MRID No. 436781-20

DATA EVALUATION RECORD
FRESHWATER FISH EARLY LIFE-STAGE TEST
GUIDELINE 72-4

1. **CHEMICAL:** Azoxystrobin PC Code No.: 128810

2. **TEST MATERIAL:** ICIA5504 Purity: 96.2%

3. **CITATION:**
Authors: Jon E. Rhodes, Yuan Yang and David Abram
Title: Early Life Stage Toxicity of ICIA5504 to the Fathead Minnow (*Pimephales promelas*) Under Flow Through Conditions
Study Completion Date: August 22, 1994
Laboratory: ABC Laboratories, Inc., Columbia, Missouri
Laboratory Report ID: 41594
Sponsor: Zeneca Limited, Wilmington, DE
MRID No.: 436781-20

4. **REVIEWED BY:**

William Erickson
Biologist
EEB/EFED/EPA

Signature: W. Erickson
Date: 4/03/96

5. **APPROVED BY:**

Harry Craven
Section Head 4
EEB/EFED/EPA

Signature: H. T. Craven
Date: 6/21/96

6. **CONCLUSIONS:** This study is scientifically sound and fulfills the guideline requirements for a fish early life-stage toxicity test.

Results synopsis:

Most sensitive endpoint: length

NOEC: 147 ppb LOEC: 193 ppb MATC: 168 ppb

7. **ADEQUACY OF THE STUDY:**

A. Classification: Core.

B. Rationale: N/A.

C. Repairability: N/A.

(1)

DATA EVALUATION RECORD
FRESHWATER FISH EARLY LIFE-STAGE TEST
GUIDELINE 72-4

1. **CHEMICAL:** ~~Sulfentrazone~~ Azafenidin — PC Code No.: ~~129081~~ 128810

2. **TEST MATERIAL:** ICIA5504 — Purity: 96.2%

3. **CITATION:**

Authors: Jon E. Rhodes, Yuan Yang and David Abram
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MRID No.: 436781-20
~~DP Barcode: D217072, D217078~~

4. **REVIEWED BY:** Max Feken, M.S., Environmental Toxicologist, KBN Engineering and Applied Sciences, Inc.

Signature: [signature] Date: 1/19/96

APPROVED BY: Rosemary Mora, M.S., Toxicologist, KBN Engineering and Applied Sciences, Inc.

Signature: P. Kosalwat for RM Date: 1/22/96

5. **APPROVED BY:**

Signature: Date:

6. **CONCLUSIONS:** This study is scientifically sound, fulfills the guideline requirements for a fish early life-stage toxicity test, and can be classified as Core. Based on mean measured concentrations, the NOEC and LOEC for fathead minnows exposed to ICIA5504 were 147 and 193 ppb, respectively. The MATC was 168 ppb.

7. **ADEQUACY OF THE STUDY:**

A. Classification: Core.

B. Rationale: N/A.

C. Repairability: N/A.

20.5

8. **MAJOR GUIDELINE DEVIATIONS:**

1. The hardness of the dilution water (140-154 mg/L as $CaCO_3$) was higher than recommended (40-48 mg/L as $CaCO_3$).

2. The pH of the dilution water (8.1-8.3) was higher than recommended (7.2-7.6).

9. **MATERIALS AND METHODS:**

A. **Biological System:**

Guideline Criteria	Reported Information
Species: A freshwater or saltwater fish species.	*Pimephales promelas*
Source: Commercial fishery, wild, or brood stock.	In-house brood stock
Age at beginning of test: Embryos 2 to 24 hours old.	≤24 hours old at initiation
Replicates: Minimum of 20 embryos per replicate cup, 4 replicates per concentration. Minimum of 30 fish per treatment for posthatch exposure.	30 eggs/cup, 4 cups per treatment or control 20 fish/replicate, 4 replicates per treatment or control
Posthatch: % of embryos that produce live fry must be ≥ 50% in each control; % hatch in any control embryo cup must be no more than 1.6 times that in another control cup.	86.1% egg hatch in dilution water and 87.6% in solvent control. 1.2 times
Feeding: Fish should be fed at least twice daily. Fish should not be fed for at least 24 hr prior to termination on day 32.	Fish fed at least twice a day. Food was withheld 24 hours before study termination.
Counts: At a minimum, live fish should be counted 11, 18, 25, and 32 days after hatching.	Positive counts of surviving fry were made at least once every two days.

Guideline Criteria	Reported Information
Controls: Avg. survival at end of test must be ≥80%. Survival in any control chamber must not be <70%.	Average of 100% and 98.8% survival in the dilution water and solvent control groups, respectively. Survival in each control group replicate was ≥95%.
Controls: Negative control and carrier control (when applicable) are required.	Dilution water and solvent control (<0.10 mL/L).

Comments: None.

B. **Physical System:**

Guideline Criteria	Reported Information
Test Water: 1) May be natural (well or spring) or reconstituted water. 2) Water should be sterilized with UV radiation and screened for contaminants. 3) Hardness of 40-48 mg/L as $CaCO_3$, pH of 7.2-7.6	1) Natural well water. 2) Water was filtered, partially sterilized with UV radiation and screened for contaminants. 3) Hardness of 140-154 mg/L as $CaCO_3$, pH of 8.1 to 8.3.
Test Temperature: Depends upon test species; should not deviate by more than 2°C from appropriate temperature. For fathead minnow, 25°C is recommended.	Range from 25.0 to 25.8°C.
Photoperiod: Recommend 16L/8D.	16 h light, 8 h dark
Dosing Apparatus: Intermittent flow proportional diluters or continuous flow serial diluters should be used. A minimum of 5 toxicant concentrations with a dilution factor not greater than 0.5 and controls should be used.	Intermittent-flow proportional diluter. Treatment concentrations of 45, 90, 140, 180, 360, and 720 µg/L.

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Guideline Criteria	Reported Information
Toxicant Mixing: 1) Mixing chamber is recommended but not required; 2) Aeration should not be used for mixing; 3) It must be demonstrated that the test solution is completely mixed before intro. into the test system; 4) Flow splitting accuracy must be within 10%.	1) Mixing chamber used. 2) No aeration of exposure solutions. 3) Mixing confirmed by analysis. 4) Not reported.
Test Vessels: All glass or glass with stainless steel frame.	15.5 x 31 x 25 cm glass aquaria.
Embryo Cups: 120 mL glass jars with bottoms replaced with 40 mesh stainless steel or nylon screen.	9-cm diameter glass jars with 40-mesh Nitex-screen bottoms.
Flow Rate: Flow rates to larval cups should provide 90% replacement in 8-12 hours. Flow rate must maintain DO at above 75% of saturation and maintain the toxicant level.	7.8 volume replacements/24 h. DO and chemical concentrations confirmed by analysis.
Aeration: Dilution water should be aerated to insure DO concentration at or near 100% saturation. Test tanks and embryo cups should not be aerated.	DO $\geq$80% (6.3 mg/L) of saturation at all times.

Comments: Hardness and pH of the dilution water were higher than recommended.

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C. **Chemical System:**

Guideline Criteria	Reported Information
Concentrations: Minimum of 5 concentrations and a control, all replicated, plus solvent control if appropriate. - Toxicant conc. must be measured in one tank at each toxicant level every week. - One concentration must adversely affect a life stage and one concentration must not affect any life stage.	- Yes; control, solvent control and mean measured conc. of 51.1, 96.3, 147, 193, 374, and 750 µg/L. - Yes. - Yes.
Other Variables: DO must be measured at each conc. at least once a week.	Yes, DO ≥80% at all times.
Solvents: Should not exceed 0.1 mL/L in a flow-through system. Following solvents are acceptable: dimethylformamide, triethylene glycol, methanol, acetone, ethanol.	Acetone (<0.1 mL/L).

