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also page 134

MRID No. 442448-01

DATA EVALUATION RECORD
AQUATIC INVERTEBRATE LIFE CYCLE TEST
GUIDELINE 72-4

1. **CHEMICAL:** Diazinon PC Code No.: 057801

2. **TEST MATERIAL:** ¹⁴C-Diazinon - chemical purity of 99.8%
Diazinon - purity of 87.3%

3. **CITATION:**

Author: J.V. Sousa
Title: Diazinon - Chronic Toxicity to Mysids
(Mysidopsis bahia) Under Flow-Through
Conditions

Study Completion Date: March 18, 1997

Laboratory: Springborn Laboratories, Inc., Wareham,
MA

Sponsor: Novartis Crop Protection, Inc.,
Greensboro, NC

Laboratory Report ID: 97-2-6882

MRID No.: 442448-01

DP Barcode: D240486 - not closed out

4. **REVIEWED BY:** Mark Mossler, M.S., Toxicologist
Golder Associates Inc. *P. Mossler by per tick protocol*

Signature: *[Signature]*

Date: 3/9/99

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APPROVED BY: Pim Kosalwat, Ph.D., Senior Scientist,
Golder Associates Inc.

Signature: *P. Kosalwat*

Date: 3/9/99

5. **APPROVED BY:**

Signature: *[Signature]*

Date: 5/17/99

6. **STUDY PARAMETERS:**

Age of Test Organism: ≤24 hours
Definitive Test Duration: 28 days
Study Method: Flow-Through
Type of Concentrations: Mean Measured

7. **CONCLUSIONS:** This study is scientifically sound and fulfills the guideline requirements for a saltwater invertebrate life-cycle test.

Results Synopsis: Most sensitive endpoint-growth (dry weight)

✓ NOEC: 0.23 ppb ai ✓ LOEC: 0.42 ppb ai MATC: 0.31 ppb ai



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LOEC's for specific endpoints:

Neonates Produced: >1.6 ppb ai
 Mysid Survival: >1.6 ppb ai
 Growth (weight): 0.42 ppb ai
 Growth (length): 1.6 ppb ai

8. ADEQUACY OF THE STUDY:

A. Classification: Core

B. Rationale: N/A

C. Repairability: N/A

9. **GUIDELINE DEVIATIONS:** Since an EPA SEP for the mysid life cycle test does not exist, ASTM E1191-90 (1990) was used as a guidance in this evaluation. The only deviation from the ASTM's guidelines is that the amount of food given during each feeding period was not reported.

10. SUBMISSION PURPOSE:**11. MATERIALS AND METHODS:****A. Test Organisms/Acclimation**

Guideline Criteria	Reported Information
<u>Species</u> Mysidopsis spp.	Mysidopsis bahia
<u>Source</u> Laboratory, commercial, or wild stock.	In-house cultures
<u>Parental Acclimation Conditions</u> Parental stock must be maintained separately from the brood culture in dilution water and under test conditions.	Held under test conditions in test dilution water
<u>Parental Acclimation Period</u> At least 14 days.	Continuous
<u>Age of Parental Stock</u> At least 10-12 days old at the beginning of the acclimation period.	Not reported

Guideline Criteria	Reported Information
<u>Food</u> Brine shrimp nauplii in possible combination with rotifers and/or algae.	Newly-hatched <i>Artemia salina</i> nauplii at least twice daily. A fatty acid supplement was added every other day after pairing. ✓
<u>Food Concentration</u> 150 brine shrimp nauplii per mysid per day.	Unspecified ✓
Were mysids in good health during acclimation period?	Not reported

B. Test System

Guideline Criteria	Reported Information
<u>Test Water</u> Unpolluted saltwater that has been tested for contaminants, or appropriate reconstituted water.	Artificial seawater with a salinity of 25-26 parts per thousand. The water was also filtered and aerated. ✓
<u>Water Temperature</u> 27 ±2°C.	24-26°C ✓
<u>pH</u>	7.7 to 8.3
<u>Dissolved Oxygen</u> ≥60% throughout test.	≥68% of saturation during the test ✓
<u>Test Vessels or Compartments</u> 1. <u>Material</u> : Glass, No. 316 stainless steel, or perfluorocarbon plastics 2. <u>Size</u> : 250 mL with 200 mL fill volume is preferred; 100 mL with 80 mL fill volume is acceptable.	 1. Glass ✓ 2. 20-L glass aquaria that contained holding (1200 mL volume) or mating (200 mL) chambers - fluctuating fill volume ✓

Guideline Criteria	Reported Information
<u>Type of Dilution System</u> Must provide reproducible supply of toxicant. Intermittent flow proportional diluters or continuous flow serial diluters should be used.	Intermittent-flow proportional diluter
<u>Flow Rate</u> At least 5 volume additions per 24 hours.	7.5 volume additions per 24 hours
<u>Aeration</u> Dilution water should be vigorously aerated, but the test tanks should not be aerated.	Solutions were not aerated during testing
<u>Photoperiod</u> 16 hours light, 8 hours dark	16 hours light, 8 hours dark
<u>Solvents</u> Not to exceed 0.5 mL/L for static tests or 0.1 mL/L for flow-through tests. Acceptable solvents are dimethylformamide, triethylene glycol, methanol, acetone and ethanol.	Solvent: acetone Maximum conc.: 6.5 µL/L

C. Test Design

Guideline Criteria	Reported Information
<u>Duration</u>	28 days
<u>Nominal Concentrations</u> Control(s) and at least 5 test concentrations; dilution factor not less than 50%.	Dilution water and solvent controls and five treatment concentrations: 0.13, 0.25, 0.5, 1.0, and 2.0 µg active ingredient/L (ppb ai)

