.

NOTE: THE X'X MATRIX HAS BEEN FOUND TO BE SINGULAR AND A GENERALIZED INVERSE WAS USED TO SOLVE THE NORMAL EQUATIONS. ESTIMATES FOLLOWED BY THE LETTER 'B' ARE BIASED, AND ARE NOT UNIQUE ESTIMATORS OF THE PARAMETERS.