Data Requirement::

EPA DP Barcode D288775

EPA MRID 458675-01
EPA Guideline 70-1(Special Study)

Test material: **Purity:** not reported
Common name Atrazine
Chemical name: IUPAC
CAS name 6-chloro-N-ethyl-N'-(1-methylethyl)-1,3,5-triazine-2,4-diamine
CAS No. 1912-24-9
Synonyms
EPA PC Code: 80803

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EPA PC Code 080803

Date Evaluation Completed: 06/01/2003

CITATION: Giesy, J. P., M. Hecker, and P. D. Jones. 2003. South African Analytical Support – Hormone and Aromatase Analysis (SA- 01C). Aquatic Toxicology Laboratory, Michigan State University, National Food Safety and Toxicology Center, E. Lansing, MI. Sponsor: Syngenta Crop Protection, Inc., Laboratory Study ID ECORISK Number MSU-07.

EXECUTIVE SUMMARY:

A field study was conducted in corn-growing (experimental) and non-corn growing (reference) areas in the Potchefstroom region of South Africa to determine whether exposure to atrazine and related triazines could affect aromatization of testosterone to estradiol in wild populations of African clawed frogs (*Xenopus laevis*) In this region, atrazine is typically applied in October to November. Most frogs were collected in April and May after the rainy season; however, in some atrazine-use areas, frog collections extended until mid-September due to the low sample sizes. Frogs were collected from baited traps after 48 hours, transferred to the lab, and housed individually in 2-L plastic cages for 48 hours before collecting samples. Blood samples were collected for plasma testosterone and estradiol analysis and gonad (one) samples were collected for aromatase activity analysis. Snout-vent length, body weight, and gonad weight were measured. Gonadosomatic index (GSI = gonad weight ÷ body weight), condition index (CI = body weight ÷ snout-vent length) and the ratio of plasma testosterone to estradiol were calculated.

Mean and median GSI were greater for both males and females in high atrazine exposure (experimental) sites compared to low atrazine exposure (reference) sites; however, there was no difference in body weight (CI) between high and low atrazine exposure sites. When comparisons were made between ponds with the highest atrazine concentrations to those with the lowest atrazine concentrations, males from high atrazine exposure sites had significantly lower median plasma testosterone than males from low atrazine exposure sites. Although male plasma testosterone was not significantly correlated with atrazine concentrations, there was a significant negative correlation between the log of male plasma testosterone levels and log of the atrazine degradate diaminochlorotriazine (DACT) concentration. Additionally, female plasma testosterone levels were negatively correlated with atrazine concentrations, and females collected from reference ponds had significantly higher testosterone levels than females collected from experimental sites.

Mean plasma estradiol concentrations were significantly lower in experimental site males and females compared to reference site animals. Male plasma estradiol was negatively correlated with log DACT concentrations, while female estradiol concentrations were negatively correlated with atrazine concentrations.

Ideally, a study should be designed based on the variability associated with the measurement endpoints. Sample sizes should reflect the number of test animals required to identify a specified difference within a given level of certainty. Potential sources of variability should also be identified and controlled to the extent possible. The current study did not appear to base its design on the variability associated with the range of measurement endpoints. Animals were collected over some fairly broad periods of time (up to 6 months) that would almost assure that animals within the same group would vary considerably in terms of development. Based on the number of animals collected, frogs appeared to be more abundant in reference sites than in corn-growing regions where half as many frogs were collected. The entire design was questionable, including extended sampling periods in ponds of questionable similarity, baiting with potentially hormone-laden liver/meat, and confinement in cages at unknown loading rates. These factors could confound the study's ability to reliably and reasonably quantify what "typical" steroid hormone levels and/or aromatase activity is for *Xenopus*. Additionally, the presence of atrazine and triazine degradates across all sites (reference and corn-growing) and the failure of the study to characterize the suite of pesticides other than triazines in the study sites contributes to the uncertain utility of this study in attempting to document potential effects of atrazine.

In order for such a study to be of value, the authors would need to conduct a pilot study first to establish the necessary sample size required to detect a specified difference in the biological attributes being measured within a certain level of confidence. The sample size would be based on the variability associated with a particular

parameter. Unfortunately, the levels of variability associated with the parameters of interest in this study would likely require very high sample sizes. A more practical approach would be to identify major sources of variability and attempt to better control those conditions.

The current data suggest that atrazine and/or its degradates may be impacting plasma testosterone; however, the data are not conclusive and the mechanism underlying this phenomena can not be identified based on this study.

I. MATERIALS AND METHODS

GUIDELINE FOLLOWED: Nonguideline Study

COMPLIANCE: Not conducted under full GLP; however, most practices as defined by 40 CFR Part 160, August 19, 1989 were established for this study, including but not limited to:

- Written, authorized protocol
- Written, authorized Standard Operating Procedures for all key procedures.
- Organization and Personnel were sufficient in terms of number, education, training and experience.
- Facilities were of suitable size and construction
- Equipment used was of appropriate design and adequate capacity.
- Independent QA Inspections were conducted.
- Phase Report was written
- Raw data, documentation, records, protocols, and final phase report will be archieved.

A. MATERIALS:

1. Test Material Atrazine

Description: Not reported

Lot No./Batch No. : Not reported

Purity: Not reported

Stability of compound

under test conditions: Not reported

Storage conditions of

test chemicals: Not reported

2. <u>Test organism</u>:

Species: African clawed frog (*Xenopus laevis*)

.

Age at test initiation: Adults

Weight at study initiation (mean and range): Not reported

Length at study initiation (mean and range): Not reported

Source: Adult *X. laevis* were field collected in two areas (non-corn growing and corn growing) in the vicinity of Potchefstrooom, South Africa, using traps baited with liver and meat scraps.

B. STUDY DESIGN:

Objective: 1. To determine whether exposure to atrazine and related triazines under field conditions in a major corn-growing area in South Africa could affect aromatization of testosterone and estradiol in wild populations of clawed frogs (*X. laevis*) and more specifically:

a. to determine if exposure to triazines used in corn production affects plasma concentrations of the sex steroid hormones T and E2 in male and female *X. laevis* adults;
b. to determine whether there are alterations in aromatase activity in adult *X. laevis* in both sexes in response to exposure to triazines;
c. to evaluate the range of triazine concentrations, if any, that might lead to changes in plasma hormone concentrations and aromatase activity synthesis; and
d. to evaluate the possible relevance of triazine-mediated alterations in the aromatization of T to E2 to reproduction.

1. Experimental Conditions

a) Range-finding Study:

b) Definitive Study

Table 1 . Experimental Parameters

Sampling was conducted in April and May approximately 6 months after atrazine was applied (October / November); water samples to characterize exposure was collected one month prior to frog sampling. Environmental parameters measured at each site included habitat description (vegetative cover and water depth). Water samples were analyzed for atrazine, related triazines, other pesticides and metals.

A total of eight sites in two adjacent regions (Viljoenskroon corn growing region = E for experimental were sampled; Potchefstroom non-corn growing region = C or R or control/reference) in South Africa.

Compounds of interest included atrazine, its metabolites desethylated atrazine (DEA), desisopropyl atrazine (DIA), diaminochlorotriazine (DACT), plus terbutylazine, simazine and acetochlor.

Non-corn growing sites had secchi disc readings ranging from 6.5 to 32 cm; pH ranged from 5.1 to 8.8; some of the control ponds were subject to drying (semi-permanent).

Corn-growing sites had surface areas ranging from 2,400 m^2 to 68,000 m^2; pH ranged from 7.2 - 10.8 and upper secchi disc value of 207 cm.

Frogs were sampled after the rainy season in April and May; however, at atrazine site E8, frogs were sampled over a six -month period (April - September) due to low sample sizes. Sampling at all other sites took place once or twice within a "few days." Frogs were collected in 10 baited traps and harvested after two days. Afterwards, animals were housed individually in 2-L plastic containers for 48 hours to recover from capture stress. Blood was collected by cardiac puncture; gonads were removed, weighed and measured. One gonad was fixed in 10% neutral buffered formalin or Bouin's, while the second was snap frozen. Gonadosomatic index (weight of the gonad ÷ snout-vent length) and the condition index (body weight ÷ snout-vent length) were calculated.

Concentrations of testosterone (T) and estradiol (E2) in blood plasma were measured by competitive ELISA as described by Cuisset *et al.* 1994 with modifications by Hecker *et al.* 2002 using COSTAR high binding plates. Working ranges of the assays were from 0.78 to 800 pg/well for both testosterone and estradiol.

Aromatase activity was measured following the protocol from Lephart and Simpson 1991 with minor modifications (Sanderson 2000). Less than 0.5 g of gonad was homogenized.

II. RESULTS and DISCUSSION: [All results discussed in this section and the next are those reported by the study authors. Although supplemental data are typically used in a qualitative manner only, EFED verified spreadsheet data and ran basic statistical analyses on the major study parameters. See attached appendix. If results appeared to differ in any substantive way, the difference was reported in the text below.]

Atrazine Concentrations

With the exception of site E8 (peak concentration in late January at 9 µg/l), the greatest concentrations of atrazine in pond water were observed at the end of the rainy season (March through May); highest atrazine concentrations were measured at sites E1 (4.1 µg/L), E6 (3.9 µg/L) and E8 (3.5 µg/L). Concentrations at C1, C3, C6 and E4 were low but could be quantified. The log concentrations of triazines DIA, DEA and atrazine were significantly correlated with pH of the water. ($p < 0.034$, r-range: 0.770 - 0.802). Log DIA also showed a positive linear regression with log temperature (7 = 0.801; p= 0.017) and log visual depth ® = 0.814; p = 0.014). Monitoring data (**Table 1**) indicated that measurable levels of atrazine were detected at all sampling sites (range 0.2 - 3.53 µg/L). The atrazine degradate desisopropyl atrazine (DIA) was as high in C3 (0.61 µg/L) as in many of the corn-growing sites, while diaminochlorotriazine (DACT) in C1 (3.91 µg/L) was the second highest concentration of the degradate detected at any of the sampling sites. Mean-measured atrazine concentrations, which were determined four weeks before frogs were collected and averaged over November 2001 to June 2002 (Table 2), indicated that atrazine in reference sites was generally an order of magnitude lower than sites located in corn-growing areas. However, all concentrations were apparently readily quantified.

Table 1. Concentrations of pesticides (µg/L) at the different sampling sites. Values were calculated from two individual samplings that were conducted with a time period in 2002 of 4 weeks before collecting *X. laevis*.

	C1	C3	C6	E1	E3	E4	E6	E8
Site	**4/2**	**3/18**	**5/1**	**4/15**	**4/1**	**4/2**	**4/15**	**4/15**
	4/15	**4/2**	**5/13**	**5/1**	**4/15**	**4/15**	**5/1**	**5/1**
Simazin	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.7 1.2
e	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	

DACT	3.91	<0.1	<0.1	<0.1	0.38	<0.1	5.45	1.24
	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
DIA	0.23	0.3	0.13	0.7	0.47	0.18	0.49	0.7
	0.27	0.61	0.15	0.93	0.28	0.64	0.32	0.88
DEA	0.18	0.15	0.12	1.29	0.43	0.11	1.09	1.04
	<0.1	<0.1	0.13	1.16	0.38	<0.1	0.9	0.91
Atrazine	0.28	0.36	<0.1	4.14	1.05	0.32	3.78	3.53
	0.26	0.57	0.2	3.5	1.01	0.29	3.9	3.12
Terbuty	<0.1	<0.1	0.51	3.66	0.97	0.19	2.46	0.86
l	<0.1	<0.1	0.59	2.95	1.07	0.24	2.4	0.72

Table 2. Mean concentrations of atrazine at the sampling locations measured during four weeks collecting frogs, and time weighted means of atrazine measured between November 2001 and June 2002. Values listed in ascending order of concentration

Location	Mean Atrazine Concentration 4 weeks Before Sampling	Location	Time-weighted Mean Atrazine Concentration
C6	0.13	C1	0.15
C1	0.27	C6	0.19
E4	0.31	C3	0.25
C3	0.47	E4	0.48
E3	1.0	E3	0.82
E8	3.3	E6	2.6
E1	3.8	E1	3.2
E6	3.8	E8	3.4

Gonadosomatic Index (GSI)

The means of the median GSI values for both female (t-test; $p = 0.0640$) and male (t-test; $p = 0.0725$) from corn growing areas were greater than the female and male means from the non-corn growing areas. The GSI of females form E1 and E8 were more variable than those at other locations.

Condition Index

No statistically significant differences were observed in the means of the site-specific CI values between the corn-growing and non-corn growing sites regardless of whether the analysis was based on means or medians.