Guideline Criteria	Reported Information
<u>Number of Test Organisms</u> 60 mysids/level; At least two test replicate vessels, each containing two chambers, with each chamber containing 15 mysids until 10 or 14 days after initiation. After sexing, at least 10 mated pairs per replicate.	60 mysids/level; 2 replicate test vessels with 30 mysids each. Each vessel contained two retention chambers with 15 mysids each. After 15 days, 10 mated pairs were placed in 10 reproduction chambers. The remaining shrimp (up to 20) were housed in a single chamber from day 15 to day 28 (termination) of the test
Test organisms randomly or impartially assigned to test vessels?	Impartially distributed
<u>Renewal</u> Parent mysids in all beakers must be transferred to containers with fresh test solution (< 4 hours old) three times each week (e.g. every Monday, Wednesday and Friday).	N/A
<u>Water Parameter Measurements</u> 1. Dissolved oxygen must be measured at each concentration at least once a week. 2. pH must be measured once a week in one test concentration and in one control. 3. Temperature should be monitored at least hourly throughout the test in one test chamber, and near the beginning, middle and end of the test in all test chambers.	1. Dissolved oxygen (DO) was measured daily during testing in each aquarium. 2. The pH was measured in the same manner as the DO. 3. Temperature was measured daily in each aquarium and continuously in one negative control replicate vessel.
<u>Chemical Analysis</u> Needed if chemical was volatile, insoluble, or known to absorb, if precipitate formed, if containers were not steel or glass, or if flow-through system was used.	Samples removed and analyzed radiometrically on days 0, 7, and 14 (both replicates) and on days 21 and 28 (one replicate). Samples of both replicates of the 2 ppb ai group were also analyzed for each time period using GC.

12. REPORTED RESULTS**A. General Results**

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	Yes
<u>Control Mortality</u> ≤30% between pairing and test termination.	At termination: 10% and 8% for the negative and solvent controls, respectively.
Did more than 25% of the paired female mysids in each control not produce young or was the mean control offspring production less than three?	Not reported
<u>Data Endpoints</u> - Survival of first-generation mysids, - Number of young produced per female, - Dry weight (required) and length (optional) of each first generation mysid alive at the end of the test, - Observations of other effects or clinical signs.	-Survival of parental mysids. -Mean number of offspring per female per reproductive day. -Mean dry weight and length of surviving first-generation mysids separated by sex. -Clinical observation of parental mysids and offspring
Raw data included?	Yes

Effects Data

Concentration* (ppb ai)		Day 28 Surv. (%)	Avg. Offspring/ Female/ Repro. Day	Male/ Female Length (mm)	Male/ Female Dry weight (mg)
Nominal	Measured (RSD)				
Control	<0.014 (N/A)	90	0.95	7.1/ 7.3	0.82/ 1.1
Solvent Control	<0.014 (N/A)	92	0.72	7.3/ 7.5	0.84/ 1.1
0.13	0.13 (7.7%)	75	1.1	7.4/ 7.4	0.80/ 0.97
0.25	0.23 (9.6%)	87	0.70	7.5/ 7.6	0.78/ 1.0
0.5	0.42 (6.4%)	88	0.77	7.1/ 7.3	0.75/ 1.1
1.0	0.80 (6.0%)	82	0.59	7.3/ 7.4	0.72/ 0.96
2.0	1.6 (7.5%)	72	0.70	6.7/ 6.9	0.67/ 0.76

*The procedural recovery for the radiometric assay was reported to be 90.5%.

Toxicity Observations: No observations were reported.

B. Statistical Results: The results are based on mean measured concentrations and comparisons were made to the pooled control data.

Endpoint	Method	NOEC (ppb ai)	LOEC (ppb ai)
Survival	Williams' Test	1.6	>1.6
Reproduction	"	1.6	>1.6
Length	"	0.80	1.6
Dry Weight	"	0.23	0.42

13. **VERIFICATION OF STATISTICAL RESULTS:** Treatment group values were compared to solvent control group values.

Endpoint	Method	NOEC (ppb ai)	LOEC (ppb ai)
Survival	Williams' Test	1.6	>1.6
Reproduction	"	1.6	>1.6
Length	Dunnett's Test	0.80	1.6
Dry Weight	"	0.23	0.42

14. **REVIEWER'S COMMENTS:** This study is scientifically sound, fulfills the guideline requirements for a mysid life-cycle test, and can be classified as Core. Based on the most sensitive endpoint (dry weight), the NOEC and LOEC are 0.23 and 0.42 ppb ai, respectively. The geometric mean MATC is 0.31 ppb ai.

Terminal mysid survival
File: mys Transform: ARC SINE(SQUARE ROOT(Y))

WILLIAMS TEST (Isotonic regression model)			TABLE 1 OF 2		
GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Sol. Con.	2	0.917	1.315	1.315
2	0.13 ppb ai	2	0.750	1.059	1.172
3	0.23 ppb ai	2	0.867	1.228	1.172
4	0.42 ppb ai	2	0.883	1.229	1.172
5	0.80 ppb ai	2	0.816	1.138	1.138
6	1.6 ppb ai	2	0.717	1.014	1.014

Terminal mysid survival
File: mys Transform: ARC SINE(SQUARE ROOT(Y))

WILLIAMS TEST (Isotonic regression model)			TABLE 2 OF 2		
IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Sol. Con.	1.315				
0.13 ppb ai	1.172	0.783		1.94	k= 1, v= 6
0.23 ppb ai	1.172	0.783		2.06	k= 2, v= 6
0.42 ppb ai	1.172	0.783		2.10	k= 3, v= 6
0.80 ppb ai	1.138	0.967		2.12	k= 4, v= 6
1.6 ppb ai	1.014	1.653		2.13	k= 5, v= 6

s = 0.182
Note: df used for table values are approximate when v > 20.