Comments: None.

10. **REPORTED RESULTS:**

Guideline Criteria	Reported Information
Data Endpoints must include: - Number of embryos hatched; - Time to hatch; - Mortality of embryos, larvae, and juveniles; - Time to swim-up (if approp.); - Measurement of growth; - Incidence of pathological or histological effects; - Observations of other effects or clinical signs.	Data include: - Number of eggs hatch; - Time to hatch (days 3-5); - 28-day posthatch survival; - 28-day posthatch length; - 28-day posthatch wet weight; - Morphological and behavioral observations.
Raw data included? (Y/N)	Yes.

Effects Data:

Toxicant Concentration (ppb)		Mean Percent Hatch	Percent Post-Hatch Survival (28 days)	Standard Length (mm)	Blotted Wet weight (g)
Nominal	Measured				
Control	<17	86.1	100	22.8	0.190
Solvent	<17	87.6	98.8	23.0	0.203
45	51.1	89.4	98.8	22.8	0.194
90	96.3	81.9	98.8	22.6	0.190
140	147	82.6	98.8	22.6	0.192
180	193	86.0	98.8	22.2	0.190
360	374	88.1	97.5	20.9	0.161
720	750	33.6	0	--	--

Toxicity Observations: No physical or behavioral abnormalities were observed during the study.

Statistical Results:
Statistical Method: Contingency table methods were used to analyze egg hatchability and survival data. ANOVA was used for continuous scale measurements (length and wet weight) with Dunnett's test for control comparisons.

NOEC: 147 µg/L LOEC: 193 µg/L MATC: 168 µg/L

Most sensitive endpoint: 28-day standard length

Comments: Hatch, survival, and growth data from the treatment groups were compared to data from the pooled control.

11. **REVIEWER'S STATISTICAL RESULTS:**

Statistical Method: ANOVA (nested) and Dunnett's test for pooled mean comparisons.

NOEC: 147 ppb LOEC: 193 ppb MATC: 168 ppb
Most sensitive endpoint: 28-day standard length

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Comments: Hatch, survival, and growth data from the treatment groups were compared to the data from the pooled control. An ANOVA was performed using a nested design with vessels nested within aquaria and aquaria nested within treatments.

12. **REVIEWER'S COMMENTS:** This study is scientifically sound and fulfills the guideline requirements for a fish early life-stage toxicity test using the fathead minnow. Based on mean measured concentrations, the NOEC and LOEC for fathead minnows exposed to ICIA5504 were 147 and 193 ppb, respectively. The MATC was 168 ppb. This study is classified as **Core**.

The SAS System 1

09:15 Friday, December 1, 1995

TRT=C

OBS	REP	AQUA	LENGTH	WEIGHT
1	A	A	25.2293	0.186
2	A	A	20.9299	0.243
3	A	A	25.2345	0.198
4	A	A	22.4554	0.222
5	A	A	26.6627	0.221
6	A	A	22.0560	0.235
7	A	A	24.0864	0.327
8	A	A	23.4791	0.173
9	A	A	21.8816	0.177
10	A	A	23.8615	0.203
11	A	A	22.3407	0.225
12	A	A	22.9852	0.189
13	A	A	22.3712	0.158
14	A	A	24.0787	0.187
15	A	A	24.1097	0.178
16	A	A	21.2817	0.219
17	A	A	19.9646	0.199
18	A	A	24.9022	0.249
19	A	A	23.6524	0.165
20	A	A	22.5508	0.127
21	B	A	21.2989	0.222
22	B	A	23.0075	0.182
23	B	A	24.0989	0.183
24	B	A	20.1572	0.125
25	B	A	23.4847	0.187
26	B	A	21.9039	0.230
27	B	A	22.4768	0.142
28	B	A	22.5797	0.153
29	B	A	25.8398	0.209
30	B	A	22.9692	0.259
31	B	A	19.9756	0.194
32	B	A	22.2147	0.188
33	B	A	24.6306	0.211
34	B	A	22.0818	0.270
35	B	A	26.6074	0.188
36	B	A	22.3188	0.223
37	B	A	26.4421	0.175
38	B	A	21.8623	0.126
39	B	A	20.0783	0.207
40	B	A	22.9441	0.179
41	C	B	23.2707	0.196
42	C	B	22.5075	0.129
43	C	B	24.1451	0.234
44	C	B	24.8856	0.273
45	C	B	21.1683	0.261
46	C	B	25.0169	0.202
47	C	B	23.8496	0.198
48	C	B	24.4989	0.147
49	C	B	21.0152	0.148
50	C	B	23.9201	0.202
51	C	B	22.3192	0.137
52	C	B	19.3893	0.155
53	C	B	20.7982	0.233
54	C	B	25.1269	0.110
55	C	B	20.9408	0.117
56	C	B	23.2732	0.159

The SAS System 2

09:15 Friday, December 1, 1995

TRT=C (continued)

OBS	REP	AQUA	LENGTH	WEIGHT
57	C	B	21.4116	0.208
58	C	B	19.7697	0.169
59	C	B	21.3046	0.138
60	C	B	21.5777	0.187
61	D	B	21.7545	0.151
62	D	B	25.3912	0.262
63	D	B	20.6534	0.134
64	D	B	22.0696	0.115
65	D	B	20.5812	0.230
66	D	B	21.6079	0.279
67	D	B	22.2849	0.171
68	D	B	22.7104	0.087
69	D	B	20.8177	0.135
70	D	B	23.7987	0.285
71	D	B	25.2637	0.168
72	D	B	18.6360	0.231
73	D	B	22.8293	0.212
74	D	B	23.8585	0.222
75	D	B	20.0000	0.161
76	D	B	25.5458	0.114
77	D	B	21.8389	0.133
78	D	B	24.1151	0.274
79	D	B	26.1744	0.169
80	D	B	20.7379	0.163

TRT=V

OBS	REP	AQUA	LENGTH	WEIGHT
81	E	C	24.6412	0.219
82	E	C	27.0560	0.179
83	E	C	22.9636	0.221
84	E	C	22.6717	0.312
85	E	C	25.2727	0.255
86	E	C	23.8506	0.198
87	E	C	23.2903	0.188
88	E	C	23.0618	0.201
89	E	C	24.1542	0.171
90	E	C	23.7231	0.223
91	E	C	22.5768	0.250
92	E	C	23.4396	0.184
93	E	C	24.5271	0.243
94	E	C	24.6936	0.223
95	E	C	22.2250	0.201
96	E	C	24.3434	0.254
97	E	C	22.7018	0.185
98	E	C	21.9455	0.201
99	E	C	22.6099	0.246
100	E	C	24.3677	0.185
101	F	C	22.5634	0.188
102	F	C	19.5334	0.211
103	F	C	22.4789	0.214
104	F	C	24.6330	0.244
105	F	C	22.3552	0.186

The SAS System 3

09:15 Friday, December 1, 1995

TRT=V (continued)