Testosterone (T)

Plasma T concentrations were greater in males than in females except in reference pond C1 where mean male plasma testosterone (~105 pg/mL) was roughly an order of magnitude lower than females' mean plasma testosterone (~1005 pg/mL). At sites C6 and E6, males and females contained roughly similar amounts of plasma testosterone. For males, there was no significant difference between plasma T in frogs from corn-growing and non-corn growing sites, and there was no correlation between plasma T and atrazine. However, there was a significant negative correlation between the log of male plasma T concentration and the log of the DACT concentration (r= -0.839, p = 0.009) Median and mean plasma T concentrations of males were not significantly different between the experimental and reference sites. However, when the sites were grouped into either those with the four greatest and four least atrazine concentrations or into groups where atrazine concentrations were greater than 3 µg/L vs those with concentrations that were less than 1 µg/L, there were significant differences, with the frogs from the greater atrazine sites having less median concentrations of plasma T.

Although the report states that mean and median female plasma testosterone levels were significantly higher in experimental ponds than at reference sites (t-test, mean p = 0.018; median 0.0061), the figure (Figure 4) depicting this relationship suggests the opposite, *i.e.*, that median female plasma testosterone concentrations were higher in reference sites. This would better support the fact that female plasma T concentrations were negatively correlated with atrazine concentrations (r = -0.725; p = 0.042).

Estradiol (E2)

Median female plasma concentrations of E2 from experimental sites were significantly less than those of females from reference sites (t-test; p = 0.0018), but there was no significant difference for males. Mean plasma estradiol concentrations were less at experimental sites for both males (t-test, p = 0.0186) and females (t-test; p = 0.0052). Concentrations of E2 in the plasma of both males and females were more variable in reference sites than those from experimental sites. Male plasma E2 were not related to atrazine but were negatively correlated with the log of DACT concentrations (r = -0.779; p = 0.023). In females, plasma E2 was negatively correlated with atrazine concentration (r = -0.833; p = 0.010).

E2/T Ratio

Because of the magnitude of variability associated with this index, E2/T ratios for both males and females were not significantly different either between the experimental and reference sites or between other location groupings regardless of whether they were based on means or medians. E2/T ratio in males was negatively correlated with DIA concentrations (r = -0.830; p = 0.011). There were no significant relationships for E2/T ratio for females and any triazine residues.

Aromatase Activity

Aromatase levels in testes were not measurable at most sites. There were no significant differences in median aromatase activity in ovaries between experimental and reference or when locations were grouped based on the highest and lowest atrazine concentrations. The greatest variability in ovarian aromatase activity was at site E8 and was attributed to the extended sampling period (April to September). Log ovarian aromatase activity was correlated with the log of the 4WM water temperature (7 = 0.786; p = 0.021); aromatase activity was not correlated with atrazine concentration but was correlated with with the log of the DIA concentration (r = 0.857; p = 0.007).

There were statistically significant linear regressions between the logarithms of T and E2 in both males (r = 0.757; p < 0.001) and females (r = 0.868; p < 0.001). Both sexes also exhibited positive relationships between log E2 and log E2/T (males: r = 0.804, p < 0.001; females: r = 0.582, p < 0.001). However, aromatase in females was not related to sex steroid concentrations.

C. <u>REPORTED STATISTICS</u>: Data used in statistical tests were stratified by sex, *i.e.*, male and female data analyzed separately. Studies were designed to be analyzed by both fixed-effects models and by regression type statistics because specific locations could not be classified as exposed or unexposed since atrazine residues were also detected in non-corn growing “reference sites”. Statistical comparisons were made between the median concentrations of plasma testosterone and estradiol as well as the E2/T ratio, the GSI, the EI and

gonadal aromatase; regression analysis between atrazine concentration and these parameters was also conducted.. For statistical tests, locations were grouped several ways: grouped based on whether they were in corn-growing (E) or non-corn growing (C) areas; grouped with a mean atrazine concentration ≤ 1.0 µg/L (C1, C3, C6, E3, E4) versus > 3 µg/L (E1, E6, E8). Finally, study sites were grouped with the four sites with the 4 smallest means in one group, and the remaining four sites with the four largest means in the other group. Two-sided two sample t-test was used to compare the mean of the site values in the first group to the mean of the site values in the second group. Two-sample Kolmogorov-Smirnov test was used to compare individual locations. Linear model comparisons of four -week average atrazine and/or metabolites were used for each parameter.

D. VERIFICATION OF STATISTICAL RESULTS: See attached SAS© output (Statistical Analysis System, Release 8.01, Cary, North Carolina.
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E. STUDY DEFICIENCIES:

Atrazine and/or triazine degradates were present in control sites.

While the low sample size at sites E1 and E8 may have been explained by the sudden introduction of predatory catfish, it does not explain why the remaining corn-growing sites (E3, E4 and E6) also yielded fewer frogs than non-corn growing sites.

Because frogs were sampled over disproportionate periods of time, e.g., 6 months for site E8, samples would likely contain animals at different stages of development

Frog traps were baited with liver/meat scraps that may have contained hormones.

Following capture, frogs were housed individually in “clean water” for 48 hours. The volume and characteristics of this water were not described in the study.

F. REVIEWER'S COMMENTS:

The large amount of variability associated with aromatase and plasma hormone data in laboratory studies make it difficult to understand the utility of conducting a field study with these parameters. Collecting animals over a six-month period would also contribute to extremely high variability.

Atrazine is typically applied in October / November when corn is planted in South Africa. Frog sampling was conducted after the rainy season in April to May and water samples to occurred within a time span of four weeks before frogs were sampled. At exposure site E8, frogs were sampled over a 6-month time frame. The fewer number of frogs was attributed to a high runoff event that washed catfish into the pond; the catfish preyed on the frogs.

Reference and atrazine-exposure sites appeared to be widely divergent, ranging from 5.1 - 8.8 at reference sites and 7.2 - 10.8 at atrazine sites.

Frogs were attracted into baited traps containing liver and/or scrap meat which may have contained hormones. Apparently trapped animals were held in cages for two days which should have provided sufficient time to consume all of the bait. Also, depending on catch rates, the loading within the cages could have stressed the frogs. Although it doesn't state the desired sample size in the report's methodology, apparently (based on the raw data), 20 male and 20 female frogs were to be sampled at each site. **Table 3** shows that while the desired sample size was generally available for frogs collected in non-corn growing areas, sample sizes were minimally 50% lower in corn-growing areas. In site E1, sampling for female frogs extended into late June, and at site E8 sampling extended into mid-August for females and into mid-September for males. Extended sampling periods at these two sites may have resulted in collecting animals that were at considerably different states of development. The gonadosomatic index and ovarian aromatase activity in females collected from sites E1 and E8 expressed the highest variability relative to any of the other treatment sites.

Table 3. Summary of total number of *Xenopus laevis* collected from April through May 2002 at non-corn growing (C) and corn growing (E) sites in South Africa.

Site	Males	Females
C1	20 (Apr 21 - Apr 23)	20 (Apr 21 - May 1)
C3	17 (Apr 4 - Apr 11)	20 (Apr 4 - Apr 11)
C6	20 (May 13 - May 15)	20 (May 13 - May 14)
E1	8 (April 29 - May 7)	8 (April 29 - June 29)
E3	10 (Apr 9 - Apr 17)	10 (Apr 9 - Apr 18)
E4	10 (Apr 13 - Apr 15)	10 (Apr 14 - Apr 16)
E6	10 (May 5 - May 9)	10 (May 5 - May 6)
E8	6 (Apr 29 - Sep 17)	15 (Apr 29 - Aug 17)

Statistical analyses were more regression-based because specific sampling locations could not be classified as exposed or unexposed. There was a range of concentrations of primary residues of concern, with greater concentrations in the corn-growing areas; however, residues were also detected in non-corn growing areas. In Phase II of the study (Smith *et al.* 2003), the authors suggested that atrazine residues in reference ponds may be a result of atmospheric deposition (wind).

The GSI and aromatase ovarian activity of females from E8 were more variable than those at other locations. This variability may have resulted from the long sampling period (six months) and the considerable changes in the frogs' reproductive state.

Gonadosomatic index suggests that both males and females collected in corn-growing areas were more sexually developed than their counterparts in "reference" sites.

Comparisons between male and female plasma testosterone levels were also are hindered by the considerable variability within pond and within treatment groups. Although median plasma testosterone levels were qualitatively different. Males in reference ponds had higher median plasma testosterone levels than males in experimental ponds by approximately a factor of 2. Similarly, females in reference ponds had higher median

plasma testosterone levels than females in experimental ponds by approximately a factor of 8. However, given the magnitude of variability, it wasn't possible to document statistical differences in means or medians. Only when the samples were grouped based on the three highest and three lowest atrazine exposures could statistical differences be documented in median T levels. Also, the text may be in error when it concludes that female plasma testosterone levels were higher in corn-growing areas (experimental) than in non-corn growing areas because the statement appears to contradict the figure (Figure 4) depicting the data and from the significant correlation showing that female plasma testosterone is negatively related to atrazine.

Based on Figure 5 , median plasma E2 concentrations in males from reference sites were approximately similar to female plasma estradiol concentrations in reference sites, while median male plasma estradiol at reference sites was approximately five-fold higher than plasma estradiol concentrations of males from experimental sites. A similar pattern existed for females where reference site animals had roughly six-fold higher estradiol concentrations than females at experimental sites.

Although the study authors conclude that there were no statistical differences in the ratio of estradiol to testosterone (E2/T), in a qualitative sense, the median values for females were relatively consistent across experimental and reference sites. However, the median ratio for males tended to be roughly double in animals collected from reference sites compared to those collected at experimental sites.

Although not considered very predictive (correlation coefficients ranged from 0.22 to 0.38), there were significant correlations ($p<0.026$) between condition index and both gonadosomatic index and log aromatase activity in females. This correlation is intuitively obvious because more gravid females should weigh more and have higher aromatase activity than less developed animals.

The report discussed a number of statistical differences that were detected and how misleading this could be based on the number of statistical comparisons that were run. The authors suggested that if Bonferroni's correction had been made, none of the p values would have been significant. The Bonferroni correction is used to control experiment error rates and is obtained by dividing the overall α-level for the study by the number of groups being compared. If the study has a large number of means, however, this process can be very

conservative. It may also fail to detect significant differences between groups and increase the likelihood of making a Type II error.

In this study, the authors discuss the relevancy of the Tavera-Mendoza *et al.* (2002*a* and 2002*b*) studies which showed decreased testicular volume in animals exposed to 21 µg/L and how the current study demonstrated increases in GSI. At the same time, though, they note that the current study's maximum exposure values were roughly five-fold lower than those used in the Tavera-Mendoza study and that improved food sources may have resulted in increased gonadal weight . Others differences in the Tavera-Mendoza study include: the laboratory study was presumably conducted on animals that were probably in the same state of development, the environmental conditions in the laboratory were better defined, and the laboratory study was an acute exposure (48 hour) as opposed to the current chronic study.

The authors state that there is no plausible mechanism that could be postulated to explain the negative correlation between plasma E2 concentrations in females and concentrations of atrazine in pond water; however, they note that correlations do not imply causality.

Since there were no differences in aromatase activities between locations or significant correlations between exposure to atrazine and aromatase activity, the authors believe that these findings do not support the Hayes *et al.* 2002*a, b* hypothesis that atrazine causes an increase in the production of estrogen by inducing aromatase activity. The fact that plasma T concentrations were less in groups with the higher atrazine exposure values was viewed as being consistent with the hypothesis that atrazine decreased plasma T, but the fact that atrazine concentrations were not correlated with plasma T was viewed as suggesting that the statistical significance was artifactual. The significant negative correlation between the E2/T ratio of males and DIA was viewed as being inconsistent with Sanderson *et al.* 2001, showing that DIA significantly increased CYP-19 mRNA expression as well as aromatase activity. They concluded, though, that the differences in plasma steroid hormone concentrations were not caused by up-regulation of aromatase activity. The report states "although significant negative correlations were observed between exposure to atrazine and its metabolite DACT and plasma concentrations of sex steroids in wild *X. laevis*, it is impossible from this study to conclude the exact cause or accuracy of these differences." The experimental corn-growing regions were subject to a range of chemicals there were not fully characterized and that may have contributed to the observed statistical differences.