NoEC = 1.6 ppb ai
LoEC = >1.6 ppb ai

Mysid reproduction (per repro. day)
 File: mys Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Sol. Con.	2	0.719	0.719	0.896
2	0.13 ppb ai	2	1.073	1.073	0.896
3	0.23 ppb ai	2	0.700	0.700	0.737
4	0.42 ppb ai	2	0.774	0.774	0.737
5	0.80 ppb ai	2	0.586	0.586	0.645
6	1.6 ppb ai	2	0.705	0.705	0.645

Mysid reproduction (per repro. day)
 File: mys Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Sol. Con.	0.896				
0.13 ppb ai	0.896	0.876		1.94	k= 1, v= 6
0.23 ppb ai	0.737	0.088		2.06	k= 2, v= 6
0.42 ppb ai	0.737	0.088		2.10	k= 3, v= 6
0.80 ppb ai	0.645	0.367		2.12	k= 4, v= 6
1.6 ppb ai	0.645	0.367		2.13	k= 5, v= 6

s = 0.202

Note: df used for table values are approximate when v > 20.

NOEC = 1.6 ppb ai

LOEC = > 1.6 ppb ai

Male mysid length & dry weight

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DIAZINON - MYSID CHRONIC TEST
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TRT=1
= 501. Cos.

Variable	N	Mean	Std Dev	Minimum	Maximum
LENGTH	28	7.3285714	0.3557539	6.8000000	8.2000000
WEIGHT	28	0.8389286	0.1326465	0.5900000	1.2100000

TRT=2
= 0.23 ppb ai

Variable	N	Mean	Std Dev	Minimum	Maximum
LENGTH	13	7.3692308	0.2750291	6.7000000	7.6000000
WEIGHT	13	0.8038462	0.0665255	0.6900000	0.8900000

TRT=3
= 0.23 ppb ai

Variable	N	Mean	Std Dev	Minimum	Maximum
LENGTH	23	7.4608696	0.3486847	6.8000000	8.2000000
WEIGHT	23	0.7773913	0.1291658	0.5400000	1.0100000

TRT=4
= 0.42 ppb ai

Variable	N	Mean	Std Dev	Minimum	Maximum
LENGTH	24	7.0750000	0.4152003	5.9000000	7.9000000
WEIGHT	24	0.7516667	0.0873607	0.5300000	0.8900000

TRT=5
= 0.80 ppb ai

Variable	N	Mean	Std Dev	Minimum	Maximum
LENGTH	21	7.3047619	0.3993447	6.0000000	8.0000000
WEIGHT	20	0.7230000	0.1010003	0.4700000	0.9000000

TRT=6
= 1.6 ppb ai

Variable	N	Mean	Std Dev	Minimum	Maximum
LENGTH	17	6.7000000	0.2872281	6.2000000	7.1000000
WEIGHT	17	0.6652941	0.0817861	0.5500000	0.9100000

DIAZINON - MYSID CHRONIC TEST
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General Linear Models Procedure
Class Level Information

Class	Levels	Values
TRT	6	1 2 3 4 5 6
REP	2	1 2

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Number of observations in data set = 126

Group	Obs	Dependent Variables
1	126	LENGTH
2	125	WEIGHT

NOTE: Variables in each group are consistent with respect to the presence or absence of missing values.

DIAZINON - MYSID CHRONIC TEST
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General Linear Models Procedure

Dependent Variable: LENGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	7.6648289	1.2774715	10.12	0.0001
Error	119	15.0155680	0.1261812		
Corrected Total	125	22.6803968			
R-Square	C.V.	Root MSE	LENGTH Mean		
0.337950	4.920053	0.3552	7.2198		

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	5	7.2062552	1.4412510	11.42	0.0001
REP	1	0.4585736	0.4585736	3.63	0.0590
Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	7.1043803	1.4208761	11.26	0.0001
REP	1	0.4585736	0.4585736	3.63	0.0590

DIAZINON - MYSID CHRONIC TEST
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General Linear Models Procedure
Least Squares Means

TRT	LENGTH LSMEAN	Pr > T	H0: LSMEAN(i)=LSMEAN(j)	1	2	3	4	5	6
1	7.32857143	1		0.5404	0.1795	0.0179	0.8843	0.0001	
2	7.40255491	2	0.5404		0.6245	0.0122	0.4816	0.0001	
3	7.46356033	3	0.1795	0.6245		0.0005	0.1647	0.0001	
4	7.09047192	4	0.0179	0.0122	0.0005		0.0377	0.0010	
5	7.31360300	5	0.8843	0.4816	0.1647	0.0377		0.0001	
6	6.71092136	6	0.0001	0.0001	0.0001	0.0010	0.0001		

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

DIAZINON - MYSID CHRONIC TEST
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General Linear Models Procedure

Bonferroni (Dunn) T tests for variable: LENGTH

NOTE: This test controls the type I experimentwise error rate but generally has a higher type II error rate than Tukey's for all pairwise comparisons.

Alpha= 0.05 Confidence= 0.95 df= 119 MSE= 0.126181
Critical Value of T= 2.99561

Comparisons significant at the 0.05 level are indicated by '***'.

TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
3 - 2	-0.27759	0.09164	0.46087	
3 - 1	-0.16715	0.13230	0.43175	
3 - 5	-0.16506	0.15611	0.47728	
3 - 4	0.07537	0.38587	0.69637	***
3 - 6	0.42052	0.76087	1.10122	***
2 - 3	-0.46087	-0.09164	0.27759	
2 - 1	-0.31647	0.04066	0.39779	
2 - 5	-0.31106	0.06447	0.44000	
2 - 4	-0.07221	0.29423	0.66067	
2 - 6	0.27718	0.66923	1.06129	***
1 - 3	-0.43175	-0.13230	0.16715	
1 - 2	-0.39779	-0.04066	0.31647	
1 - 5	-0.28337	0.02381	0.33099	
1 - 4	-0.04243	0.25357	0.54958	
1 - 6	0.30139	0.62857	0.95575	***
5 - 3	-0.47728	-0.15611	0.16506	
5 - 2	-0.44000	-0.06447	0.31106	
5 - 1	-0.33099	-0.02381	0.28337	
5 - 4	-0.08820	0.22976	0.54772	
5 - 6	0.25759	0.60476	0.95193	***
4 - 3	-0.69637	-0.38587	-0.07537	***
4 - 2	-0.66067	-0.29423	0.07221	
4 - 1	-0.54958	-0.25357	0.04243	
4 - 5	-0.54772	-0.22976	0.08820	
4 - 6	0.03768	0.37500	0.71232	***
6 - 3	-1.10122	-0.76087	-0.42052	***
6 - 2	-1.06129	-0.66923	-0.27718	***
6 - 1	-0.95575	-0.62857	-0.30139	***
6 - 5	-0.95193	-0.60476	-0.25759	***
6 - 4	-0.71232	-0.37500	-0.03768	***

DIAZINON - MYSID CHRONIC TEST

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General Linear Models Procedure

Dunnett's One-tailed T tests for variable: LENGTH

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 119 MSE= 0.126181
Critical Value of Dunnett's T= 2.287

Comparisons significant at the 0.05 level are indicated by '***'.

TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit
3 - 1	-0.09634	0.13230	0.36094
2 - 1	-0.23202	0.04066	0.31334
5 - 1	-0.25835	-0.02381	0.21073
4 - 1	-0.47958	-0.25357	-0.02756
6 - 1	-0.87838	-0.62857	-0.37876

*** - only level believed to be reduced due to treatment.

DIAZINON - MYSID CHRONIC TEST

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General Linear Models Procedure

Dependent Variable: WEIGHT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	0.4203118	0.0700520	6.19	0.0001
Error	118	1.3360130	0.0113221		
Corrected Total	124	1.7563248			
R-Square		C.V.	Root MSE	WEIGHT Mean	
0.239313		13.90850	0.1064	0.7650	

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	5	0.3847289	0.0769458	6.80	0.0001
REP	1	0.0355829	0.0355829	3.14	0.0788
Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	0.3761607	0.0752321	6.64	0.0001
REP	1	0.0355829	0.0355829	3.14	0.0788

DIAZINON - MYSID CHRONIC TEST

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General Linear Models Procedure
Least Squares Means

TRT	WEIGHT LSMEAN	Pr > T	H0: LSMEAN(i)=LSMEAN(j)	1	2	3	4	5	6
1	0.83892857	1	0.4771	0.0446	0.0061	0.0005	0.0001		
2	0.81318249	2	0.4771	0.3487	0.1224	0.0245	0.0004		
3	0.77814517	3	0.0446	0.3487	0.4781	0.1153	0.0016		
4	0.75600139	4	0.0061	0.1224	0.4781	0.3612	0.0106		
5	0.72646778	5	0.0005	0.0245	0.1153	0.3612	0.1005		
6	0.66835393	6	0.0001	0.0004	0.0016	0.0106	0.1005		

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

DIAZINON - MYSID CHRONIC TEST

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General Linear Models Procedure

Bonferroni (Dunn) T tests for variable: WEIGHT

NOTE: This test controls the type I experimentwise error rate but generally has a higher type II error rate than Tukey's for all pairwise comparisons.

Alpha= 0.05 Confidence= 0.95 df= 118 MSE= 0.011322
Critical Value of T= 2.99613

Comparisons significant at the 0.05 level are indicated by '***'.

TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
1 - 2	-0.07191	0.03508	0.14208	
1 - 3	-0.02818	0.06154	0.15125	
1 - 4	-0.00142	0.08726	0.17595	
1 - 5	0.02259	0.11593	0.20927	***
1 - 6	0.07561	0.17363	0.27166	***
2 - 1	-0.14208	-0.03508	0.07191	
2 - 3	-0.08417	0.02645	0.13708	
2 - 4	-0.05761	0.05218	0.16197	
2 - 5	-0.03273	0.08085	0.19442	
2 - 6	0.02109	0.13855	0.25601	***
3 - 1	-0.15125	-0.06154	0.02818	
3 - 2	-0.13708	-0.02645	0.08417	
3 - 4	-0.06730	0.02572	0.11875	
3 - 5	-0.04308	0.05439	0.15186	
3 - 6	0.01013	0.11210	0.21407	***
4 - 1	-0.17595	-0.08726	0.00142	
4 - 2	-0.16197	-0.05218	0.05761	
4 - 3	-0.11875	-0.02572	0.06730	
4 - 5	-0.06786	0.02867	0.12519	
4 - 6	-0.01469	0.08637	0.18743	
5 - 1	-0.20927	-0.11593	-0.02259	***
5 - 2	-0.19442	-0.08085	0.03273	
5 - 3	-0.15186	-0.05439	0.04308	
5 - 4	-0.12519	-0.02867	0.06786	
5 - 6	-0.04746	0.05771	0.16287	
6 - 1	-0.27166	-0.17363	-0.07561	***
6 - 2	-0.25601	-0.13855	-0.02109	***
6 - 3	-0.21407	-0.11210	-0.01013	***
6 - 4	-0.18743	-0.08637	0.01469	
6 - 5	-0.16287	-0.05771	0.04746	

DIAZINON - MYSID CHRONIC TEST

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General Linear Models Procedure

Dunnnett's One-tailed T tests for variable: WEIGHT

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 118 MSE= 0.011322
Critical Value of Dunnnett's T= 2.288

Comparisons significant at the 0.05 level are indicated by '***'.