OBS	REP	AQUA	LENGTH	WEIGHT
106	F	C	22.1168	0.171
107	F	C	23.9768	0.102
108	F	C	20.9256	0.178
109	F	C	23.2119	0.168

C - Control
V - Vehicle control

110	F	C	21.4264	0.174
111	F	C	25.0731	0.177
112	F	C	19.1818	0.245
113	F	C	26.2058	0.211
114	F	C	24.2372	0.280
115	F	C	21.9732	0.152
116	F	C	25.2293	0.212
117	F	C	24.7420	0.173
118	F	C	23.0361	0.110
119	F	C	22.8958	0.136
120	G	D	20.5812	0.280
121	G	D	24.3864	0.279
122	G	D	24.6412	0.176
123	G	D	22.7046	0.209
124	G	D	22.1927	0.181
125	G	D	23.4666	0.173
126	G	D	21.4719	0.157
127	G	D	21.4825	0.174
128	G	D	22.0387	0.202
129	G	D	24.0107	0.190
130	G	D	22.0161	0.107
131	G	D	24.1165	0.246
132	G	D	21.5721	0.190
133	G	D	21.1898	0.179
134	G	D	25.5072	0.191
135	G	D	22.4789	0.261
136	G	D	24.1404	0.221
137	G	D	25.5123	0.262
138	G	D	18.5209	0.244
139	G	D	21.5551	0.142
140	H	D	23.6066	0.201
141	H	D	25.1637	0.238
142	H	D	19.8731	0.173
143	H	D	24.7420	0.244
144	H	D	19.1410	0.264
145	H	D	23.7221	0.196
146	H	D	22.5753	0.121
147	H	D	21.5551	0.126
148	H	D	24.9166	0.225
149	H	D	22.4192	0.218
150	H	D	24.5718	0.094
151	H	D	23.8615	0.166
152	H	D	24.4952	0.131
153	H	D	22.8517	0.252
154	H	D	17.4724	0.283
155	H	D	25.4747	0.194
156	H	D	21.8474	0.270
157	H	D	22.9090	0.227
158	H	D	21.4503	0.240
159	H	D	20.0297	0.204

TRT=C

Variable	N	Mean	Std Dev	Minimum	Maximum
LENGTH	80	22.7743013	1.8466718	18.6360000	26.6627000
WEIGHT	80	0.1904125	0.0476729	0.0870000	0.3270000

TRT=V

Variable	N	Mean	Std Dev	Minimum	Maximum
LENGTH	79	22.9895633	1.8196729	17.4724000	27.0560000
WEIGHT	79	0.2025570	0.0459553	0.0940000	0.3120000

General Linear Models Procedure
Class Level Information

Class	Levels	Values
TRT	2	C V
REP	8	A B C D E F G H
AQUA	4	A B C D

Number of observations in data set = 159

General Linear Models Procedure

Dependent Variable: LENGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	23.00469091	3.28638442	0.98	0.4482
Error	151	506.51704250	3.35441750		
Corrected Total	158	529.52173341			

R-Square	C.V.	Root MSE	LENGTH Mean
0.043444	8.004399	1.8315069	22.881255

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	1	1.84185256	1.84185256	0.55	0.4598
AQUA(TRT)	2	14.09709980	7.04854990	2.10	0.1259
REP(TRT*AQUA)	4	7.06573855	1.76643464	0.53	0.7163

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	1	1.83008972	1.83008972	0.55	0.4613
AQUA(TRT)	2	13.83344936	6.91672468	2.06	0.1308
REP(TRT*AQUA)	4	7.06573855	1.76643464	0.53	0.7163

General Linear Models Procedure

Dependent Variable: WEIGHT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	0.02185756	0.00312251	1.44	0.1947
Error	151	0.32827574	0.00217401		
Corrected Total	158	0.35013330			

R-Square	C.V.	Root MSE	WEIGHT Mean
0.062426	23.73485	0.0466263	0.1964465

No significant ($P < 0.05$) between control + Vehicle control.

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	1	0.00586241	0.00586241	2.70	0.1026
AQUA(TRT)	2	0.00508209	0.00254104	1.17	0.3135
REP(TRT*AQUA)	4	0.01091305	0.00272826	1.25	0.2903

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	1	0.00566165	0.00566165	2.60	0.1087
AQUA(TRT)	2	0.00510807	0.00255403	1.17	0.3117
REP(TRT*AQUA)	4	0.01091305	0.00272826	1.25	0.2903

TTEST PROCEDURE

Variable: LENGTH

TRT	N	Mean	Std Dev	Std Error	Minimum	Maximum
C	80	22.77430125	1.84667180	0.20646418	18.63600000	26.66270000
V	79	22.98956329	1.81967290	0.20472920	17.47240000	27.05600000

Variances	T	DF	Prob>|T|
Unequal	-0.7403	157.0	0.4602
Equal	-0.7403	157.0	0.4602

For HO: Variances are equal, F' = 1.03 DF = (79,78) Prob>F' = 0.8969

****

Variable: WEIGHT

TRT	N	Mean	Std Dev	Std Error	Minimum	Maximum
C	80	0.19041250	0.04767286	0.00532999	0.08700000	0.32700000
V	79	0.20255696	0.04595531	0.00517038	0.09400000	0.31200000

Variances	T	DF	Prob>|T|
Unequal	-1.6355	156.9	0.1040
Equal	-1.6351	157.0	0.1040

For HO: Variances are equal, F' = 1.08 DF = (79,78) Prob>F' = 0.7463

TRT=C

Variable	N	Mean	Std Dev	Minimum	Maximum
LENGTH	159	22.8812553	1.8306839	17.4724000	27.0560000
WEIGHT	159	0.1964465	0.0470748	0.0870000	0.3270000

TRT=I

Variable	N	Mean	Std Dev	Minimum	Maximum
LENGTH	78	22.8411577	1.6970182	18.4346000	26.4049000
WEIGHT	78	0.1942308	0.0440601	0.1050000	0.2950000

T-Test: Control + Vehicle control not significantly Different. ∴ Pool controls

TRT=II

Variable	N	Mean	Std Dev	Minimum	Maximum
LENGTH	79	22.5599848	2.6831935	11.9047000	28.0153000
WEIGHT	79	0.1896709	0.0598009	0.0190000	0.3220000

TRT=III

Variable	N	Mean	Std Dev	Minimum	Maximum
LENGTH	78	22.5600000	2.0427299	13.4881000	25.5458000
WEIGHT	78	0.1916410	0.0489442	0.0470000	0.3000000

TRT=IV

Variable	N	Mean	Std Dev	Minimum	Maximum
LENGTH	79	22.2032911	1.9285446	16.6194000	27.1963000
WEIGHT	79	0.1897468	0.0473418	0.0700000	0.3310000

TRT=V

Variable	N	Mean	Std Dev	Minimum	Maximum
LENGTH	78	20.9133449	1.9673128	15.3664000	24.6197000
WEIGHT	78	0.1606026	0.0466240	0.0600000	0.2910000

General Linear Models Procedure
Class Level Information

Class	Levels	Values
TRT	6	C I II III IV V
REP	8	A B C D E F G H
AQUA	4	A B C D

Number of observations in data set = 551

TREATMENTS
FOGLER
C - Control
I - 51.1 ppb
II - 96.3
III - 147
IV - 193
V - 374

General Linear Models Procedure

Dependent Variable: LENGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	27	313.47936170	11.61034673	2.84	0.0001
Error	523	2140.21088653	4.09218143		
Corrected Total	550	2453.69024823			

R-Square	C.V.	Root MSE	LENGTH Mean
0.127758	9.027539	2.0229141	22.408257

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	5	231.43513151	46.28702630	11.31	0.0001
AQUA(TRT)	8	43.11264083	5.38908010	1.32	0.2323
REP(TRT*AQUA)	14	38.93158936	2.78082781	0.68	0.7953

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	231.22299951	46.24459990	11.30	0.0001
AQUA(TRT)	8	42.76878186	5.34609773	1.31	0.2376
REP(TRT*AQUA)	14	38.93158936	2.78082781	0.68	0.7953