G. CONCLUSIONS:

This study indicates that plasma hormone levels and gonadal aromatase activity are highly variable and depend on a number of factors that were not anticipated when the study was designed. Reference ponds in areas of South Africa where corn is not grown were subject to variable levels of atrazine contamination that approached exposure values for ponds in corn-growing regions. Collecting frogs over protracted periods of time may have constituted one of the greatest sources of variability because the frogs were probably at different stages of their sexual cycles. It is unclear what effect the bait used to attract frogs into traps may have had on hormone levels. In spite of the fact that in some comparisons the study was unable to differentiate male and female hormone levels, some evidence suggested that males subjected to higher atrazine concentrations tended to have reduced plasma testosterone and that higher concentrations of the atrazine degradate DACT were associated with reduced plasma testosterone levels. Also, contrary to what the authors state, median female plasma testosterone appeared to be significantly higher in reference sites where atrazine exposure was reduced. This conclusion is consistent with the authors' observation that female plasma testosterone was negatively correlated with atrazine concentration. Mean plasma estradiol concentrations in both males and females were significantly lower in high atrazine exposure sites, and like testosterone, male estradiol concentrations were negatively correlated with concentrations of the atrazine degradate DACT. Female estradiol concentrations were negatively correlated with atrazine concentrations. Gonadal aromatase activity in males could not be accurately characterized because of its low level across the majority of collection sites, while high variability in female aromatase activity made all the comparisons insignificant. Aromatase activity, though, was negatively correlated with concentrations of the atrazine degradate DIA.

Ideally, a study should be designed based on the variability associated with the measurement endpoints. Sample sizes should reflect the number of test animals required to identify a specified difference within a given level of certainty. Potential sources of variability should also be identified and controlled to the extent possible. The current study did not appear to base its design on the variability associated with the range of measurement endpoints. Animals were collected over broad periods of time (up to six months) which would assure variation within the same group in terms of development. Based on the number of animals collected, frogs

appeared to be more abundant in reference sites than in corn-growing regions where half as many frogs were collected. The entire design was questionable, including: the extended sampling periods in ponds of questionable similarity, baiting with potentially hormone-laden liver/meat, and confinement in cages at unknown loading rates. These factors could confound the study's ability to reliably and reasonably quantify "typical" steroid hormone levels and/or aromatase activity in *Xenopus*. Additionally, the presence of atrazine and triazine degradates across all sites (reference and corn-growing) and the failure to characterize other pesticides at the study sites limits the usefulness of this study in determining potential effects of atrazine and in supporting the study's hypothesis.

Before a field study of this scope is undertaken, researchers need to conduct a pilot study to establish the necessary sample size for detecting a specified difference in the biological attribute being measured within a certain level of confidence. The sample size would be based on the variability associated with a particular parameter. Unfortunately, the levels of variability associated with the parameters of interest in this study would likely require very high sample sizes. A more practical approach would be to identify major sources of variability and then try to control those conditions.

The current data suggest that atrazine and/or its degradates may be impacting plasma testosterone; however, the data are not conclusive for the reasons cited above.

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MEAN LENGTHS OF FROGS COLLECTED BY POND AND SEX 391

Obs	POND	Sex	GROUP	_TYPE_	_FREQ_	LENGTH	L_SD	L_CV
1	C1	F	REF	0	20	69.5450	8.0156	11.5258
2	C1	M	REF	0	20	58.0000	6.6373	11.4436
3	C3	F	REF	0	20	68.9100	14.4936	21.0326
4	C3	M	REF	0	20	56.9882	10.9170	19.1565
5	C6	F	REF	0	20	76.9500	7.0433	9.1531
6	C6	M	REF	0	20	72.1100	7.1908	9.9721
7	E1	F	EXP	0	10	64.4833	14.3272	22.2185
8	E1	M	EXP	0	10	59.2000	9.4870	16.0253
9	E3	F	EXP	0	10	74.3900	6.9437	9.3341
10	E3	M	EXP	0	10	66.6300	6.9863	10.4853
11	E4	F	EXP	0	10	77.5400	10.9218	14.0853
12	E4	M	EXP	0	10	63.8300	3.3549	5.2561
13	E6	F	EXP	0	10	88.5000	9.5274	10.7654
14	E6	M	EXP	0	10	62.6600	9.5755	15.2816
15	E8	F	EXP	0	15	64.4733	13.8195	21.4344
16	E8	M	EXP	0	10	60.7167	7.2841	11.9968

ANOVA FOR LENGTH OF FROGS BETWEEN PONDS BY SEX 392

---------- Sex=F ----------

The ANOVA Procedure

Class Level Information

Class	Levels	Values
POND	8	C1 C3 C6 E1 E3 E4 E6 E8

Number of observations 115

NOTE: Due to missing values, only 111 observations can be used in this analysis.

Dependent Variable: LENGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	5026.98373	718.14053	6.07	<.0001
Error	103	12178.98817	118.24260		
Corrected Total	110	17205.97189			

R-Square	Coeff Var	Root MSE	LENGTH Mean
0.292165	14.96340	10.87394	72.67027

Source	DF	Anova SS	Mean Square	F Value	Pr > F
POND	7	5026.983725	718.140532	6.07	<.0001

Levene's Test for Homogeneity of LENGTH Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
POND	7	432098	61728.3	3.51	0.0020
Error	103	1810469	17577.4		

Bartlett's Test for Homogeneity of LENGTH Variance

Source	DF	Chi-Square	Pr > ChiSq
POND	7	17.4523	0.0147

Dunnett's t Tests for LENGTH

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

Alpha	0.05
Error Degrees of Freedom	103
Error Mean Square	118.2426
Critical Value of Dunnett's t	2.69261

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

POND Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
E6 - C1	18.955	7.615	30.295	***
E4 - C1	7.995	-3.345	19.335	
C6 - C1	7.405	-1.854	16.664	
E3 - C1	4.845	-6.495	16.185	
C3 - C1	-0.635	-9.894	8.624	
E1 - C1	-5.062	-18.690	8.567	
E8 - C1	-5.072	-15.072	4.929	

ANOVA FOR LENGTH OF FROGS BETWEEN PONDS BY SEX 396

---------- Sex=M ----------

The ANOVA Procedure

Class Level Information

Class	Levels	Values
POND	8	C1 C3 C6 E1 E3 E4 E6 E8

Number of observations 110

NOTE: Due to missing values, only 101 observations can be used in this analysis.

Dependent Variable: LENGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	3055.667841	436.523977	6.78	<.0001
Error	93	5987.449980	64.381183		
Corrected Total	100	9043.117822			

R-Square	Coeff Var	Root MSE	LENGTH Mean
0.337900	12.78217	8.023789	62.77327

Source	DF	Anova SS	Mean Square	F Value	Pr > F
POND	7	3055.667841	436.523977	6.78	<.0001

Levene's Test for Homogeneity of LENGTH Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
POND	7	92002.7	13143.2	2.03	0.0591
Error	93	601693	6469.8		

Bartlett's Test for Homogeneity of LENGTH Variance

Source	DF	Chi-Square	Pr > ChiSq
POND	7	14.5701	0.0419

Dunnett's t Tests for LENGTH

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

Alpha	0.05
Error Degrees of Freedom	93
Error Mean Square	64.38118
Critical Value of Dunnett's t	2.70384

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

POND Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
C6 - C1	14.110	7.249	20.971	***
E3 - C1	8.630	0.228	17.032	***
E4 - C1	5.830	-2.572	14.232	
E6 - C1	4.660	-3.742	13.062	
E8 - C1	2.717	-7.382	12.815	
E1 - C1	1.200	-7.876	10.276	
C3 - C1	-1.012	-8.169	6.145	

NONPARAMETRIC COMPARISON OF FROG LENGTH BETWEEN PONDS 400

---------- Sex=F ----------

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable LENGTH
Classified by Variable POND

POND	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	20	896.00	1120.0	130.323757	44.800000
C3	20	975.50	1120.0	130.323757	48.775000
C6	20	1361.00	1120.0	130.323757	68.050000
E1	6	209.00	336.0	76.675775	34.833333
E3	10	593.00	560.0	97.084207	59.300000
E4	10	656.00	560.0	97.084207	65.600000
E6	10	945.50	560.0	97.084207	94.550000
E8	15	580.00	840.0	115.922875	38.666667

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	28.5206
DF	7
Pr > Chi-Square	0.0002

The NPAR1WAY Procedure

Median Scores (Number of Points Above Median) for Variable LENGTH
Classified by Variable POND

POND	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	20	7.0	9.909910	2.033723	0.350000
C3	20	6.0	9.909910	2.033723	0.300000
C6	20	14.0	9.909910	2.033723	0.700000
E1	6	1.0	2.972973	1.196537	0.166667
E3	10	6.0	4.954955	1.515014	0.600000
E4	10	5.0	4.954955	1.515014	0.500000
E6	10	10.0	4.954955	1.515014	1.000000
E8	15	6.0	7.432432	1.808995	0.400000

Average scores were used for ties.

Median One-Way Analysis

Chi-Square	21.6625
DF	7
Pr > Chi-Square	0.0029

NONPARAMETRIC COMPARISON OF FROG LENGTH BETWEEN PONDS 403

---------- Sex=M ----------

Wilcoxon Scores (Rank Sums) for Variable LENGTH
Classified by Variable POND

POND	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	20	713.00	1020.0	117.339834	35.650000
C3	17	559.00	867.0	110.167138	32.882353
C6	20	1600.50	1020.0	117.339834	80.025000
E1	8	312.50	408.0	79.519644	39.062500
E3	10	644.50	510.0	87.944495	64.450000
E4	10	552.50	510.0	87.944495	55.250000
E6	10	494.00	510.0	87.944495	49.400000
E8	6	275.00	306.0	69.602588	45.833333

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	35.4807
DF	7
Pr > Chi-Square	<.0001

The NPAR1WAY Procedure

Median Scores (Number of Points Above Median) for Variable LENGTH
Classified by Variable POND

POND	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	20	6.0	9.900990	2.012363	0.300000
C3	17	3.0	8.415842	1.889352	0.176471
C6	20	20.0	9.900990	2.012363	1.000000
E1	8	2.0	3.960396	1.363751	0.250000
E3	10	6.0	4.950495	1.508236	0.600000
E4	10	6.0	4.950495	1.508236	0.600000
E6	10	4.0	4.950495	1.508236	0.400000
E8	6	3.0	2.970297	1.193675	0.500000

Average scores were used for ties.

Median One-Way Analysis

Chi-Square	33.1792
DF	7
Pr > Chi-Square	<.0001

ANOVA FOR LENGTH OF FROGS BETWEEN REFERENCE (REF) AND EXPERIMENTAL (EXP) SITES 404

---------- Sex=F ----------

The ANOVA Procedure

Class Level Information

Class	Levels	Values
GROUP	2	EXP REF

Number of observations 8

Dependent Variable: LENGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	8.0782352	8.0782352	0.11	0.7524
Error	6	444.1424033	74.0237339		
Corrected Total	7	452.2206385			

R-Square	Coeff Var	Root MSE	LENGTH Mean
0.017863	11.76994	8.603705	73.09896

Source	DF	Anova SS	Mean Square	F Value	Pr > F
GROUP	1	8.07823521	8.07823521	0.11	0.7524

Levene's Test for Homogeneity of LENGTH Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
GROUP	1	8547.2	8547.2	1.76	0.2326
Error	6	29101.8	4850.3		

Bartlett's Test for Homogeneity of LENGTH Variance

Source	DF	Chi-Square	Pr > ChiSq
GROUP	1	1.1508	0.2834

Dunnett's t Tests for LENGTH

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

Alpha	0.05
Error Degrees of Freedom	6
Error Mean Square	74.02373
Critical Value of Dunnett's t	2.44695

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

GROUP Comparison	Difference Between Means	Simultaneous 95% Confidence Limits	
REF - EXP	-2.076	-17.451	13.299

ANOVA FOR LENGTH OF FROGS BETWEEN REFERENCE (REF) AND EXPERIMENTAL (EXP) SITES 408

---------- Sex=M ----------

Class Level Information

Class	Levels	Values
GROUP	2	EXP REF

Number of observations 8

Dependent Variable: LENGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.1091324	0.1091324	0.00	0.9533
Error	6	175.7919208	29.2986535		
Corrected Total	7	175.9010531			

R-Square	Coeff Var	Root MSE	LENGTH Mean
0.000620	8.658181	5.412823	62.51686

Source	DF	Anova SS	Mean Square	F Value	Pr > F
GROUP	1	0.10913236	0.10913236	0.00	0.9533

Levene's Test for Homogeneity of LENGTH Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
GROUP	1	3162.6	3162.6	5.27	0.0615
Error	6	3600.4	600.1		

Bartlett's Test for Homogeneity of LENGTH Variance

Source	DF	Chi-Square	Pr > ChiSq
GROUP	1	2.7649	0.0964

Dunnett's t Tests for LENGTH

NOTE: This test controls the Type I experimentwise error for comparisons of all treatments

against a control.