Simultaneous

Simultaneous

TRT Comparison	Lower Confidence Limit	Difference Between Means	Upper Confidence Limit	
2 - 1	-0.11679	-0.03508	0.04663	
3 - 1	-0.13005	-0.06154	0.00698	
4 - 1	-0.15499	-0.08726	-0.01954	***
5 - 1	-0.18721	-0.11593	-0.04465	***
6 - 1	-0.24849	-0.17363	-0.09878	***

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM

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General Linear Models Procedure
Class Level Information

Class	Levels	Values
REP	2	1 2
TRT	6	1 2 3 4 5 6

Number of observations in data set = 126

Group	Obs	Dependent Variables
1	126	LENGTH
2	125	WEIGHT

NOTE: Variables in each group are consistent with respect to the presence or absence of missing values.

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM

11:04 Wednesday, March 3, 1999

General Linear Models Procedure

Dependent Variable: LENGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	10.733499	0.975773	9.31	0.0001
Error	114	11.946898	0.104797		
Corrected Total	125	22.680397			
R-Square	C.V.	Root MSE	LENGTH Mean		
0.473250	4.483813	0.3237	7.2198		

Source	DF	Type I SS	Mean Square	F Value	Pr > F
REP	1	0.5604485	0.5604485	5.35	0.0225
TRT	5	7.1043803	1.4208761	13.56	0.0001
REP*TRT	5	3.0686704	0.6137341	5.86	0.0001
Source	DF	Type III SS	Mean Square	F Value	Pr > F
REP	1	0.1367280	0.1367280	1.30	0.2558
TRT	5	7.3635647	1.4727129	14.05	0.0001
REP*TRT	5	3.0686704	0.6137341	5.86	0.0001

Tests of Hypotheses using the Type III MS for REP*TRT as an error term

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	7.3635647	1.4727129	2.40	0.1794

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM

11:04 Wednesday, March 3, 1999

General Linear Models Procedure
Least Squares MeansStandard Errors and Probabilities calculated using the Type III MS for
REP*TRT as an Error term

TRT	LENGTH LSMEAN	Pr > T i/j	HO: LSMEAN(i)=LSMEAN(j)	1	2	3	4	5	6
1	7.32857143	1	0.9824	0.5619	0.4495	0.9834	0.0398		
2	7.32166667	2	0.9824	0.6574	0.5924	0.9952	0.0941		
3	7.46553030	3	0.5619	0.6574	0.2284	0.5767	0.0241		
4	7.14666667	4	0.4495	0.5924	0.2284	0.4923	0.1119		
5	7.32361111	5	0.9834	0.9952	0.5767	0.4923	0.0499		
6	6.65714286	6	0.0398	0.0941	0.0241	0.1119	0.0499		

NOTE: To ensure overall protection level, only probabilities associated
with pre-planned comparisons should be used.

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM

11:04 Wednesday, March 3, 1999

General Linear Models Procedure

Dunnett's One-tailed T tests for variable: LENGTH

NOTE: This tests controls the type I experimentwise error for
comparisons of all treatments against a control.Alpha= 0.05 Confidence= 0.95 df= 5 MSE= 0.613734
Critical Value of Dunnett's T= 3.040

Comparisons significant at the 0.05 level are indicated by '****'.

TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit
3 - 1	-0.5379	0.1323	0.8025
2 - 1	-0.7587	0.0407	0.8400
5 - 1	-0.7113	-0.0238	0.6637
4 - 1	-0.9161	-0.2536	0.4090
6 - 1	-1.3609	-0.6286	0.1037

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM

11:04 Wednesday, March 3, 1999

General Linear Models Procedure

Dependent Variable: WEIGHT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	0.4895488	0.0445044	3.97	0.0001

Error 113 1.2667760 0.0112104

Corrected Total 124 1.7563248

R-Square	C.V.	Root MSE	WEIGHT Mean
0.278735	13.83970	0.1059	0.7650

Source	DF	Type I SS	Mean Square	F Value	Pr > F
REP	1	0.0441510	0.0441510	3.94	0.0496
TRT	5	0.3761607	0.0752321	6.71	0.0001
REP*TRT	5	0.0692371	0.0138474	1.24	0.2973

Source	DF	Type III SS	Mean Square	F Value	Pr > F
REP	1	0.0160922	0.0160922	1.44	0.2334
TRT	5	0.3720765	0.0744153	6.64	0.0001
REP*TRT	5	0.0692371	0.0138474	1.24	0.2973

Tests of Hypotheses using the Type III MS for REP*TRT as an error term

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	0.3720765	0.0744153	5.37	0.0443

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM

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General Linear Models Procedure
Least Squares MeansStandard Errors and Probabilities calculated using the Type III MS for
REP*TRT as an Error term

TRT	WEIGHT LSMEAN	Pr > T i/j	HO: LSMEAN(i)=LSMEAN(j)	1	2	3	4	5	6
1	0.83892857	1	0.4251	0.1315	0.0458	0.0199	0.0052		
2	0.80016667	2	0.4251	0.6673	0.3330	0.1558	0.0390		
3	0.77924242	3	0.1315	0.6673	0.4536	0.1732	0.0306		
4	0.75088889	4	0.0458	0.3330	0.4536	0.4574	0.0761		
5	0.72145833	5	0.0199	0.1558	0.1732	0.4574	0.2180		
6	0.66578571	6	0.0052	0.0390	0.0306	0.0761	0.2180		

NOTE: To ensure overall protection level, only probabilities associated
with pre-planned comparisons should be used.