General Linear Models Procedure

Dependent Variable: WEIGHT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	27	0.11263924	0.00417182	1.72	0.0140
Error	523	1.26687493	0.00242232		
Corrected Total	550	1.37951417			

R-Square	C.V.	Root MSE	WEIGHT Mean
0.081651	26.11729	0.0492171	0.1884465

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	5	0.07430602	0.01486120	6.14	0.0001
AQUA(TRT)	8	0.01842720	0.00230340	0.95	0.4739
REP(TRT*AQUA)	14	0.01990603	0.00142186	0.59	0.8761

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	0.07412713	0.01482543	6.12	0.0001
AQUA(TRT)	8	0.01824119	0.00228015	0.94	0.4818
REP(TRT*AQUA)	14	0.01990603	0.00142186	0.59	0.8761

TRT=C

OBS	REP	AQUA	LENGTH	WEIGHT
1	A	A	25.2293	0.186
2	A	A	20.9299	0.243
3	A	A	25.2345	0.198
4	A	A	22.4554	0.222
5	A	A	26.6627	0.221
6	A	A	22.0560	0.235
7	A	A	24.0864	0.327
8	A	A	23.4791	0.173
9	A	A	21.8816	0.177
10	A	A	23.8615	0.203
11	A	A	22.3407	0.225

12	A	A	22.9852	0.189
13	A	A	22.3712	0.158
14	A	A	24.0787	0.187
15	A	A	24.1097	0.178
16	A	A	21.2817	0.219
17	A	A	19.9646	0.199
18	A	A	24.9022	0.249
19	A	A	23.6524	0.165
20	A	A	22.5508	0.127
21	B	A	21.2989	0.222
22	B	A	23.0075	0.182
23	B	A	24.0989	0.183
24	B	A	20.1572	0.125
25	B	A	23.4847	0.187
26	B	A	21.9039	0.230
27	B	A	22.4768	0.142
28	B	A	22.5797	0.153
29	B	A	25.8398	0.209
30	B	A	22.9692	0.259
31	B	A	19.9756	0.194
32	B	A	22.2147	0.188
33	B	A	24.6306	0.211
34	B	A	22.0818	0.270
35	B	A	26.6074	0.188
36	B	A	22.3188	0.223
37	B	A	26.4421	0.175
38	B	A	21.8623	0.126
39	B	A	20.0783	0.207
40	B	A	22.9441	0.179
41	C	B	23.2707	0.196
42	C	B	22.5075	0.129
43	C	B	24.1451	0.234
44	C	B	24.8856	0.273
45	C	B	21.1683	0.261
46	C	B	25.0169	0.202
47	C	B	23.8496	0.198
48	C	B	24.4989	0.147
49	C	B	21.0152	0.148
50	C	B	23.9201	0.202
51	C	B	22.3192	0.137
52	C	B	19.3893	0.155
53	C	B	20.7982	0.233
54	C	B	25.1269	0.110
55	C	B	20.9408	0.117
56	C	B	23.2732	0.159

TRT=C (continued)

OBS	REP	AQUA	LENGTH	WEIGHT
57	C	B	21.4116	0.208
58	C	B	19.7697	0.169
59	C	B	21.3046	0.138
60	C	B	21.5777	0.187
61	D	B	21.7545	0.151
62	D	B	25.3912	0.262
63	D	B	20.6534	0.134
64	D	B	22.0696	0.115
65	D	B	20.5812	0.230
66	D	B	21.6079	0.279
67	D	B	22.2849	0.171
68	D	B	22.7104	0.087
69	D	B	20.8177	0.135
70	D	B	23.7987	0.285
71	D	B	25.2637	0.168
72	D	B	18.6360	0.231

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Obs - Observation
Rep - Replicates
Aqua - Aquarium

73	D	B	22.8293	0.212
74	D	B	23.8585	0.222
75	D	B	20.0000	0.161
76	D	B	25.5458	0.114
77	D	B	21.8389	0.133
78	D	B	24.1151	0.274
79	D	B	26.1744	0.169
80	D	B	20.7379	0.163
81	E	C	24.6412	0.219
82	E	C	27.0560	0.179
83	E	C	22.9636	0.221
84	E	C	22.6717	0.312
85	E	C	25.2727	0.255
86	E	C	23.8506	0.198
87	E	C	23.2903	0.188
88	E	C	23.0618	0.201
89	E	C	24.1542	0.171
90	E	C	23.7231	0.223
91	E	C	22.5768	0.250
92	E	C	23.4396	0.184
93	E	C	24.5271	0.243
94	E	C	24.6936	0.223
95	E	C	22.2250	0.201
96	E	C	24.3434	0.254
97	E	C	22.7018	0.185
98	E	C	21.9455	0.201
99	E	C	22.6099	0.246
100	E	C	24.3677	0.185
101	F	C	22.5634	0.188
102	F	C	19.5334	0.211
103	F	C	22.4789	0.214
104	F	C	24.6330	0.244
105	F	C	22.3552	0.186
106	F	C	22.1168	0.171
107	F	C	23.9768	0.102
108	F	C	20.9256	0.178
109	F	C	23.2119	0.168
110	F	C	21.4264	0.174
111	F	C	25.0731	0.177

---------- TRT=C (continued) ----------

OBS	REP	AQUA	LENGTH	WEIGHT
112	F	C	19.1818	0.245
113	F	C	26.2058	0.211
114	F	C	24.2372	0.280
115	F	C	21.9732	0.152
116	F	C	25.2293	0.212
117	F	C	24.7420	0.173
118	F	C	23.0361	0.110
119	F	C	22.8958	0.136
120	G	D	20.5812	0.280
121	G	D	24.3864	0.279
122	G	D	24.6412	0.176
123	G	D	22.7046	0.209
124	G	D	22.1927	0.181
125	G	D	23.4666	0.173
126	G	D	21.4719	0.157
127	G	D	21.4825	0.174
128	G	D	22.0387	0.202
129	G	D	24.0107	0.190
130	G	D	22.0161	0.107
131	G	D	24.1165	0.246
132	G	D	21.5721	0.190
133	G	D	21.1898	0.179

134	G	D	25.5072	0.191
135	G	D	22.4789	0.261
136	G	D	24.1404	0.221
137	G	D	25.5123	0.262
138	G	D	18.5209	0.244
139	G	D	21.5551	0.142
140	H	D	23.6066	0.201
141	H	D	25.1637	0.238
142	H	D	19.8731	0.173
143	H	D	24.7420	0.244
144	H	D	19.1410	0.264
145	H	D	23.7221	0.196
146	H	D	22.5753	0.121
147	H	D	21.5551	0.126
148	H	D	24.9166	0.225
149	H	D	22.4192	0.218
150	H	D	24.5718	0.094
151	H	D	23.8615	0.166
152	H	D	24.4952	0.131
153	H	D	22.8517	0.252
154	H	D	17.4724	0.283
155	H	D	25.4747	0.194
156	H	D	21.8474	0.270
157	H	D	22.9090	0.227
158	H	D	21.4503	0.240
159	H	D	20.0297	0.204