Alpha	0.05
Error Degrees of Freedom	6
Error Mean Square	29.29865
Critical Value of Dunnett's t	2.44695

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

GROUP Comparison	Difference Between Means	Simultaneous 95% Confidence Limits	
REF - EXP	-0.2413	-9.9140	9.4315

NONPARAMETRIC COMPARISON OF FROG LENGTH BETWEEN REFERENCE AND EXPERIMENTAL SITES 412

---------- Sex=F ----------

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable LENGTH
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
EXP	5	23.0	22.50	3.354102	4.600000
REF	3	13.0	13.50	3.354102	4.333333

Wilcoxon Two-Sample Test

Statistic	13.0000
Normal Approximation	
Z	0.0000
One-Sided Pr < Z	0.5000
Two-Sided Pr > |Z|	1.0000
t Approximation	
One-Sided Pr < Z	0.5000
Two-Sided Pr > |Z|	1.0000

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.0222
DF	1
Pr > Chi-Square	0.8815

Median Scores (Number of Points Above Median) for Variable LENGTH
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
EXP	5	3.0	2.50	0.731925	0.600000
REF	3	1.0	1.50	0.731925	0.333333

Median Two-Sample Test

Statistic	1.0000
Z	-0.6831
One-Sided Pr < Z	0.2473
Two-Sided Pr > |Z|	0.4945

Median One-Way Analysis

Chi-Square	0.4667
DF	1
Pr > Chi-Square	0.4945

NONPARAMETRIC COMPARISON OF FROG LENGTH BETWEEN REFERENCE AND EXPERIMENTAL SITES 414

---------- Sex=M ----------

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable LENGTH
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
EXP	5	25.0	22.50	3.354102	5.000000
REF	3	11.0	13.50	3.354102	3.666667

Wilcoxon Two-Sample Test

Statistic	11.0000
Normal Approximation	
Z	-0.5963
One-Sided Pr < Z	0.2755
Two-Sided Pr > |Z|	0.5510
t Approximation	
One-Sided Pr < Z	0.2849
Two-Sided Pr > |Z|	0.5698

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.5556
DF	1
Pr > Chi-Square	0.4561

The NPAR1WAY Procedure

Median Scores (Number of Points Above Median) for Variable LENGTH
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
EXP	5	3.0	2.50	0.731925	0.600000

REF	3	1.0	1.50	0.731925	0.333333

Median Two-Sample Test

Statistic	1.0000
Z	-0.6831
One-Sided Pr < Z	0.2473
Two-Sided Pr > |Z|	0.4945

Median One-Way Analysis

Chi-Square	0.4667
DF	1
Pr > Chi-Square	0.4945

MEAN WEIGHTS OF FROGS COLLECTED BY POND AND SEX 416

Obs	POND	Sex	GROUP	_TYPE_	_FREQ_	WEIGHT	W_SD	W_CV
1	C1	F	REF	0	20	32.8315	11.1449	33.9459
2	C1	M	REF	0	20	19.4445	6.1022	31.3826
3	C3	F	REF	0	20	35.3455	20.2334	57.2446
4	C3	M	REF	0	20	20.7541	13.2996	64.0818
5	C6	F	REF	0	20	41.2495	10.4261	25.2757
6	C6	M	REF	0	20	37.2590	12.0340	32.2982
7	E1	F	EXP	0	10	29.1450	19.2315	65.9856
8	E1	M	EXP	0	10	23.3888	14.4006	61.5704
9	E3	F	EXP	0	10	39.3810	8.4697	21.5071
10	E3	M	EXP	0	10	32.5740	8.9938	27.6105
11	E4	F	EXP	0	10	48.8210	18.5235	37.9417
12	E4	M	EXP	0	10	29.9000	4.1673	13.9376
13	E6	F	EXP	0	10	66.9560	22.6873	33.8838
14	E6	M	EXP	0	10	26.1050	12.3935	47.4758
15	E8	F	EXP	0	15	29.8047	18.8819	63.3521
16	E8	M	EXP	0	10	23.0917	8.7925	38.0765

ANOVA FOR WEIGHT OF FROGS BETWEEN PONDS BY SEX 417

---------- Sex=F ----------

The ANOVA Procedure

Class Level Information

Class	Levels	Values
POND	8	C1 C3 C6 E1 E3 E4 E6 E8

Number of observations 115

NOTE: Due to missing values, only 111 observations can be used in this analysis.
Dependent Variable: WEIGHT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	11751.86955	1678.83851	6.31	<.0001
Error	103	27410.49679	266.12133		
Corrected Total	110	39162.36634			

R-Square	Coeff Var	Root MSE	WEIGHT Mean
0.300081	41.51186	16.31323	39.29775

Source	DF	Anova SS	Mean Square	F Value	Pr > F
POND	7	11751.86955	1678.83851	6.31	<.0001

Levene's Test for Homogeneity of WEIGHT Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
POND	7	2120258	302894	2.53	0.0190
Error	103	12311095	119525		

Bartlett's Test for Homogeneity of WEIGHT Variance

Source	DF	Chi-Square	Pr > ChiSq
POND	7	20.4080	0.0048

Dunnett's t Tests for WEIGHT

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

Alpha	0.05
Error Degrees of Freedom	103
Error Mean Square	266.1213
Critical Value of Dunnett's t	2.69261

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

POND Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
E6 - C1	34.124	17.112	51.137	***
E4 - C1	15.990	-1.023	33.002	
C6 - C1	8.418	-5.472	22.308	
E3 - C1	6.549	-10.463	23.562	
C3 - C1	2.514	-11.376	16.404	
E8 - C1	-3.027	-18.030	11.976	
E1 - C1	-3.687	-24.133	16.760	

ANOVA FOR WEIGHT OF FROGS BETWEEN PONDS BY SEX 421

---------- Sex=M ----------

The ANOVA Procedure

Class Level Information

Class	Levels	Values
POND	8	C1 C3 C6 E1 E3 E4 E6 E8

Number of observations 110

NOTE: Due to missing values, only 101 observations can be used in this analysis.

Dependent Variable: WEIGHT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	4500.49282	642.92755	5.75	<.0001
Error	93	10393.96375	111.76305		
Corrected Total	100	14894.45657			

R-Square	Coeff Var	Root MSE	WEIGHT Mean
0.302159	39.57071	10.57180	26.71624

Source	DF	Anova SS	Mean Square	F Value	Pr > F
POND	7	4500.492823	642.927546	5.75	<.0001

Levene's Test for Homogeneity of WEIGHT Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
POND	7	339909	48558.4	1.40	0.2144
Error	93	3223997	34666.6		

Bartlett's Test for Homogeneity of WEIGHT Variance

Source	DF	Chi-Square	Pr > ChiSq

POND	7	22.0595	0.0025

Dunnett's t Tests for WEIGHT

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

Alpha	0.05
Error Degrees of Freedom	93
Error Mean Square	111.7631
Critical Value of Dunnett's t	2.70384

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

POND Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
C6 - C1	17.815	8.775	26.854	***
E3 - C1	13.130	2.059	24.200	***
E4 - C1	10.455	-0.615	21.526	
E6 - C1	6.661	-4.410	17.731	
E1 - C1	3.944	-8.013	15.902	
E8 - C1	3.647	-9.658	16.953	
C3 - C1	1.310	-8.120	10.739	

NONPARAMETRIC COMPARISON OF FROG WEIGHT BETWEEN PONDS 425

---------- Sex=F ----------

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable WEIGHT
Classified by Variable POND

POND	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	20	895.50	1120.0	130.332621	44.775000
C3	20	971.00	1120.0	130.332621	48.550000
C6	20	1266.00	1120.0	130.332621	63.300000
E1	6	215.50	336.0	76.680990	35.916667
E3	10	601.00	560.0	97.090810	60.100000
E4	10	724.00	560.0	97.090810	72.400000
E6	10	950.00	560.0	97.090810	95.000000
E8	15	593.00	840.0	115.930760	39.533333

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	28.2346
DF	7
Pr > Chi-Square	0.0002

Median Scores (Number of Points Above Median) for Variable WEIGHT
Classified by Variable POND

POND	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	20	7.0	9.909910	2.033723	0.350000
C3	20	8.0	9.909910	2.033723	0.400000
C6	20	12.0	9.909910	2.033723	0.600000
E1	6	1.0	2.972973	1.196537	0.166667
E3	10	6.0	4.954955	1.515014	0.600000
E4	10	6.0	4.954955	1.515014	0.600000
E6	10	10.0	4.954955	1.515014	1.000000
E8	15	5.0	7.432432	1.808995	0.333333

Average scores were used for ties.

Median One-Way Analysis

Chi-Square	18.3589
DF	7
Pr > Chi-Square	0.0105

NONPARAMETRIC COMPARISON OF FROG WEIGHT BETWEEN PONDS 427

---------- Sex=M ----------

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable WEIGHT
Classified by Variable POND

POND	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	20	649.0	1020.0	117.344960	32.450000
C3	17	568.0	867.0	110.171950	33.411765
C6	20	1525.0	1020.0	117.344960	76.250000
E1	8	311.0	408.0	79.523118	38.875000
E3	10	681.0	510.0	87.948337	68.100000
E4	10	658.0	510.0	87.948337	65.800000
E6	10	484.0	510.0	87.948337	48.400000
E8	6	275.0	306.0	69.605629	45.833333

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	36.5882
DF	7
Pr > Chi-Square	<.0001

Median Scores (Number of Points Above Median) for Variable WEIGHT
Classified by Variable POND

POND	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	20	4.0	9.900990	2.012363	0.200000
C3	17	4.0	8.415842	1.889352	0.235294
C6	20	18.0	9.900990	2.012363	0.900000
E1	8	2.0	3.960396	1.363751	0.250000
E3	10	6.0	4.950495	1.508236	0.600000
E4	10	9.0	4.950495	1.508236	0.900000
E6	10	4.0	4.950495	1.508236	0.400000
E8	6	3.0	2.970297	1.193675	0.500000

Average scores were used for ties.

Median One-Way Analysis

Chi-Square	33.6219
DF	7
Pr > Chi-Square	<.0001

ANOVA FOR WEIGHT OF FROGS BETWEEN REFERENCE (REF) AND EXPERIMENTAL (EXP) SITES 429

---------- Sex=F ----------

The ANOVA Procedure

Class Level Information

Class	Levels	Values
GROUP	2	EXP REF

Number of observations 8

Dependent Variable: WEIGHT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	75.510261	75.510261	0.44	0.5307
Error	6	1024.136445	170.689408		
Corrected Total	7	1099.646706			

R-Square	Coeff Var	Root MSE	WEIGHT Mean
0.068668	32.30525	13.06482	40.44177

Source	DF	Anova SS	Mean Square	F Value	Pr > F
GROUP	1	75.51026075	75.51026075	0.44	0.5307

Levene's Test for Homogeneity of WEIGHT Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
GROUP	1	64108.8	64108.8	1.83	0.2246
Error	6	209888	34981.3		

Bartlett's Test for Homogeneity of WEIGHT Variance

Source	DF	Chi-Square	Pr > ChiSq
GROUP	1	2.4716	0.1159

Dunnett's t Tests for WEIGHT

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

Alpha	0.05
Error Degrees of Freedom	6
Error Mean Square	170.6894
Critical Value of Dunnett's t	2.44695

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

GROUP Comparison	Difference Between Means	Simultaneous 95% Confidence Limits	
REF - EXP	-6.346	-29.693	17.001

ANOVA FOR WEIGHT OF FROGS BETWEEN REFERENCE (REF) AND EXPERIMENTAL (EXP) SITES 433

---------- Sex=M ----------

The ANOVA Procedure

Class Level Information

Class	Levels	Values
GROUP	2	EXP REF

Number of observations 8

Dependent Variable: WEIGHT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	2.6671491	2.6671491	0.06	0.8143
Error	6	265.7568743	44.2928124		
Corrected Total	7	268.4240234			

R-Square	Coeff Var	Root MSE	WEIGHT Mean
0.009936	25.05318	6.655285	26.56463

Source	DF	Anova SS	Mean Square	F Value	Pr > F
GROUP	1	2.66714907	2.66714907	0.06	0.8143

Levene's Test for Homogeneity of WEIGHT Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
GROUP	1	5070.2	5070.2	4.36	0.0818
Error	6	6973.5	1162.3		