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM

11:04 Wednesday, March 3, 1999

General Linear Models Procedure

Dunnett's One-tailed T tests for variable: WEIGHT

NOTE: This tests controls the type I experimentwise error for
comparisons of all treatments against a control.Alpha= 0.05 Confidence= 0.95 df= 5 MSE= 0.013847
Critical Value of Dunnett's T= 3.042

Comparisons significant at the 0.05 level are indicated by '****'.

Simultaneous Lower	Difference	Simultaneous Upper
-----------------------	------------	-----------------------

	TRT Comparison	Confidence Limit	Between Means	Confidence Limit	
2	- 1	-0.15521	-0.03508	0.08504	
3	- 1	-0.16226	-0.06154	0.03919	
4	- 1	-0.18683	-0.08726	0.01230	
5	- 1	-0.22072	-0.11593	-0.01114	***
6	- 1	-0.28369	-0.17363	-0.06358	***

Female mysid length + dry weight

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DIAZINON - MYSID CHRONIC TEST
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TRT=1

= 0.015 ppb ai

Variable	N	Mean	Std Dev	Minimum	Maximum
LENGTH	27	7.4518519	0.4107876	6.5000000	8.4000000
WEIGHT	27	1.0670370	0.1355279	0.7000000	1.3000000

TRT=2

= 0.13 ppb ai

Variable	N	Mean	Std Dev	Minimum	Maximum
LENGTH	32	7.4343750	0.3188785	6.8000000	8.2000000
WEIGHT	32	0.9659375	0.1697600	0.6800000	1.3500000

TRT=3

= 0.23 ppb ai

Variable	N	Mean	Std Dev	Minimum	Maximum
LENGTH	29	7.5827586	0.4226354	6.6000000	8.3000000
WEIGHT	29	1.0241379	0.2006866	0.5500000	1.4400000

TRT=4

= 0.42 ppb ai

Variable	N	Mean	Std Dev	Minimum	Maximum
LENGTH	29	7.3068966	0.4366521	6.3000000	7.9000000
WEIGHT	29	1.0668966	0.2177171	0.5600000	1.6200000

TRT=5

= 0.80 ppb ai

Variable	N	Mean	Std Dev	Minimum	Maximum
LENGTH	29	7.3689655	0.4235087	6.4000000	8.0000000
WEIGHT	29	0.9620690	0.1968571	0.5100000	1.3900000

TRT=6

= 1.6 ppb ai

Variable	N	Mean	Std Dev	Minimum	Maximum
LENGTH	26	6.8923077	0.3285399	6.3000000	7.6000000
WEIGHT	26	0.7607692	0.1503309	0.5400000	1.0400000

DIAZINON - MYSID CHRONIC TEST
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General Linear Models Procedure
Class Level Information

Class	Levels	Values
TRT	6	1 2 3 4 5 6
REP	2	1 2

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Number of observations in data set = 172

DIAZINON - MYSID CHRONIC TEST
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General Linear Models Procedure

Dependent Variable: LENGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	7.7184095	1.2864016	8.33	0.0001
Error	165	25.4706603	0.1543676		
Corrected Total	171	33.1890698			
R-Square		C.V.	Root MSE	LENGTH Mean	
0.232559		5.347222	0.3929	7.3477	

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	5	7.5889444	1.5177889	9.83	0.0001
REP	1	0.1294651	0.1294651	0.84	0.3611
Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	7.5844560	1.5168912	9.83	0.0001
REP	1	0.1294651	0.1294651	0.84	0.3611

DIAZINON - MYSID CHRONIC TEST
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General Linear Models Procedure

Dependent Variable: WEIGHT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	1.7661502	0.2943584	8.91	0.0001
Error	165	5.4534778	0.0330514		
Corrected Total	171	7.2196279			
R-Square		C.V.	Root MSE	WEIGHT Mean	
0.244632		18.60847	0.1818	0.9770	

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	5	1.7437085	0.3487417	10.55	0.0001
REP	1	0.0224417	0.0224417	0.68	0.4111
Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	1.7601013	0.3520203	10.65	0.0001
REP	1	0.0224417	0.0224417	0.68	0.4111

DIAZINON - MYSID CHRONIC TEST
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General Linear Models Procedure
Least Squares Means

TRT	LENGTH LSMEAN	Pr > T i/j	HO: LSMEAN(i)=LSMEAN(j)	1	2	3	4	5	6
1	7.44673710	1	.	0.9044	0.1844	0.1764	0.4666	0.0001	
2	7.43437500	2	0.9044	.	0.1309	0.1977	0.5232	0.0001	
3	7.58752063	3	0.1844	0.1309	.	0.0068	0.0366	0.0001	
4	7.30403935	4	0.1764	0.1977	0.0068	.	0.5244	0.0002	
5	7.36991792	5	0.4666	0.5232	0.0366	0.5244	.	0.0001	
6	6.89443228	6	0.0001	0.0001	0.0001	0.0002	0.0001	.	