---------- TRT=I ----------

OBS	REP	AQUA	LENGTH	WEIGHT
160	A	A	23.7231	0.2

---------- TRT=I (continued) ----------

OBS	REP	AQUA	LENGTH	WEIGHT
161	A	A	23.7341	0.209
162	A	A	22.6099	0.190
163	A	A	23.0840	0.157
164	A	A	21.8474	0.142
165	A	A	22.7029	0.214
166	A	A	24.2332	0.225
167	A	A	24.5718	0.184
168	A	A	21.8459	0.195
169	A	A	21.3961	0.223
170	A	A	25.9513	0.169
171	A	A	25.7490	0.193
172	A	A	24.2483	0.144
173	A	A	23.2147	0.180
174	A	A	20.9943	0.176
175	A	A	22.2111	0.140
176	A	A	21.0624	0.283
177	A	A	23.7341	0.132
178	A	A	21.0129	0.197
179	A	A	21.8072	0.295
180	B	A	21.6755	0.170
181	B	A	22.4695	0.120
182	B	A	23.1266	0.195
183	B	A	25.6122	0.105
184	B	A	22.7036	0.286
185	B	A	23.1740	0.173
186	B	A	26.4049	0.162
187	B	A	22.8517	0.233
188	B	A	22.9317	0.291

189	B	A	22.7701	0.228
190	B	A	20.4094	0.239
191	B	A	24.2322	0.129
192	B	A	25.2022	0.196
193	B	A	23.0967	0.167
194	B	A	23.1530	0.202
195	B	A	26.0202	0.164
196	B	A	18.7339	0.116
197	B	A	18.4346	0.219
198	B	A	22.7580	0.269
199	B	A	19.6790	0.204
200	C	B	22.9993	0.227
201	C	B	24.7450	0.237
202	C	B	22.1417	0.200
203	C	B	20.7418	0.257
204	C	B	24.4447	0.179
205	C	B	23.7272	0.243
206	C	B	22.9852	0.143
207	C	B	23.7221	0.200
208	C	B	25.2782	0.232
209	C	B	23.1013	0.160
210	C	B	24.7686	0.220
211	C	B	22.5742	0.254
212	C	B	23.1867	0.139
213	C	B	21.8087	0.202
214	C	B	21.4291	0.147
215	C	B	20.0917	0.216

---------- TRT=I ----------
(continued)

OBS	REP	AQUA	LENGTH	WEIGHT
216	C	B	23.3478	0.218
217	C	B	24.2439	0.175
218	C	B	25.1712	0.153
219	C	B	21.9662	0.241
220	D	B	26.0414	0.224
221	D	B	23.3739	0.167
222	D	B	22.8589	0.168
223	D	B	23.1632	0.172
224	D	B	22.3246	0.187
225	D	B	21.3172	0.153
226	D	B	22.9579	0.180
227	D	B	22.2849	0.149
228	D	B	18.8964	0.216
229	D	B	22.5753	0.209
230	D	B	21.7115	0.107
231	D	B	22.3319	0.227
232	D	B	23.1688	0.177
233	D	B	21.1302	0.193
234	D	B	21.9332	0.206
235	D	B	20.0268	0.212
236	D	B	23.9798	0.292
237	D	B	23.8871	0.152

---------- TRT=II ----------

OBS	REP	AQUA	LENGTH	WEIGHT
238	A	A	24.4673	0.227
239	A	A	24.5354	0.247
240	A	A	24.6412	0.160
241	A	A	24.3928	0.273
242	A	A	23.1013	0.169
243	A	A	22.6257	0.117

244	A	A	23.0872	0.213
245	A	A	21.5291	0.238
246	A	A	19.6194	0.150
247	A	A	22.2092	0.070
248	A	A	24.2349	0.220
249	A	A	25.5072	0.170
250	A	A	25.1249	0.173
251	A	A	24.6620	0.250
252	A	A	23.3478	0.214
253	A	A	23.0163	0.169
254	A	A	21.8090	0.183
255	A	A	21.1744	0.228
256	A	A	21.6500	0.217
257	A	A	15.8884	0.220
258	B	A	25.2509	0.151
259	B	A	19.0751	0.160
260	B	A	26.1461	0.236
261	B	A	21.6114	0.131
262	B	A	24.6174	0.322
263	B	A	24.8708	0.156
264	B	A	20.1995	0.203

---------- TRT=II ----------
(continued)

OBS	REP	AQUA	LENGTH	WEIGHT
265	B	A	22.8987	0.116
266	B	A	21.5913	0.229
267	B	A	23.3377	0.167
268	B	A	22.7447	0.108
269	B	A	23.3422	0.258
270	B	A	22.4757	0.216
271	B	A	22.4467	0.223
272	B	A	21.0574	0.205
273	B	A	19.7743	0.122
274	B	A	20.5206	0.135
275	B	A	21.5113	0.204
276	B	A	23.3405	0.166
277	B	A	19.8014	0.200
278	C	B	19.1410	0.225
279	C	B	25.1246	0.206
280	C	B	23.4680	0.130
281	C	B	26.0202	0.236
282	C	B	23.3405	0.117
283	C	B	23.9781	0.220
284	C	B	23.8769	0.210
285	C	B	20.1701	0.103
286	C	B	21.9377	0.242
287	C	B	18.9853	0.174
288	C	B	21.3367	0.223
289	C	B	23.8496	0.187
290	C	B	22.1872	0.256
291	C	B	20.5432	0.317
292	C	B	26.7853	0.270
293	C	B	22.8742	0.191
294	C	B	25.6604	0.199
295	C	B	24.6065	0.157
296	C	B	23.9853	0.128
297	C	B	20.7002	0.100
298	D	B	24.8813	0.316
299	D	B	24.8695	0.035
300	D	B	28.0153	0.243
301	D	B	21.2205	0.132
302	D	B	22.2048	0.266
303	D	B	24.4899	0.019
304	D	B	19.9858	0.236

305	D	B	19.3960	0.179
306	D	B	19.6906	0.123
307	D	B	11.9047	0.249
308	D	B	25.7737	0.252
309	D	B	24.2975	0.223
310	D	B	25.4616	0.122
311	D	B	23.3673	0.121
312	D	B	25.5187	0.230
313	D	B	23.5956	0.218
314	D	B	20.3183	0.147
315	D	B	21.1191	0.160
316	D	B	14.3204	0.206

TRT=III

OBS	REP	AQUA	LENGTH	WEIGHT
317	A	A	23.6823	0.194
318	A	A	22.6174	0.259
319	A	A	24.3677	0.219
320	A	A	21.8459	0.209
321	A	A	22.7072	0.211
322	A	A	23.1126	0.207
323	A	A	22.7929	0.186
324	A	A	23.8711	0.175
325	A	A	24.0256	0.223
326	A	A	23.8578	0.158
327	A	A	23.0897	0.219
328	A	A	22.6257	0.189
329	A	A	21.8102	0.139
330	A	A	22.4007	0.170
331	A	A	23.4753	0.222
332	A	A	24.5430	0.187
333	A	A	21.8325	0.171
334	A	A	22.0051	0.186
335	A	A	20.5337	0.219
336	A	A	22.9090	0.219
337	B	A	23.4791	0.300
338	B	A	25.5458	0.226
339	B	A	25.2985	0.220
340	B	A	22.7619	0.194
341	B	A	25.3954	0.125
342	B	A	24.1905	0.047
343	B	A	22.4366	0.189
344	B	A	22.8379	0.206
345	B	A	22.7046	0.086
346	B	A	23.8660	0.103
347	B	A	22.5797	0.190
348	B	A	22.5389	0.195
349	B	A	20.5476	0.099
350	B	A	19.3893	0.296
351	B	A	19.9161	0.116
352	B	A	19.8960	0.239
353	B	A	19.1512	0.161
354	B	A	19.0375	0.245
355	B	A	18.3887	0.217
356	B	A	13.4881	0.104
357	C	B	24.6158	0.249
358	C	B	23.3447	0.231
359	C	B	24.4922	0.218
360	C	B	23.3516	0.164
361	C	B	24.3647	0.222
362	C	B	22.1927	0.210
363	C	B	19.9058	0.188
364	C	B	21.9429	0.108
365	C	B	18.9373	0.171
366	C	B	18.7495	0.106