Bartlett's Test for Homogeneity of WEIGHT Variance

Source	DF	Chi-Square	Pr > ChiSq
GROUP	1	1.8380	0.1752

Dunnett's t Tests for WEIGHT

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

Alpha	0.05
Error Degrees of Freedom	6
Error Mean Square	44.29281
Critical Value of Dunnett's t	2.44695

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

GROUP Comparison	Difference Between Means	Simultaneous 95% Confidence Limits	
REF - EXP	-1.193	-13.086	10.700

NONPARAMETRIC COMPARISON OF FROG WEIGHT BETWEEN GROUPS 437

---------- Sex=F ----------

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable WEIGHT
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
EXP	5	23.0	22.50	3.354102	4.600000
REF	3	13.0	13.50	3.354102	4.333333

Wilcoxon Two-Sample Test

Statistic	13.0000
Normal Approximation	
Z	0.0000
One-Sided Pr < Z	0.5000
Two-Sided Pr > |Z|	1.0000
t Approximation	
One-Sided Pr < Z	0.5000
Two-Sided Pr > |Z|	1.0000

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.0222
DF	1
Pr > Chi-Square	0.8815

Median Scores (Number of Points Above Median) for Variable WEIGHT
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
EXP	5	3.0	2.50	0.731925	0.600000
REF	3	1.0	1.50	0.731925	0.333333

Median Two-Sample Test

Statistic	1.0000
Z	-0.6831
One-Sided Pr < Z	0.2473
Two-Sided Pr > |Z|	0.4945

Median One-Way Analysis

Chi-Square	0.4667
DF	1
Pr > Chi-Square	0.4945

NONPARAMETRIC COMPARISON OF FROG WEIGHT BETWEEN GROUPS 439

---------- Sex=M ----------

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable WEIGHT
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
EXP	5	25.0	22.50	3.354102	5.000000
REF	3	11.0	13.50	3.354102	3.666667

Wilcoxon Two-Sample Test

Statistic	11.0000
Normal Approximation	
Z	-0.5963
One-Sided Pr < Z	0.2755
Two-Sided Pr > |Z|	0.5510
t Approximation	
One-Sided Pr < Z	0.2849
Two-Sided Pr > |Z|	0.5698

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.5556
DF	1
Pr > Chi-Square	0.4561

Median Scores (Number of Points Above Median) for Variable WEIGHT
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
EXP	5	3.0	2.50	0.731925	0.600000
REF	3	1.0	1.50	0.731925	0.333333

Median Two-Sample Test

Statistic	1.0000
Z	-0.6831
One-Sided Pr < Z	0.2473
Two-Sided Pr > |Z|	0.4945

Median One-Way Analysis

Chi-Square	0.4667
DF	1
Pr > Chi-Square	0.4945

MEAN TESTICULAR WEIGHTS FOR FROGS COLLECTED BY POND 441

Obs	POND	GROUP	_TYPE_	_FREQ_	TESTES	T_SD	T_CV
1	C1	REF	0	20	0.024585	0.010550	42.9144
2	C3	REF	0	20	0.030953	0.023958	77.4001
3	C6	REF	0	20	0.047570	0.016667	35.0366
4	E1	EXP	0	10	0.036925	0.014242	38.5703
5	E3	EXP	0	10	0.053570	0.017665	32.9753
6	E4	EXP	0	10	0.057670	0.009618	16.6769
7	E6	EXP	0	10	0.033560	0.018074	53.8565
8	E8	EXP	0	10	0.044200	0.019885	44.9884

ANOVA FOR TESTICULAR WEIGHT FOR FROGS BETWEEN PONDS 442

The ANOVA Procedure

Class Level Information

Class	Levels	Values
POND	8	C1 C3 C6 E1 E3 E4 E6 E8

Number of observations 8

Dependent Variable: TESTES

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	0.00093152	0.00013307	.	.
Error	0	0.00000000	.		
Corrected Total	7	0.00093152			

R-Square	Coeff Var	Root MSE	TESTES Mean
1.000000	.	.	0.041129

Source	DF	Anova SS	Mean Square	F Value	Pr > F
POND	7	0.00093152	0.00013307	.	.

Levene's Test for Homogeneity of TESTES Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
POND	0	0	.	.	.
Error	0	0	.		

Bartlett's Test for Homogeneity of TESTES Variance

Source	DF	Chi-Square	Pr > ChiSq
POND	0	0	.

ANOVA FOR TESTICULAR WEIGHT FOR FROGS BETWEEN PONDS 445

The ANOVA Procedure

Level of ----------TESTES----------

POND	N	Mean	Std Dev
C1	1	0.02458500	.
C3	1	0.03095294	.
C6	1	0.04757000	.
E1	1	0.03692500	.
E3	1	0.05357000	.
E4	1	0.05767000	.
E6	1	0.03356000	.
E8	1	0.04420000	.

ANOVA FOR TESTICULAR WEIGHT FOR FROGS BETWEEN REFERENCE (REF) AND EXPERIMENTAL (EXP) SITE 446

The ANOVA Procedure

Class Level Information

Class	Levels	Values
GROUP	2	EXP REF

Number of observations 8

Dependent Variable: TESTES

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.00021934	0.00021934	1.85	0.2229
Error	6	0.00071218	0.00011870		
Corrected Total	7	0.00093152			

R-Square	Coeff Var	Root MSE	TESTES Mean
0.235460	26.48934	0.010895	0.041129

Source	DF	Anova SS	Mean Square	F Value	Pr > F
GROUP	1	0.00021934	0.00021934	1.85	0.2229

Levene's Test for Homogeneity of TESTES Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
GROUP	1	1.14E-10	1.14E-10	0.02	0.8818
Error	6	2.831E-8	4.719E-9		

Bartlett's Test for Homogeneity of TESTES Variance

Source	DF	Chi-Square	Pr > ChiSq
GROUP	1	0.0415	0.8386

Dunnett's t Tests for TESTES

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

Alpha	0.05
Error Degrees of Freedom	6
Error Mean Square	0.000119
Critical Value of Dunnett's t	2.44695

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

GROUP Comparison	Difference Between Means	Simultaneous 95% Confidence Limits	
REF - EXP	-0.010816	-0.030285	0.008653

NONPARAMETRIC COMPARISON OF FROG TESTICULAR WEIGHT BETWEEN TREATMENT GROUPS 450

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable TESTES
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
EXP	5	27.0	22.50	3.354102	5.40
REF	3	9.0	13.50	3.354102	3.00

Wilcoxon Two-Sample Test

Statistic	9.0000
Normal Approximation	
Z	-1.1926
One-Sided Pr < Z	0.1165
Two-Sided Pr > |Z|	0.2330
t Approximation	
One-Sided Pr < Z	0.1359
Two-Sided Pr > |Z|	0.2719

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	1.8000
DF	1
Pr > Chi-Square	0.1797

Median Scores (Number of Points Above Median) for Variable TESTES
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
EXP	5	3.0	2.50	0.731925	0.600000
REF	3	1.0	1.50	0.731925	0.333333

Median Two-Sample Test

Statistic	1.0000
Z	-0.6831
One-Sided Pr < Z	0.2473
Two-Sided Pr > |Z|	0.4945

Median One-Way Analysis

Chi-Square	0.4667
DF	1
Pr > Chi-Square	0.4945

MEAN GONADOSOMATIC INDEX (GSI) OF FROGS COLLECTED BY POND AND SEX 452

Obs	POND	Sex	GROUP	_TYPE_	_FREQ_	GSI	GSI_SD	GSI_CV
1	C1	F	REF	0	20	1.20519	0.59529	49.3938
2	C1	M	REF	0	20	0.12568	0.02906	23.1225
3	C3	F	REF	0	20	2.32511	1.78135	76.6135
4	C3	M	REF	0	20	0.13554	0.04066	29.9998
5	C6	F	REF	0	20	1.56896	1.23447	78.6810
6	C6	M	REF	0	20	0.12992	0.03488	26.8432
7	E1	F	EXP	0	10	3.84820	3.58562	93.1766
8	E1	M	EXP	0	10	0.17529	0.04832	27.5681
9	E3	F	EXP	0	10	5.74161	2.38193	41.4853
10	E3	M	EXP	0	10	0.16518	0.03373	20.4210
11	E4	F	EXP	0	10	5.39806	1.45422	26.9397
12	E4	M	EXP	0	10	0.19433	0.03069	15.7908
13	E6	F	EXP	0	10	2.52463	1.94072	76.8714
14	E6	M	EXP	0	10	0.13001	0.04169	32.0636
15	E8	F	EXP	0	15	4.60581	3.38835	73.5669
16	E8	M	EXP	0	10	0.18583	0.02224	11.9674

ANOVA FOR GSI OF FROGS BETWEEN PONDS BY SEX 453

---------- Sex=F ----------

The ANOVA Procedure

Class Level Information

Class	Levels	Values
POND	8	C1 C3 C6 E1 E3 E4 E6 E8

Number of observations 115

NOTE: Due to missing values, only 111 observations can be used in this analysis.

Dependent Variable: GSI

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	292.3774342	41.7682049	10.12	<.0001
Error	103	424.9868075	4.1260855		
Corrected Total	110	717.3642417			

R-Square	Coeff Var	Root MSE	GSI Mean
0.407572	68.15863	2.031277	2.980220

Source	DF	Anova SS	Mean Square	F Value	Pr > F
POND	7	292.3774342	41.7682049	10.12	<.0001

Levene's Test for Homogeneity of GSI Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
POND	7	1421.7	203.1	7.65	<.0001
Error	103	2732.9	26.5335		

Bartlett's Test for Homogeneity of GSI Variance

Source	DF	Chi-Square	Pr > ChiSq

POND	7	52.6276	<.0001

Dunnett's t Tests for GSI

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

Alpha	0.05
Error Degrees of Freedom	103
Error Mean Square	4.126086
Critical Value of Dunnett's t	2.69261

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

POND Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
E3 - C1	4.5364	2.4181	6.6547	***
E4 - C1	4.1929	2.0746	6.3112	***
E8 - C1	3.4006	1.5325	5.2688	***
E1 - C1	2.6430	0.0971	5.1889	***
E6 - C1	1.3194	-0.7989	3.4377	
C3 - C1	1.1199	-0.6097	2.8495	
C6 - C1	0.3638	-1.3658	2.0934	

ANOVA FOR GSI OF FROGS BETWEEN PONDS BY SEX 457

---------- Sex=M ----------

The ANOVA Procedure

Class Level Information

Class	Levels	Values
POND	8	C1 C3 C6 E1 E3 E4 E6 E8

Number of observations 110

NOTE: Due to missing values, only 101 observations can be used in this analysis.

Dependent Variable: GSI

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	0.06119627	0.00874232	6.84	<.0001
Error	93	0.11878563	0.00127726		
Corrected Total	100	0.17998190			

R-Square	Coeff Var	Root MSE	GSI Mean
0.340013	24.34181	0.035739	0.146821

Source	DF	Anova SS	Mean Square	F Value	Pr > F
POND	7	0.06119627	0.00874232	6.84	<.0001

Levene's Test for Homogeneity of GSI Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
POND	7	0.000018	2.513E-6	0.86	0.5406
Error	93	0.000272	2.92E-6		

Bartlett's Test for Homogeneity of GSI Variance

Source	DF	Chi-Square	Pr > ChiSq

POND	7	5.9559	0.5449

Dunnett's t Tests for GSI

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

Alpha	0.05
Error Degrees of Freedom	93
Error Mean Square	0.001277
Critical Value of Dunnett's t	2.70384

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

POND Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
E4 - C1	0.06865	0.03122	0.10607	***
E8 - C1	0.06015	0.01517	0.10513	***
E1 - C1	0.04961	0.00918	0.09003	***
E3 - C1	0.03950	0.00208	0.07693	***
C3 - C1	0.00986	-0.02202	0.04173	
E6 - C1	0.00433	-0.03309	0.04176	
C6 - C1	0.00424	-0.02632	0.03480	

NONPARAMETRIC COMPARISON OF GSI BETWEEN PONDS BY SEX 461

---------- Sex=F ----------

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable GSI
Classified by Variable POND

POND	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	20	640.0	1120.0	130.332907	32.000000
C3	20	1005.0	1120.0	130.332907	50.250000
C6	20	780.0	1120.0	130.332907	39.000000
E1	6	347.0	336.0	76.681158	57.833333
E3	10	885.0	560.0	97.091023	88.500000
E4	10	887.0	560.0	97.091023	88.700000
E6	10	577.0	560.0	97.091023	57.700000
E8	15	1095.0	840.0	115.931014	73.000000