TRT	WEIGHT LSMEAN	Pr > T i/j	HO: LSMEAN(i)=LSMEAN(j)	1	2	3	4	5	6
1	1.06916653	1	.	0.0315	0.3375	0.9823	0.0287	0.0001	
2	0.96593750	2	0.0315	.	0.2301	0.0299	0.9272	0.0001	
3	1.02215530	3	0.3375	0.2301	.	0.3390	0.2074	0.0001	
4	1.06808613	4	0.9823	0.0299	0.3390	.	0.0273	0.0001	
5	0.96167244	5	0.0287	0.9272	0.2074	0.0273	.	0.0001	
6	0.75988467	6	0.0001	0.0001	0.0001	0.0001	0.0001	.	

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

DIAZINON - MYSID CHRONIC TEST

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General Linear Models Procedure

Bonferroni (Dunn) T tests for variable: LENGTH

NOTE: This test controls the type I experimentwise error rate but generally has a higher type II error rate than Tukey's for all pairwise comparisons.

Alpha= 0.05 Confidence= 0.95 df= 165 MSE= 0.154368
Critical Value of T= 2.97854

Comparisons significant at the 0.05 level are indicated by '***'.

TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
3 - 1	-0.18206	0.13091	0.44387	
3 - 2	-0.15165	0.14838	0.44842	
3 - 5	-0.09353	0.21379	0.52112	
3 - 4	-0.03146	0.27586	0.58319	
3 - 6	0.37439	0.69045	1.00652	***
1 - 3	-0.44387	-0.13091	0.18206	
1 - 2	-0.28833	0.01748	0.32329	
1 - 5	-0.23008	0.08289	0.39585	
1 - 4	-0.16801	0.14496	0.45792	
1 - 6	0.23799	0.55954	0.88110	***
2 - 3	-0.44842	-0.14838	0.15165	
2 - 1	-0.32329	-0.01748	0.28833	
2 - 5	-0.23463	0.06541	0.36545	
2 - 4	-0.17256	0.12748	0.42751	
2 - 6	0.23308	0.54207	0.85105	***
5 - 3	-0.52112	-0.21379	0.09353	
5 - 1	-0.39585	-0.08289	0.23008	
5 - 2	-0.36545	-0.06541	0.23463	
5 - 4	-0.24526	0.06207	0.36939	

5 - 6	0.16059	0.47666	0.79272	***
4 - 3	-0.58319	-0.27586	0.03146	
4 - 1	-0.45792	-0.14496	0.16801	
4 - 2	-0.42751	-0.12748	0.17256	
4 - 5	-0.36939	-0.06207	0.24526	
4 - 6	0.09852	0.41459	0.73065	***
6 - 3	-1.00652	-0.69045	-0.37439	***
6 - 1	-0.88110	-0.55954	-0.23799	***
6 - 2	-0.85105	-0.54207	-0.23308	***
6 - 5	-0.79272	-0.47666	-0.16059	***
6 - 4	-0.73065	-0.41459	-0.09852	***

DIAZINON - MYSID CHRONIC TEST

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General Linear Models Procedure

Bonferroni (Dunn) T tests for variable: WEIGHT

NOTE: This test controls the type I experimentwise error rate but generally has a higher type II error rate than Tukey's for all pairwise comparisons.

Alpha= 0.05 Confidence= 0.95 df= 165 MSE= 0.033051
Critical Value of T= 2.97854

Comparisons significant at the 0.05 level are indicated by '***'.

TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
1 - 4	-0.14467	0.00014	0.14495	
1 - 3	-0.10192	0.04290	0.18771	
1 - 2	-0.04040	0.10110	0.24260	
1 - 5	-0.03985	0.10497	0.24978	
1 - 6	0.15748	0.30627	0.45506	***
4 - 1	-0.14495	-0.00014	0.14467	
4 - 3	-0.09945	0.04276	0.18496	
4 - 2	-0.03787	0.10096	0.23979	
4 - 5	-0.03738	0.10483	0.24703	
4 - 6	0.15988	0.30613	0.45238	***
3 - 1	-0.18771	-0.04290	0.10192	
3 - 4	-0.18496	-0.04276	0.09945	
3 - 2	-0.08063	0.05820	0.19703	
3 - 5	-0.08014	0.06207	0.20427	
3 - 6	0.11712	0.26337	0.40962	***
2 - 1	-0.24260	-0.10110	0.04040	
2 - 4	-0.23979	-0.10096	0.03787	
2 - 3	-0.19703	-0.05820	0.08063	
2 - 5	-0.13496	0.00387	0.14270	
2 - 6	0.06220	0.20517	0.34814	***
5 - 1	-0.24978	-0.10497	0.03985	
5 - 4	-0.24703	-0.10483	0.03738	
5 - 3	-0.20427	-0.06207	0.08014	
5 - 2	-0.14270	-0.00387	0.13496	
5 - 6	0.05505	0.20130	0.34755	***
6 - 1	-0.45506	-0.30627	-0.15748	***
6 - 4	-0.45238	-0.30613	-0.15988	***
6 - 3	-0.40962	-0.26337	-0.11712	***

6	- 2	-0.34814	-0.20517	-0.06220	***
6	- 5	-0.34755	-0.20130	-0.05505	***

DIAZINON - MYSID CHRONIC TEST

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General Linear Models Procedure

Dunnett's One-tailed T tests for variable: LENGTH

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 165 MSE= 0.154368
Critical Value of Dunnett's T= 2.246

Comparisons significant at the 0.05 level are indicated by '***'.

TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
3 - 1	-0.10505	0.13091	0.36686	
2 - 1	-0.24804	-0.01748	0.21308	
5 - 1	-0.31884	-0.08289	0.15307	
4 - 1	-0.38091	-0.14496	0.09100	
6 - 1	-0.80197	-0.55954	-0.31712	***

DIAZINON - MYSID CHRONIC TEST

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General Linear Models Procedure

Dunnett's One-tailed T tests for variable: WEIGHT

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 165 MSE= 0.033051
Critical Value of Dunnett's T= 2.246

Comparisons significant at the 0.05 level are indicated by '***'.

TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
4 - 1	-0.10932	-0.00014	0.10904	
3 - 1	-0.15208	-0.04290	0.06628	
2 - 1	-0.20778	-0.10110	0.00558	
5 - 1	-0.21415	-0.10497	0.00421	
6 - 1	-0.41844	-0.30627	-0.19409	***

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM

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General Linear Models Procedure
Class Level Information

Class	Levels	Values
REP	2	1 2
TRT	6	1 2 3 4 5 6

Number of observations in data set = 172

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM

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General Linear Models Procedure

Dependent Variable: LENGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	10.715612	0.974147	6.94	0.0001
Error	160	22.473457	0.140459		
Corrected Total	171	33.189070			
R-Square		C.V.	Root MSE	LENGTH Mean	
0.322866		5.100644	0.3748	7.3477	

Source	DF	Type I SS	Mean Square	F Value	Pr > F
REP	1	0.1339535	0.1339535	0.95	0.3303
TRT	5	7.5844560	1.5168912	10.80	0.0001
REP*TRT	5	2.9972030	0.5994406	4.27	0.0011
Source	DF	Type III SS	Mean Square	F Value	Pr > F
REP	1	0.1225667	0.1225667	0.87	0.3516
TRT	5	7.2243036	1.4448607	10.29	0.0001
REP*TRT	5	2.9972030	0.5994406	4.27	0.0011

Tests of Hypotheses using the Type III MS for REP*TRT as an error term

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	7.2243036	1.4448607	2.41	0.1782

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM

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General Linear Models Procedure

Dependent Variable: WEIGHT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	2.0778844	0.1888986	5.88	0.0001
Error	160	5.1417435	0.0321359		
Corrected Total	171	7.2196279			
R-Square		C.V.	Root MSE	WEIGHT Mean	
0.287810		18.34894	0.1793	0.9770	

Source	DF	Type I SS	Mean Square	F Value	Pr > F
REP	1	0.0060488	0.0060488	0.19	0.6650
TRT	5	1.7601013	0.3520203	10.95	0.0001
REP*TRT	5	0.3117343	0.0623469	1.94	0.0905
Source	DF	Type III SS	Mean Square	F Value	Pr > F

P	1	0.0244842	0.0244842	0.76	0.3840
T	5	1.6736856	0.3347371	10.42	0.0001
P*TRT	5	0.3117343	0.0623469	1.94	0.0905

sts of Hypotheses using the Type III MS for REP*TRT as an error term

Source	DF	Type III SS	Mean Square	F Value	Pr > F
T	5	1.6736856	0.3347371	5.37	0.0444

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM
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General Linear Models Procedure
Least Squares Means

Standard Errors and Probabilities calculated using the Type III MS for REP*TRT as an Error term

TRT	LENGTH LSMEAN	Pr > T i/j	H0: LSMEAN(i)=LSMEAN(j) 1	2	3	4	5	6
	7.41960227	1	.	0.9451	0.5458	0.5477	0.8168	0.0552
	7.43437500	2	0.9451	.	0.5702	0.4857	0.7538	0.0435
	7.55588235	3	0.5458	0.5702	.	0.2439	0.4026	0.0245
	7.28461538	4	0.5477	0.4857	0.2439	.	0.6976	0.1151
	7.36857143	5	0.8168	0.7538	0.4026	0.6976	.	0.0689
	6.88452381	6	0.0552	0.0435	0.0245	0.1151	0.0689	.

Standard Errors and Probabilities calculated using the Type III MS for REP*TRT as an Error term

TRT	WEIGHT LSMEAN	Pr > T i/j	H0: LSMEAN(i)=LSMEAN(j) 1	2	3	4	5	6
	1.06139205	1	.	0.2070	0.4707	0.9641	0.1968	0.0072
	0.96593750	2	0.2070	.	0.5391	0.1850	0.9424	0.0257
	1.00845588	3	0.4707	0.5391	.	0.4355	0.5055	0.0144
	1.06459135	4	0.9641	0.1850	0.4355	.	0.1763	0.0063
	0.96107143	5	0.1968	0.9424	0.5055	0.1763	.	0.0302
	0.75857143	6	0.0072	0.0257	0.0144	0.0063	0.0302	.

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM
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General Linear Models Procedure

Dunnett's One-tailed T tests for variable: LENGTH

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 5 MSE= 0.599441
Critical Value of Dunnett's T= 2.963

Comparisons significant at the 0.05 level are indicated by '***'.

TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit
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3	- 1	-0.4825	0.1309	0.7443
2	- 1	-0.6169	-0.0175	0.5819
5	- 1	-0.6963	-0.0829	0.5305
4	- 1	-0.7584	-0.1450	0.4685
6	- 1	-1.1898	-0.5595	0.0707

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM
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General Linear Models Procedure

Dunnett's One-tailed T tests for variable: WEIGHT

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 5 MSE= 0.062347
Critical Value of Dunnett's T= 2.963

Comparisons significant at the 0.05 level are indicated by '***'.

TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit
4 - 1	-0.19797	-0.00014	0.19769
3 - 1	-0.24073	-0.04290	0.15493
2 - 1	-0.29441	-0.10110	0.09221
5 - 1	-0.30280	-0.10497	0.09286
6 - 1	-0.50953	-0.30627	-0.10301 ***