367	C	B	24.3404	0.257
368	C	B	25.3065	0.147
369	C	B	22.0770	0.179
370	C	B	24.0432	0.173
371	C	B	24.3864	0.195
372	C	B	25.3810	0.252

TRT=III (continued)

OBS	REP	AQUA	LENGTH	WEIGHT
373	C	B	21.9810	0.170
374	C	B	22.4119	0.235
375	C	B	22.7476	0.222
376	D	B	25.3152	0.223
377	D	B	21.9599	0.249
378	D	B	24.1074	0.300
379	D	B	23.1435	0.215
380	D	B	24.6197	0.160
381	D	B	22.9597	0.161
382	D	B	20.7175	0.132
383	D	B	21.5672	0.183
384	D	B	20.5349	0.237
385	D	B	22.4554	0.147
386	D	B	25.4056	0.190
387	D	B	22.7046	0.172
388	D	B	24.5082	0.142
389	D	B	21.5777	0.200
390	D	B	24.3677	0.241
391	D	B	21.0624	0.176
392	D	B	21.8180	0.204
393	D	B	21.1825	0.161
394	D	B	23.5459	0.238

TRT=IV

OBS	REP	AQUA	LENGTH	WEIGHT
395	A	A	27.1963	0.244
396	A	A	23.1126	0.176
397	A	A	26.7236	0.125
398	A	A	21.8269	0.313
399	A	A	22.8322	0.109
400	A	A	24.2402	0.172
401	A	A	22.4768	0.192
402	A	A	23.0967	0.331
403	A	A	23.8206	0.204
404	A	A	18.4522	0.193
405	A	A	21.8120	0.256
406	A	A	20.1693	0.204
407	A	A	24.7335	0.235
408	A	A	23.9445	0.178
409	A	A	22.6099	0.181
410	A	A	20.3107	0.095
411	A	A	22.7322	0.218
412	A	A	22.2045	0.175
413	A	A	18.0841	0.203
414	B	A	23.2399	0.200
415	B	A	24.3677	0.196
416	B	A	23.5013	0.239
417	B	A	23.0978	0.237
418	B	A	25.2525	0.206
419	B	A	21.9366	0.199
420	B	A	23.5997	0.198
421	B	A	21.4359	0.221

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TRT=IV
(continued)

OBS	REP	AQUA	LENGTH	WEIGHT
422	B	A	20.3806	0.201
423	B	A	21.4355	0.200
424	B	A	21.7893	0.233
425	B	A	22.8379	0.172
426	B	A	23.8711	0.139
427	B	A	23.6190	0.280
428	B	A	23.8615	0.070
429	B	A	23.7303	0.222
430	B	A	25.2573	0.186
431	B	A	23.4517	0.216
432	B	A	22.6174	0.157
433	B	A	16.6194	0.168
434	C	B	22.2440	0.125
435	C	B	21.5570	0.269
436	C	B	23.9890	0.178
437	C	B	21.0747	0.160
438	C	B	25.4689	0.220
439	C	B	24.6620	0.140
440	C	B	23.8585	0.168
441	C	B	21.1191	0.190
442	C	B	21.4397	0.166
443	C	B	20.5812	0.220
444	C	B	18.9102	0.203
445	C	B	19.2617	0.125
446	C	B	22.0696	0.166
447	C	B	18.7517	0.158
448	C	B	21.2572	0.127
449	C	B	21.4264	0.173
450	C	B	19.8400	0.132
451	C	B	21.3367	0.195
452	C	B	20.2087	0.297
453	C	B	20.3459	0.160
454	D	B	23.1347	0.172
455	D	B	21.3630	0.282
456	D	B	20.8200	0.170
457	D	B	19.3893	0.154
458	D	B	24.3764	0.243
459	D	B	22.7819	0.253
460	D	B	21.0929	0.132
461	D	B	22.5638	0.166
462	D	B	22.1913	0.161
463	D	B	20.6644	0.172
464	D	B	21.5630	0.133
465	D	B	22.5742	0.164
466	D	B	22.3483	0.196
467	D	B	21.1956	0.195
468	D	B	22.1465	0.178
469	D	B	24.6989	0.187
470	D	B	22.0696	0.146
471	D	B	22.5638	0.189
472	D	B	20.0491	0.200
473	D	B	20.7899	0.181

TRT=V

OBS	REP	AQUA	LENGTH	WEIGHT
474	A	A	17.3186	0.223
475	A	A	22.2004	0.234

476	A	A	17.9844	0.128
477	A	A	17.8774	0.143
478	A	A	23.0470	0.106
479	A	A	23.3478	0.184
480	A	A	23.7796	0.150
481	A	A	22.3246	0.212
482	A	A	24.3807	0.060
483	A	A	21.3447	0.086
484	A	A	22.4239	0.081
485	A	A	20.4121	0.134
486	A	A	21.4503	0.160
487	A	A	21.3367	0.140
488	A	A	21.4507	0.173
489	A	A	21.7216	0.153
490	A	A	19.9646	0.253
491	A	A	20.3171	0.209
492	A	A	19.9544	0.141
493	A	A	15.3664	0.204
494	B	A	22.6347	0.140
495	B	A	21.1825	0.165
496	B	A	23.6286	0.102
497	B	A	21.6815	0.291
498	B	A	24.6197	0.214
499	B	A	20.9175	0.195
500	B	A	23.1947	0.101
501	B	A	20.2670	0.109
502	B	A	20.7884	0.175
503	B	A	21.3732	0.105
504	B	A	21.4640	0.077
505	B	A	20.4121	0.175
506	B	A	22.3901	0.146
507	B	A	20.6860	0.146
508	B	A	19.0136	0.190
509	B	A	17.7610	0.211
510	B	A	20.5586	0.183
511	B	A	18.5787	0.156
512	B	A	19.7335	0.145
513	B	A	17.9713	0.159
514	C	B	22.7530	0.182
515	C	B	20.1511	0.173
516	C	B	21.2817	0.155
517	C	B	20.6927	0.133
518	C	B	21.8120	0.094
519	C	B	18.5283	0.101
520	C	B	19.6331	0.199
521	C	B	21.6173	0.115
522	C	B	23.2732	0.187
523	C	B	22.5634	0.203
524	C	B	21.9332	0.161
525	C	B	21.4355	0.209
526	C	B	22.0858	0.145
527	C	B	20.2847	0.181
528	C	B	17.8719	0.192
529	C	B	21.3869	0.180

TRT=V
(continued)

OBS	REP	AQUA	LENGTH	WEIGHT
530	C	B	17.8596	0.111
531	C	B	18.3723	0.138
532	D	B	23.4878	0.167
533	D	B	24.0449	0.113
534	D	B	23.7933	0.208
535	D	B	21.2649	0.179
536	D	B	20.6624	0.080

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537	D	B	23.2116	0.262
538	D	B	21.8816	0.150
539	D	B	21.9895	0.216
540	D	B	22.6659	0.184
541	D	B	19.3922	0.212
542	D	B	23.2116	0.094
543	D	B	20.5527	0.094
544	D	B	20.0248	0.149
545	D	B	21.5536	0.134
546	D	B	20.0333	0.140
547	D	B	17.5509	0.237
548	D	B	19.2258	0.171
549	D	B	16.9205	0.171
550	D	B	21.3843	0.161
551	D	B	17.9939	0.187