Kruskal-Wallis Test

Chi-Square	42.0856
DF	7
Pr > Chi-Square	<.0001

The NPAR1WAY Procedure

Median Scores (Number of Points Above Median) for Variable GSI
Classified by Variable POND

POND	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	20	3.0	9.909910	2.033723	0.150000
C3	20	11.0	9.909910	2.033723	0.550000
C6	20	4.0	9.909910	2.033723	0.200000
E1	6	3.0	2.972973	1.196537	0.500000
E3	10	9.0	4.954955	1.515014	0.900000
E4	10	10.0	4.954955	1.515014	1.000000
E6	10	4.0	4.954955	1.515014	0.400000
E8	15	11.0	7.432432	1.808995	0.733333

Median One-Way Analysis

Chi-Square	36.9250
DF	7
Pr > Chi-Square	<.0001

NONPARAMETRIC COMPARISON OF GSI BETWEEN PONDS BY SEX 463

---------- Sex=M ----------

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable GSI
Classified by Variable POND

POND	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	20	714.0	1020.0	117.345643	35.700000
C3	17	783.0	867.0	110.172592	46.058824
C6	20	757.0	1020.0	117.345643	37.850000
E1	8	548.0	408.0	79.523581	68.500000
E3	10	645.0	510.0	87.948849	64.500000
E4	10	829.0	510.0	87.948849	82.900000
E6	10	394.0	510.0	87.948849	39.400000
E8	6	481.0	306.0	69.606034	80.166667

Kruskal-Wallis Test

Chi-Square	34.3083
DF	7
Pr > Chi-Square	<.0001

Median Scores (Number of Points Above Median) for Variable GSI
Classified by Variable POND

POND	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	20	5.0	9.900990	2.012363	0.250000
C3	17	9.0	8.415842	1.889352	0.529412
C6	20	4.0	9.900990	2.012363	0.200000
E1	8	6.0	3.960396	1.363751	0.750000
E3	10	6.0	4.950495	1.508236	0.600000
E4	10	10.0	4.950495	1.508236	1.000000
E6	10	4.0	4.950495	1.508236	0.400000
E8	6	6.0	2.970297	1.193675	1.000000

Median One-Way Analysis

Chi-Square	30.7445

DF	7
Pr > Chi-Square	<.0001

ANOVA FOR GSI OF FROGS BETWEEN REFERENCE (REF) AND EXPERIMENTAL (EXP) SITES 465

---------- Sex=F ----------

The ANOVA Procedure

Class Level Information

Class	Levels	Values
GROUP	2	EXP REF

Number of observations 8

Dependent Variable: GSI

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	13.91190688	13.91190688	11.42	0.0149
Error	6	7.30985217	1.21830869		
Corrected Total	7	21.22175905			

R-Square	Coeff Var	Root MSE	GSI Mean
0.655549	32.44289	1.103770	3.402195

Source	DF	Anova SS	Mean Square	F Value	Pr > F
GROUP	1	13.91190688	13.91190688	11.42	0.0149

Levene's Test for Homogeneity of GSI Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
GROUP	1	2.3261	2.3261	1.69	0.2409
Error	6	8.2425	1.3737		

Bartlett's Test for Homogeneity of GSI Variance

Source	DF	Chi-Square	Pr > ChiSq
GROUP	1	1.1609	0.2813

Dunnett's t Tests for GSI

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

Alpha	0.05
Error Degrees of Freedom	6
Error Mean Square	1.218309
Critical Value of Dunnett's t	2.44695

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

GROUP Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
REF - EXP	-2.7239	-4.6963	-0.7515	***

ANOVA FOR GSI OF FROGS BETWEEN REFERENCE (REF) AND EXPERIMENTAL (EXP) SITES 469

---------- Sex=M ----------

The ANOVA Procedure

Class Level Information

Class	Levels	Values
GROUP	2	EXP REF

Number of observations 8

Dependent Variable: GSI

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.00296251	0.00296251	6.99	0.0383
Error	6	0.00254148	0.00042358		
Corrected Total	7	0.00550399			

R-Square	Coeff Var	Root MSE	GSI Mean
0.538248	13.25886	0.020581	0.155225

Source	DF	Anova SS	Mean Square	F Value	Pr > F
GROUP	1	0.00296251	0.00296251	6.99	0.0383

Levene's Test for Homogeneity of GSI Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
GROUP	1	4.36E-7	4.36E-7	1.49	0.2676
Error	6	1.753E-6	2.921E-7		

Bartlett's Test for Homogeneity of GSI Variance

Source	DF	Chi-Square	Pr > ChiSq
GROUP	1	3.4829	0.0620

Dunnett's t Tests for GSI

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

Alpha	0.05
Error Degrees of Freedom	6
Error Mean Square	0.000424
Critical Value of Dunnett's t	2.44695

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

GROUP Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
REF - EXP	-0.03975	-0.07653	-0.00297	***

NONPARAMETRIC COMPARISON OF GSI BETWEEN TREATMENT GROUPS BY SEX 473

---------- Sex=F ----------

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable GSI
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
EXP	5	30.0	22.50	3.354102	6.0
REF	3	6.0	13.50	3.354102	2.0

Wilcoxon Two-Sample Test

Statistic	6.0000
Normal Approximation	
Z	-2.0870
One-Sided Pr < Z	0.0184
Two-Sided Pr > |Z|	0.0369
t Approximation	
One-Sided Pr < Z	0.0377
Two-Sided Pr > |Z|	0.0753

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	5.0000
DF	1
Pr > Chi-Square	0.0253

Median Scores (Number of Points Above Median) for Variable GSI
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
EXP	5	4.0	2.50	0.731925	0.80
REF	3	0.0	1.50	0.731925	0.00

Median Two-Sample Test

Statistic	0.0000
Z	-2.0494
One-Sided Pr < Z	0.0202
Two-Sided Pr > |Z|	0.0404

Median One-Way Analysis

Chi-Square	4.2000
DF	1
Pr > Chi-Square	0.0404

NONPARAMETRIC COMPARISON OF GSI BETWEEN TREATMENT GROUPS BY SEX 475

---------- Sex=M ----------

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable GSI
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
EXP	5	29.0	22.50	3.354102	5.800000
REF	3	7.0	13.50	3.354102	2.333333

Wilcoxon Two-Sample Test

Statistic	7.0000
Normal Approximation	
Z	-1.7889
One-Sided Pr < Z	0.0368
Two-Sided Pr > |Z|	0.0736
t Approximation	
One-Sided Pr < Z	0.0584
Two-Sided Pr > |Z|	0.1168

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	3.7556
DF	1
Pr > Chi-Square	0.0526

The NPAR1WAY Procedure

Median Scores (Number of Points Above Median) for Variable GSI
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
EXP	5	4.0	2.50	0.731925	0.80

REF	3	0.0	1.50	0.731925	0.00

Median Two-Sample Test

Statistic	0.0000
Z	-2.0494
One-Sided Pr < Z	0.0202
Two-Sided Pr > |Z|	0.0404

Median One-Way Analysis

Chi-Square	4.2000
DF	1
Pr > Chi-Square	0.0404

MEAN CONDITION INDEX OF FROGS COLLECTED BY POND AND SEX 477

Obs	POND	Sex	GROUP	_TYPE_	_FREQ_	CONDITION	CI_SD	CI_CV
1	C1	F	REF	0	20	0.46055	0.10789	23.4271
2	C1	M	REF	0	20	0.32900	0.06735	20.4721
3	C3	F	REF	0	20	0.47447	0.19746	41.6174
4	C3	M	REF	0	20	0.33864	0.14453	42.6786
5	C6	F	REF	0	20	0.53024	0.09217	17.3826
6	C6	M	REF	0	20	0.50706	0.10983	21.6600
7	E1	F	EXP	0	10	0.41857	0.18672	44.6087
8	E1	M	EXP	0	10	0.37327	0.15799	42.3275
9	E3	F	EXP	0	10	0.52443	0.06631	12.6435
10	E3	M	EXP	0	10	0.48108	0.09040	18.7901
11	E4	F	EXP	0	10	0.61236	0.14012	22.8822
12	E4	M	EXP	0	10	0.46696	0.04620	9.8932
13	E6	F	EXP	0	10	0.74118	0.17227	23.2423
14	E6	M	EXP	0	10	0.40045	0.12809	31.9870
15	E8	F	EXP	0	15	0.42604	0.19041	44.6937
16	E8	M	EXP	0	10	0.37014	0.11131	30.0735

ANOVA FOR CONDITION INDEX OF FROGS BETWEEN PONDS BY SEX 478

---------- Sex=F ----------

The ANOVA Procedure

Class Level Information

Class	Levels	Values
POND	8	C1 C3 C6 E1 E3 E4 E6 E8

Number of observations 115

NOTE: Due to missing values, only 111 observations can be used in this analysis.

Dependent Variable: CI

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	0.87825562	0.12546509	5.65	<.0001
Error	103	2.28870294	0.02222042		
Corrected Total	110	3.16695856			

R-Square	Coeff Var	Root MSE	CI Mean
0.277318	29.03514	0.149065	0.513396

Source	DF	Anova SS	Mean Square	F Value	Pr > F
POND	7	0.87825562	0.12546509	5.65	<.0001

Levene's Test for Homogeneity of CI Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
POND	7	0.0167	0.00238	3.16	0.0046
Error	103	0.0775	0.000753		

Bartlett's Test for Homogeneity of CI Variance

Source	DF	Chi-Square	Pr > ChiSq
POND	7	23.0265	0.0017

Dunnett's t Tests for CI

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

Alpha	0.05
Error Degrees of Freedom	103
Error Mean Square	0.02222
Critical Value of Dunnett's t	2.69261

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

POND Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
E6 - C1	0.28063	0.12518	0.43608	***
E4 - C1	0.15181	-0.00365	0.30726	
C6 - C1	0.06969	-0.05723	0.19662	
E3 - C1	0.06388	-0.09157	0.21933	
C3 - C1	0.01392	-0.11300	0.14085	
E8 - C1	-0.03451	-0.17161	0.10258	
E1 - C1	-0.04198	-0.22881	0.14485	

ANOVA FOR CONDITION INDEX OF FROGS BETWEEN PONDS BY SEX 482

---------- Sex=M ----------

The ANOVA Procedure

Class Level Information

Class	Levels	Values
POND	8	C1 C3 C6 E1 E3 E4 E6 E8

Number of observations 110

NOTE: Due to missing values, only 101 observations can be used in this analysis.

Dependent Variable: CI

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	0.50980220	0.07282889	6.01	<.0001
Error	93	1.12670273	0.01211508		
Corrected Total	100	1.63650493			

R-Square	Coeff Var	Root MSE	CI Mean
0.311519	27.00248	0.110069	0.407624

Source	DF	Anova SS	Mean Square	F Value	Pr > F
POND	7	0.50980220	0.07282889	6.01	<.0001

Levene's Test for Homogeneity of CI Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
POND	7	0.00421	0.000602	1.65	0.1310
Error	93	0.0339	0.000365		

Bartlett's Test for Homogeneity of CI Variance

Source	DF	Chi-Square	Pr > ChiSq
POND	7	20.4868	0.0046

Dunnett's t Tests for CI

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

Alpha	0.05
Error Degrees of Freedom	93
Error Mean Square	0.012115
Critical Value of Dunnett's t	2.70384

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

POND Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
C6 - C1	0.17805	0.08394	0.27217	***
E3 - C1	0.15208	0.03682	0.26734	***
E4 - C1	0.13795	0.02269	0.25322	***
E6 - C1	0.07145	-0.04381	0.18672	
E1 - C1	0.04426	-0.08024	0.16876	
E8 - C1	0.04114	-0.09739	0.17967	
C3 - C1	0.00964	-0.08853	0.10782	

NONPARAMETRIC COMPARISON OF CONDITION INDEX BETWEEN PONDS BY SEX 486

---------- Sex=F ----------

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable CI
Classified by Variable POND

POND	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	20	901.0	1120.0	130.332907	45.050000
C3	20	982.0	1120.0	130.332907	49.100000
C6	20	1200.0	1120.0	130.332907	60.000000
E1	6	216.0	336.0	76.681158	36.000000
E3	10	607.0	560.0	97.091023	60.700000
E4	10	762.0	560.0	97.091023	76.200000
E6	10	946.0	560.0	97.091023	94.600000
E8	15	602.0	840.0	115.931014	40.133333

Kruskal-Wallis Test

Chi-Square	28.0380
DF	7
Pr > Chi-Square	0.0002

Median Scores (Number of Points Above Median) for Variable CI
Classified by Variable POND