General Linear Models Procedure
Class Level Information

Class	Levels	Values
TRT	6	C I II III IV V
REP	8	A B C D E F G H
AQUA	4	A B C D

Number of observations in data set = 551

General Linear Models Procedure

Dependent Variable: LENGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	27	313.47936170	11.61034673	2.84	0.0001
Error	523	2140.21088653	4.09218143		
Corrected Total	550	2453.69024823			

R-Square	C.V.	Root MSE	LENGTH Mean
0.127758	9.027539	2.0229141	22.408257

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	5	231.43513151	46.28702630	11.31	0.0001
AQUA(TRT)	8	43.11264083	5.38908010	1.32	0.2323
REP(TRT*AQUA)	14	38.93158936	2.78082781	0.68	0.7953

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	231.22299951	46.24459990	11.30	0.0001
AQUA(TRT)	8	42.76878186	5.34609773	1.31	0.2376
REP(TRT*AQUA)	14	38.93158936	2.78082781	0.68	0.7953

General Linear Models Procedure

Dependent Variable: WEIGHT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	27	0.11263924	0.00417182	1.72	0.0140
Error	523	1.26687493	0.00242232		
Corrected Total	550	1.37951417			

R-Square	C.V.	Root MSE	WEIGHT Mean
0.081651	26.11729	0.0492171	0.1884465

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	5	0.07430602	0.01486120	6.14	0.0001
AQUA(TRT)	8	0.01842720	0.00230340	0.95	0.4739
REP(TRT*AQUA)	14	0.01990603	0.00142186	0.59	0.8761

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	0.07412713	0.01482543	6.12	0.0001
AQUA(TRT)	8	0.01824119	0.00228015	0.94	0.4818
REP(TRT*AQUA)	14	0.01990603	0.00142186	0.59	0.8761

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= 523 MSE= 4.092181
Critical Value of T= 2.94875

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

TRT Comparison		Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
C	- I	-0.7845	0.0401	0.8647	
C	- III	-0.5033	0.3213	1.1459	
C	- II	-0.4998	0.3213	1.1424	
C	- IV	-0.1431	0.6780	1.4991	
C	- V	1.1433	1.9679	2.7925	***
I	- C	-0.8647	-0.0401	0.7845	
I	- III	-0.6740	0.2812	1.2363	
I	- II	-0.6710	0.2812	1.2333	
I	- IV	-0.3143	0.6379	1.5900	
I	- V	0.9726	1.9278	2.8830	***
III	- C	-1.1459	-0.3213	0.5033	
III	- I	-1.2363	-0.2812	0.6740	
III	- II	-0.9521	0.0000	0.9522	
III	- IV	-0.5954	0.3567	1.3089	
III	- V	0.6915	1.6467	2.6018	***
II	- C	-1.1424	-0.3213	0.4998	

II	- I	-1.2333	-0.2812	0.6710	
II	- III	-0.9522	-0.0000	0.9521	
II	- IV	-0.5924	0.3567	1.3058	
II	- V	0.6945	1.6466	2.5988	***
IV	- C	-1.4991	-0.6780	0.1431	
IV	- I	-1.5900	-0.6379	0.3143	
IV	- III	-1.3089	-0.3567	0.5954	
IV	- II	-1.3058	-0.3567	0.5924	
IV	- V	0.3378	1.2899	2.2421	***
V	- C	-2.7925	-1.9679	-1.1433	***
V	- I	-2.8830	-1.9278	-0.9726	***
V	- III	-2.6018	-1.6467	-0.6915	***
V	- II	-2.5988	-1.6466	-0.6945	***
V	- IV	-2.2421	-1.2899	-0.3378	***

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= 523 MSE= 0.002422
Critical Value of T= 2.94875

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

TRT Comparison		Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
C	- I	-0.017847	0.002216	0.022278	
C	- III	-0.015257	0.004806	0.024868	
C	- IV	-0.013277	0.006700	0.026677	
C	- II	-0.013201	0.006776	0.026753	
C	- V	0.015782	0.035844	0.055906	***
I	- C	-0.022278	-0.002216	0.017847	
I	- III	-0.020649	0.002590	0.025829	
I	- IV	-0.018682	0.004484	0.027649	
I	- II	-0.018606	0.004560	0.027725	
I	- V	0.010389	0.033628	0.056867	***
III	- C	-0.024868	-0.004806	0.015257	
III	- I	-0.025829	-0.002590	0.020649	
III	- IV	-0.021271	0.001894	0.025060	
III	- II	-0.021195	0.001970	0.025136	
III	- V	0.007799	0.031038	0.054278	***
IV	- C	-0.026677	-0.006700	0.013277	
IV	- I	-0.027649	-0.004484	0.018682	
IV	- III	-0.025060	-0.001894	0.021271	
IV	- II	-0.023016	0.000076	0.023168	
IV	- V	0.005979	0.029144	0.052310	***
II	- C	-0.026753	-0.006776	0.013201	
II	- I	-0.027725	-0.004560	0.018606	
II	- III	-0.025136	-0.001970	0.021195	
II	- IV	-0.023168	-0.000076	0.023016	
II	- V	0.005903	0.029068	0.052234	***

V	- C	-0.055906	-0.035844	-0.015782	***
V	- I	-0.056867	-0.033628	-0.010389	***
V	- III	-0.054278	-0.031038	-0.007799	***
V	- IV	-0.052310	-0.029144	-0.005979	***
V	- II	-0.052234	-0.029068	-0.005903	***

Univariate Procedure

Variable=LENGTH

Moments

N	551	Sum Wgts	551
Mean	22.40826	Sum	12346.95
Std Dev	2.112168	Variance	4.461255
Skewness	-0.69421	Kurtosis	1.607929
USS	279127.3	CSS	2453.69
CV	9.425848	Std Mean	0.089981
T:Mean=0	249.0321	Pr>|T|	0.0001
Num ^= 0	551	Num > 0	551
M(Sign)	275.5	Pr>=|M|	0.0001
Sgn Rank	76038	Pr>=|S|	0.0001

Quantiles(Def=5)

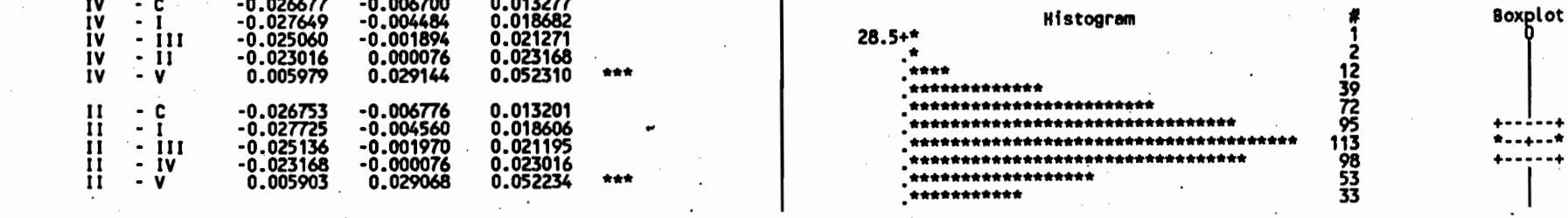
100% Max	28.0153	99%	26.6627
75% Q3	23.866	95%	25.4747
50% Med	22.5742	90%	24.9022
25% Q1	21.2649	10%	19.8014
0% Min	11.9047	5%	18.7495
		1%	16.6194
Range	16.1106		
Q3-Q1	2.6011		
Mode	24.3677		

Extremes

Lowest	Obs	Highest	Obs
11.9047(	307)	26.7236(	397)
13.4881(	356)	26.7853(	292)
14.3204(	316)	27.056(	82)
15.3664(	493)	27.1963(	395)
15.8884(	257)	28.0153(	300)