POND	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	20	7.0	9.909910	2.033723	0.350000
C3	20	8.0	9.909910	2.033723	0.400000
C6	20	11.0	9.909910	2.033723	0.550000
E1	6	1.0	2.972973	1.196537	0.166667
E3	10	6.0	4.954955	1.515014	0.600000
E4	10	8.0	4.954955	1.515014	0.800000
E6	10	10.0	4.954955	1.515014	1.000000
E8	15	4.0	7.432432	1.808995	0.266667

Median One-Way Analysis

Chi-Square	22.5214

DF	7
Pr > Chi-Square	0.0021

NONPARAMETRIC COMPARISON OF CONDITION INDEX BETWEEN PONDS BY SEX 488

---------- Sex=M ----------

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable CI
Classified by Variable POND

POND	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	20	632.0	1020.0	117.345643	31.600000
C3	17	572.0	867.0	110.172592	33.647059
C6	20	1476.0	1020.0	117.345643	73.800000
E1	8	319.0	408.0	79.523581	39.875000
E3	10	701.0	510.0	87.948849	70.100000
E4	10	700.0	510.0	87.948849	70.000000
E6	10	480.0	510.0	87.948849	48.000000
E8	6	271.0	306.0	69.606034	45.166667

Kruskal-Wallis Test

Chi-Square	36.7915
DF	7
Pr > Chi-Square	<.0001

The NPAR1WAY Procedure

Median Scores (Number of Points Above Median) for Variable CI
Classified by Variable POND

POND	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	20	2.0	9.900990	2.012363	0.100000
C3	17	4.0	8.415842	1.889352	0.235294
C6	20	17.0	9.900990	2.012363	0.850000
E1	8	3.0	3.960396	1.363751	0.375000
E3	10	7.0	4.950495	1.508236	0.700000
E4	10	10.0	4.950495	1.508236	1.000000
E6	10	3.0	4.950495	1.508236	0.300000
E8	6	4.0	2.970297	1.193675	0.666667

Median One-Way Analysis

Chi-Square	41.3124
DF	7
Pr > Chi-Square	<.0001

ANOVA FOR CONDITION INDEX OF FROGS BETWEEN REFERENCE (REF) AND EXPERIMENTAL (EXP) SITES 490

---------- Sex=F ----------

The ANOVA Procedure

Class Level Information

Class	Levels	Values
GROUP	2	EXP REF

Number of observations 8

Dependent Variable: CONDITION

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.00589954	0.00589954	0.46	0.5212
Error	6	0.07630211	0.01271702		
Corrected Total	7	0.08220165			

R-Square	Coeff Var	Root MSE	CONDITION Mean
0.071769	21.54234	0.112770	0.523480

Source	DF	Anova SS	Mean Square	F Value	Pr > F
GROUP	1	0.00589954	0.00589954	0.46	0.5212

Levene's Test for Homogeneity of CONDITION Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
GROUP	1	0.000358	0.000358	2.43	0.1703
Error	6	0.000884	0.000147		

Bartlett's Test for Homogeneity of CONDITION Variance

Source	DF	Chi-Square	Pr > ChiSq
GROUP	1	2.5067	0.1134

Dunnett's t Tests for CONDITION

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

Alpha	0.05
Error Degrees of Freedom	6
Error Mean Square	0.012717
Critical Value of Dunnett's t	2.44695

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

GROUP Comparison	Difference Between Means	Simultaneous 95% Confidence Limits	
REF - EXP	-0.05609	-0.25761	0.14543

ANOVA FOR CONDITION INDEX OF FROGS BETWEEN REFERENCE (REF) AND EXPERIMENTAL (EXP) SITES 494

---------- Sex=M ----------

The ANOVA Procedure

Class Level Information

Class	Levels	Values
GROUP	2	EXP REF

Number of observations 8

Dependent Variable: CONDITION

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.00134800	0.00134800	0.26	0.6279
Error	6	0.03102745	0.00517124		
Corrected Total	7	0.03237545			

R-Square	Coeff Var	Root MSE	CONDITION Mean
0.041636	17.61129	0.071911	0.408325

Source	DF	Anova SS	Mean Square	F Value	Pr > F
GROUP	1	0.00134800	0.00134800	0.26	0.6279

Levene's Test for Homogeneity of CONDITION Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
GROUP	1	0.000038	0.000038	3.08	0.1298
Error	6	0.000074	0.000012		

Bartlett's Test for Homogeneity of CONDITION Variance

Source	DF	Chi-Square	Pr > ChiSq
GROUP	1	1.0139	0.3140

Dunnett's t Tests for CONDITION

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

Alpha	0.05
Error Degrees of Freedom	6
Error Mean Square	0.005171
Critical Value of Dunnett's t	2.44695

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

GROUP Comparison	Difference Between Means	Simultaneous 95% Confidence Limits	
REF - EXP	-0.02681	-0.15532	0.10169

NONPARAMETRIC COMPARISON OF CONDITION INDEX BETWEEN GROUPS BY SEX 498

---------- Sex=F ----------

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable CONDITION
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
EXP	5	23.0	22.50	3.354102	4.600000
REF	3	13.0	13.50	3.354102	4.333333

Wilcoxon Two-Sample Test

Statistic	13.0000
Normal Approximation	
Z	0.0000
One-Sided Pr < Z	0.5000
Two-Sided Pr > |Z|	1.0000
t Approximation	
One-Sided Pr < Z	0.5000
Two-Sided Pr > |Z|	1.0000

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.0222
DF	1
Pr > Chi-Square	0.8815

The NPAR1WAY Procedure

Median Scores (Number of Points Above Median) for Variable CONDITION
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
EXP	5	3.0	2.50	0.731925	0.600000

REF	3	1.0	1.50	0.731925	0.333333

Median Two-Sample Test

Statistic	1.0000
Z	-0.6831
One-Sided Pr < Z	0.2473
Two-Sided Pr > |Z|	0.4945

Median One-Way Analysis

Chi-Square	0.4667
DF	1
Pr > Chi-Square	0.4945

NONPARAMETRIC COMPARISON OF CONDITION INDEX BETWEEN GROUPS BY SEX 500

---------- Sex=M ----------

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable CONDITION
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
EXP	5	25.0	22.50	3.354102	5.000000
REF	3	11.0	13.50	3.354102	3.666667

Wilcoxon Two-Sample Test

Statistic	11.0000
Normal Approximation	
Z	-0.5963
One-Sided Pr < Z	0.2755
Two-Sided Pr > |Z|	0.5510
t Approximation	
One-Sided Pr < Z	0.2849
Two-Sided Pr > |Z|	0.5698

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.5556
DF	1
Pr > Chi-Square	0.4561

The NPAR1WAY Procedure

Median Scores (Number of Points Above Median) for Variable CONDITION
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
EXP	5	3.0	2.50	0.731925	0.600000

REF	3	1.0	1.50	0.731925	0.333333

Median Two-Sample Test

Statistic	1.0000
Z	-0.6831
One-Sided Pr < Z	0.2473
Two-Sided Pr > |Z|	0.4945

Median One-Way Analysis

Chi-Square	0.4667
DF	1
Pr > Chi-Square	0.4945

MEAN FEMALE PLASMA ESTRADIOL CONCENTRATIONS BY SITE AND ANIMAL NUMBER 82

Obs	Site	Ind_No	_TYPE_	_FREQ_	E2	STD	CV
1	C1	21	0	3	4748.49	330.25	6.9549
2	C1	22	0	3	97.48	21.83	22.3947
3	C1	23	0	3	22.77	12.41	54.5215
4	C1	24	0	3	33025.69	7581.68	22.9569
5	C1	25	0	3	51.59	27.63	53.5657
6	C1	26	0	3	3137.18	267.56	8.5286
7	C1	27	0	3	3877.23	780.16	20.1215
8	C1	28	0	3	13.78	2.62	19.0307
9	C1	29	0	3	2781.17	285.40	10.2618
10	C1	30	0	3	110.61	25.45	23.0079
11	C1	31	0	3	25.21	10.25	40.6502
12	C1	32	0	3	5463.82	1002.76	18.3527
13	C1	33	0	3	49.35	24.61	49.8719
14	C1	34	0	3	292.85	184.51	63.0053
15	C1	35	0	3	55.43	25.69	46.3413
16	C1	36	0	3	6696.34	1406.15	20.9987
17	C1	37	0	3	.	.	.
18	C1	38	0	3	29043.30	0.00	0.0000
19	C1	39	0	3	16585.36	2876.22	17.3419
20	C1	40	0	3	14608.67	1333.87	9.1307
21	C3	21	0	3	18963.76	6968.94	36.7487
22	C3	22	0	3	69.64	8.83	12.6770
23	C3	23	0	3	242.59	62.08	25.5892
24	C3	24	0	3	7865.85	343.34	4.3649
25	C3	25	0	3	.	.	.
26	C3	26	0	3	367.45	87.33	23.7661
27	C3	27	0	3	6028.80	244.98	4.0635
28	C3	28	0	3	.	.	.
29	C3	29	0	3	145.50	58.21	40.0054
30	C3	30	0	3	6402.32	782.25	12.2182
31	C3	31	0	3	8629.88	1789.24	20.7330
32	C3	32	0	3	5017.56	551.41	10.9895
33	C3	33	0	3	33218.85	0.00	0.0000
34	C3	34	0	3	33.97	3.34	9.8194
35	C3	35	0	3	23.23	10.79	46.4362
36	C3	36	0	3	249.98	8.50	3.4014
37	C3	37	0	3	169.56	36.07	21.2708
38	C3	38	0	3	15342.62	4160.93	27.1200
39	C3	39	0	3	5834.65	1516.16	25.9854
40	C3	40	0	3	108.12	63.16	58.4186
41	C6	21	0	3	8718.85	770.64	8.8388
42	C6	22	0	3	112.90	30.66	27.1571
43	C6	23	0	3	.	.	.

44	C6	24	0	3	4578.96	512.44	11.1912
45	C6	25	0	3	546.55	199.05	36.4200
46	C6	26	0	3	26.31	19.35	73.5299
47	C6	27	0	3	4376.85	163.55	3.7366
48	C6	28	0	3	31.89	5.44	17.0485
49	C6	29	0	3	5682.53	431.56	7.5946
50	C6	30	0	3	4741.45	502.20	10.5918
51	C6	31	0	3	73.75	21.62	29.3201
52	C6	32	0	3	3646.29	166.95	4.5785
53	C6	33	0	3	4181.47	.	.
54	C6	34	0	3	19.63	16.47	83.9291
55	C6	35	0	3	26.74	14.71	55.0063
56	C6	36	0	3	56754.90	0.00	0.0000
57	C6	37	0	3	4586.95	357.81	7.8006
58	C6	38	0	3	34923.37	1076.57	3.0827
59	C6	39	0	3	7233.54	943.02	13.0367
60	C6	40	0	3	105573.43	9858.48	9.3380
61	E1	1	0	3	260.32	44.45	17.0755
62	E1	2	0	3	1859.49	92.60	4.9797
63	E1	3	0	3	3229.19	374.05	11.5835
64	E1	4	0	3	680.29	79.79	11.7284
65	E1	5	0	3	46.21	19.26	41.6735
66	E1	6	0	3	.	.	.
67	E3	1	0	3	128.90	23.59	18.3008
68	E3	2	0	3	198.40	45.41	22.8901
69	E3	3	0	3	162.61	19.74	12.1382
70	E3	4	0	3	266.59	4.57	1.7142
71	E3	5	0	3	.	.	.