Univariate Procedure

Variable=LENGTH



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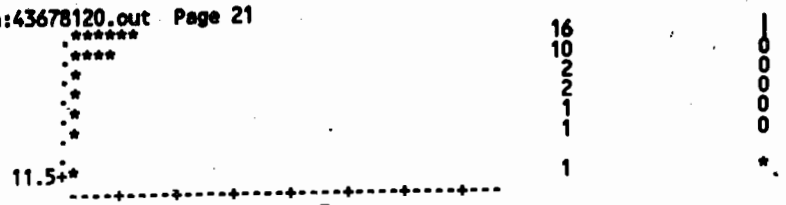
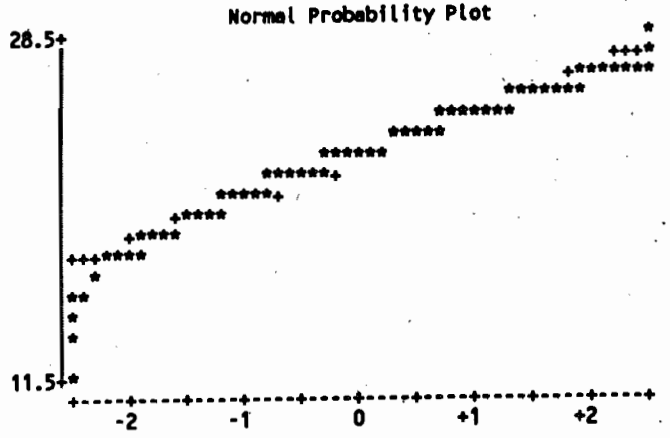




Univariate Procedure

Variable=WEIGHT

Moments

N	551	Sum Wgts	551
Mean	0.188446	Sum	103.834
Std Dev	0.050082	Variance	0.002508
Skewness	-0.02592	Kurtosis	0.159942
USS	20.94666	CSS	1.379514
CV	26.57625	Std Mean	0.002134
T:Mean=0	88.32467	Pr>|T|	0.0001
Num ^= 0	551	Num > 0	551
M(Sign)	275.5	Pr>=|M|	0.0001
Sgn Rank	76038	Pr>=|S|	0.0001

Quantiles(Def=5)

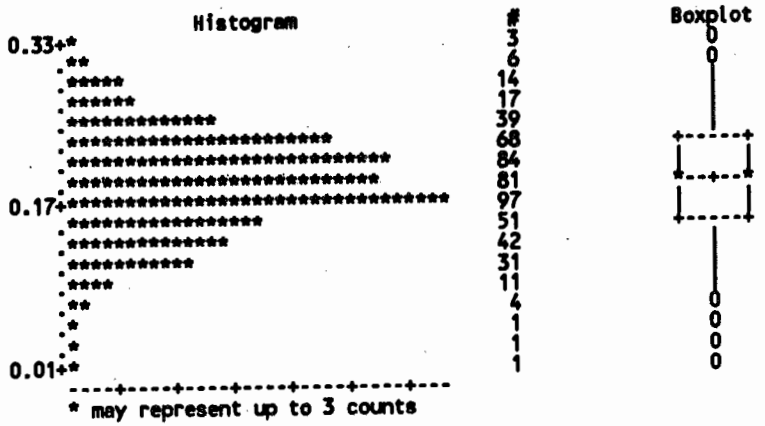
100% Max	0.331	99%	0.313
75% Q3	0.221	95%	0.273
50% Med	0.188	90%	0.25
25% Q1	0.158	10%	0.125
0% Min	0.019	5%	0.105
		1%	0.07
Range	0.312		
Q3-Q1	0.063		
Mode	0.173		

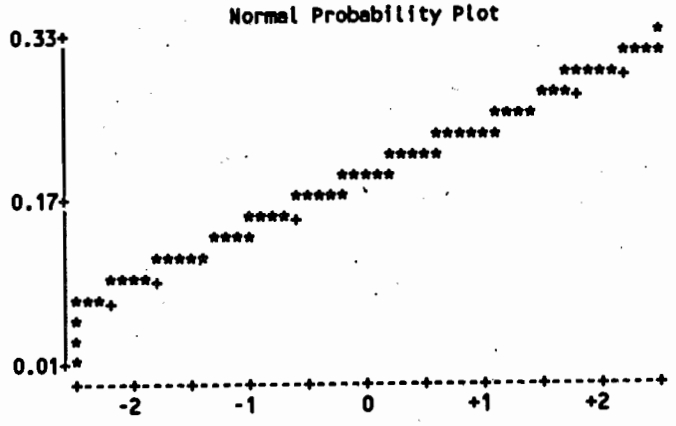
Extremes

Lowest	Obs	Highest	Obs
0.019(	303)	0.316(	298)
0.035(	299)	0.317(	291)
0.047(	342)	0.322(	262)
0.06(	482)	0.327(	7)
0.07(	428)	0.331(	402)

Univariate Procedure

Variable=WEIGHT





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General Linear Models Procedure
Class Level Information

Class	Levels	Values
TRT	6	C I II III IV V
REP	8	A B C D E F G H
AQUA	4	A B C D

Number of observations in data set = 551

General Linear Models Procedure

Dependent Variable: LENGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	27	313.47936170	11.61034673	2.84	0.0001
Error	523	2140.21088653	4.09218143		
Corrected Total	550	2453.69024823			

R-Square	C.V.	Root MSE	LENGTH Mean
0.127758	9.027539	2.0229141	22.408257

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	5	231.43513151	46.28702630	11.31	0.0001
AQUA(TRT)	8	43.11264083	5.38908010	1.32	0.2323
REP(TRT*AQUA)	14	38.93158936	2.78082781	0.68	0.7953

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	231.22299951	46.24459990	11.30	0.0001
AQUA(TRT)	8	42.76878186	5.34609773	1.31	0.2376
REP(TRT*AQUA)	14	38.93158936	2.78082781	0.68	0.7953

General Linear Models Procedure

Dependent Variable: WEIGHT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	27	0.11263924	0.00417182	1.72	0.0140
Error	523	1.26687493	0.00242232		
Corrected Total	550	1.37951417			

R-Square	C.V.	Root MSE	WEIGHT Mean
0.081651	26.11729	0.0492171	0.1884465

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	5	0.07430602	0.01486120	6.14	0.0001
AQUA(TRT)	8	0.01842720	0.00230340	0.95	0.4739
REP(TRT*AQUA)	14	0.01990603	0.00142186	0.59	0.8761

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	0.07412713	0.01482543	6.12	0.0001
AQUA(TRT)	8	0.01824119	0.00228015	0.94	0.4818
REP(TRT*AQUA)	14	0.01990603	0.00142186	0.59	0.8761

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= 523 MSE= 4.092181
Critical Value of Dunnett's T= 2.285

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

TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
I - C	-0.6790	-0.0401	0.5989	
III - C	-0.9602	-0.3213	0.3177	
II - C	-0.9575	-0.3213	0.3150	
IV - C	-1.3142	-0.6780	-0.0417	***
V - C	-2.6069	-1.9679	-1.3290	***

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= 523 MSE= 0.002422
Critical Value of Dunnett's T= 2.285

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

TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
I - C	-0.017761	-0.002216	0.013330	
III - C	-0.020351	-0.004806	0.010740	
IV - C	-0.022179	-0.006700	0.008780	
II - C	-0.022255	-0.006776	0.008704	
V - C	-0.051389	-0.035844	-0.020298	***

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