MEAN FEMALE PLASMA ESTRADIOL CONCENTRATIONS BY SITE AND ANIMAL NUMBER 83

Obs	Site	Ind_No	_TYPE_	_FREQ_	E2	STD	CV
72	E3	6	0	3	206.28	25.87	12.5389
73	E3	7	0	3	89.89	11.12	12.3714
74	E3	8	0	3	296.97	13.75	4.6306
75	E3	9	0	3	367.43	44.06	11.9904
76	E3	10	0	3	122.72	13.99	11.3976
77	E4	1	0	3	1041.18	134.13	12.8821
78	E4	2	0	3	2967.96	495.96	16.7104
79	E4	3	0	3	1810.90	319.77	17.6580
80	E4	4	0	3	659.32	146.41	22.2065
81	E4	5	0	3	561.15	83.25	14.8360
82	E4	6	0	3	3533.16	209.97	5.9427
83	E4	7	0	3	781.20	25.54	3.2692
84	E4	8	0	3	76.74	4.14	5.3991
85	E4	9	0	3	7830.98	1283.47	16.3897
86	E4	10	0	3	2956.11	376.50	12.7363
87	E6	1	0	3	95.92	40.27	41.9873
88	E6	2	0	3	124.57	27.11	21.7657
89	E6	3	0	3	7.63	0.00	0.0000
90	E6	4	0	3	138.21	47.09	34.0689
91	E6	5	0	3	87.17	2.84	3.2539
92	E6	6	0	3	166.49	32.02	19.2329
93	E6	7	0	3	182.97	58.74	32.1016
94	E6	8	0	3	10.56	0.00	0.0000
95	E6	9	0	3	140.54	29.13	20.7254
96	E6	10	0	3	128.53	31.29	24.3410
97	E8	1	0	3	392.23	31.03	7.9118
98	E8	2	0	3	1894.28	290.91	15.3573
99	E8	3	0	3	248.29	16.21	6.5302
100	E8	4	0	3	739.52	140.60	19.0130
101	E8	5	0	3	3581.29	223.32	6.2359
102	E8	6	0	3	594.92	53.15	8.9345
103	E8	7	0	3	567.99	61.997	10.9152
104	E8	8	0	3	8292.57	562.256	6.7802
105	E8	9	0	3	253.48	13.662	5.3897
106	E8	10	0	3	245.23	35.042	14.2896
107	E8	11	0	3	490.67	159.633	32.5339
108	E8	12	0	3	114.38	23.707	20.7265
109	E8	13	0	3	.	.	.
110	E8	14	0	3	.	.	.
111	E8	15	0	3	.	.	.

ANOVA FOR FEMALE PLASMA ESTRADIOL BETWEEN SITES 85

The ANOVA Procedure

Class Level Information

Class	Levels	Values
Site	8	C1 C3 C6 E1 E3 E4 E6 E8

Number of observations 111

NOTE: Due to missing values, only 102 observations can be used in this analysis.

Dependent Variable: E2

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	1995951818	285135974	1.69	0.1218
Error	94	15898863008	169136841		
Corrected Total	101	17894814826			

R-Square	Coeff Var	Root MSE	E2 Mean
0.111538	253.2194	13005.26	5135.965

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Site	7	1995951818	285135974	1.69	0.1218

Levene's Test for Homogeneity of E2 Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Site	7	6.25E18	8.929E17	1.19	0.3154
Error	94	7.045E19	7.495E17		

Bartlett's Test for Homogeneity of E2 Variance

Source	DF	Chi-Square	Pr > ChiSq
Site	7	250.4	<.0001

Dunnett's t Tests for E2

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

Alpha	0.05
Error Degrees of Freedom	94
Error Mean Square	1.6914E8
Critical Value of Dunnett's t	2.69946

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

Site Comparison	Difference Between Means	Simultaneous 95% Confidence Limits	
C6 - C1	6587	-4803	17977
C3 - C1	-312	-11860	11235
E4 - C1	-4130	-17846	9586
E8 - C1	-4901	-17846	8045
E1 - C1	-5137	-22783	12509
E3 - C1	-6147	-20354	8059
E6 - C1	-6244	-19959	7472

NONPARAMETRIC COMPARISON OF FEMALE PLASMA ESTRADIOL BETWEEN SITES 89

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable E2
Classified by Variable Site

Site	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	19	985.0	978.50	116.343958	51.842105
C3	18	1059.0	927.00	113.921025	58.833333
C6	19	1142.0	978.50	116.343958	60.105263
E1	5	247.0	257.50	64.520669	49.400000
E3	9	331.0	463.50	84.759955	36.777778
E4	10	603.0	515.00	88.863191	60.300000
E6	10	235.0	515.00	88.863191	23.500000
E8	12	651.0	618.00	96.280839	54.250000

Kruskal-Wallis Test

Chi-Square	14.9116
DF	7
Pr > Chi-Square	0.0371

Median Scores (Number of Points Above Median) for Variable E2
Classified by Variable Site

Site	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	19	10.0	9.50	1.975719	0.526316
C3	18	9.0	9.00	1.934573	0.500000
C6	19	13.0	9.50	1.975719	0.684211
E1	5	3.0	2.50	1.095671	0.600000
E3	9	0.0	4.50	1.439369	0.000000
E4	10	9.0	5.00	1.509049	0.900000
E6	10	0.0	5.00	1.509049	0.000000
E8	12	7.0	6.00	1.635013	0.583333

Median One-Way Analysis

Chi-Square	28.2849
DF	7
Pr > Chi-Square	0.0002

FEMALE PLASMA ESTRADIOL CONCENTRATIONS BY TREATMENT 91

Obs	TREAT	_TYPE_	_FREQ_	E2	STD	CV
1	ATRAZINE	0	153	1057.20	1810.05	171.211
2	CONTROL	0	180	8612.35	17414.02	202.198

ANOVA FOR FEMALE PLASMA ESTRADIOL ACROSS TREATMENTS 92

The ANOVA Procedure

Class Level Information

Class	Levels	Values
TREAT	2	ATRAZINE CONTROL

Number of observations 333

NOTE: Due to missing values, only 302 observations can be used in this analysis.

Dependent Variable: E2

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	4277610072	4277610072	25.73	<.0001
Error	300	49878301383	166261005		
Corrected Total	301	54155911454			

R-Square	Coeff Var	Root MSE	E2 Mean
0.078987	249.8882	12894.22	5159.997

Source	DF	Anova SS	Mean Square	F Value	Pr > F
TREAT	1	4277610072	4277610072	25.73	<.0001

Levene's Test for Homogeneity of E2 Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
TREAT	1	6.662E18	6.662E18	7.08	0.0082
Error	300	2.821E20	9.404E17		

Bartlett's Test for Homogeneity of E2 Variance

Source	DF	Chi-Square	Pr > ChiSq
TREAT	1	438.5	<.0001

Dunnett's t Tests for E2

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

Alpha	0.05
Error Degrees of Freedom	300
Error Mean Square	1.6626E8
Critical Value of Dunnett's t	1.96790

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

TREAT Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
CONTROL - ATRAZINE	7555	4624	10486	***

NONPARAMETRIC COMPARISON OF FEMALE PLASMA ESTRADIOL BETWEEN TREATMENTS 96

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable E2
Classified by Variable TREAT

TREAT	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
ATRAZINE	138	18405.0	20907.0	755.946352	133.369565
CONTROL	164	27348.0	24846.0	755.946352	166.756098

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	18405.0000
Normal Approximation	
Z	-3.3091
One-Sided Pr < Z	0.0005
Two-Sided Pr > |Z|	0.0009
t Approximation	
One-Sided Pr < Z	0.0005
Two-Sided Pr > |Z|	0.0010

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	10.9545
DF	1
Pr > Chi-Square	0.0009

Median Scores (Number of Points Above Median) for Variable E2
Classified by Variable TREAT

TREAT	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
ATRAZINE	138	57.0	69.0	4.335590	0.413043
CONTROL	164	94.0	82.0	4.335590	0.573171

Average scores were used for ties.

Median Two-Sample Test

Statistic	57.0000
Z	-2.7678
One-Sided Pr < Z	0.0028
Two-Sided Pr > |Z|	0.0056

Median One-Way Analysis

Chi-Square	7.6607
DF	1
Pr > Chi-Square	0.0056

MEAN FEMALE PLASMA TESTOSTERONE CONCENTRATIONS BY SITE AND ANIMAL NUMBER 98

Obs	Site	Ind_No	TREAT	_TYPE_	_FREQ_	T	STD	CV
1	C1	21	CONTROL	0	6	1934.52	262.42	13.565
2	C1	22	CONTROL	0	6	321.86	293.90	91.313
3	C1	23	CONTROL	0	6	86.37	34.90	40.408
4	C1	24	CONTROL	0	6	14971.64	3255.59	21.745
5	C1	25	CONTROL	0	6	139.76	121.89	87.217
6	C1	26	CONTROL	0	6	103.94	85.34	82.100
7	C1	27	CONTROL	0	6	7023.04	900.09	12.816
8	C1	28	CONTROL	0	6	120.39	143.49	119.182
9	C1	29	CONTROL	0	6	3169.52	186.57	5.887
10	C1	30	CONTROL	0	6	173.79	21.49	12.363
11	C1	31	CONTROL	0	6	21.74	4.23	19.473
12	C1	32	CONTROL	0	6	2863.16	374.89	13.094
13	C1	33	CONTROL	0	6	7710.56	11725.47	152.070
14	C1	34	CONTROL	0	6	882.00	742.98	84.238
15	C1	35	CONTROL	0	6	19.60	6.26	31.937
16	C1	36	CONTROL	0	6	2153.11	262.17	12.176
17	C1	37	CONTROL	0	6	.	.	.
18	C1	38	CONTROL	0	6	14521.65	0.00	0.000
19	C1	39	CONTROL	0	6	6802.20	479.18	7.045
20	C1	40	CONTROL	0	6	4473.92	192.11	4.294
21	C3	21	CONTROL	0	6	7195.61	2147.40	29.843
22	C3	22	CONTROL	0	6	182.50	51.98	28.479
23	C3	23	CONTROL	0	6	208.80	18.94	9.072
24	C3	24	CONTROL	0	6	2036.82	371.23	18.226
25	C3	25	CONTROL	0	6	.	.	.
26	C3	26	CONTROL	0	6	217.95	46.48	21.327
27	C3	27	CONTROL	0	6	2243.51	289.97	12.925
28	C3	28	CONTROL	0	6	177.61	172.35	97.040
29	C3	29	CONTROL	0	6	491.07	415.26	84.562
30	C3	30	CONTROL	0	6	2786.38	1293.81	46.433
31	C3	31	CONTROL	0	6	9437.32	1086.34	11.511
32	C3	32	CONTROL	0	6	2538.57	225.46	8.882
33	C3	33	CONTROL	0	6	13840.63	3033.06	21.914
34	C3	34	CONTROL	0	6	67.85	32.83	48.383
35	C3	35	CONTROL	0	6	71.99	48.21	66.959
36	C3	36	CONTROL	0	6	899.73	253.65	28.191
37	C3	37	CONTROL	0	6	198.41	0.00	0.000
38	C3	38	CONTROL	0	6	238.65	15.39	6.449
39	C3	39	CONTROL	0	6	6217.78	4372.15	70.317
40	C3	40	CONTROL	0	6	102.76	79.92	77.772
41	C6	21	CONTROL	0	6	1706.25	400.48	23.471
42	C6	22	CONTROL	0	6	278.77	15.39	5.521
43	C6	23	CONTROL	0	6	1442.72	311.10	21.564

44	C6	24	CONTROL	0	6	627.55	65.07	10.369
45	C6	25	CONTROL	0	6	175.93	67.73	38.501
46	C6	26	CONTROL	0	6	36.73	16.11	43.849
47	C6	27	CONTROL	0	6	2129.90	518.64	24.351
48	C6	28	CONTROL	0	6	60.51	20.16	33.320
49	C6	29	CONTROL	0	6	1756.10	227.47	12.953
50	C6	30	CONTROL	0	6	1697.45	526.60	31.023
51	C6	31	CONTROL	0	6	14.63	3.13	21.411
52	C6	32	CONTROL	0	6	1888.82	361.66	19.147
53	C6	33	CONTROL	0	6	2307.73	238.14	10.319
54	C6	34	CONTROL	0	6	74.49	123.46	165.746
55	C6	35	CONTROL	0	6	45.12	8.36	18.519
56	C6	36	CONTROL	0	6	14815.70	5414.25	36.544
57	C6	37	CONTROL	0	6	1428.39	413.12	28.922
58	C6	38	CONTROL	0	6	3102.61	411.83	13.274
59	C6	39	CONTROL	0	6	3876.90	735.67	18.976
60	C6	40	CONTROL	0	6	3085.45	900.82	29.196
61	E1	1	ATRAZINE	0	6	34.64	4.44	12.830
62	E1	2	ATRAZINE	0	6	1532.07	142.84	9.323
63	E1	3	ATRAZINE	0	6	2127.42	184.66	8.680
64	E1	4	ATRAZINE	0	6	63.66	31.31	49.174
65	E1	5	ATRAZINE	0	6	44.52	33.72	75.747
66	E1	6	ATRAZINE	0	6	.	.	.
67	E3	1	ATRAZINE	0	6	119.73	13.69	11.430
68	E3	2	ATRAZINE	0	6	244.45	99.19	40.576
69	E3	3	ATRAZINE	0	6	154.14	42.81	27.772
70	E3	4	ATRAZINE	0	6	129.56	43.94	33.913
71	E3	5	ATRAZINE	0	6	6.00	0.00	0.000

MEAN FEMALE PLASMA TESTOSTERONE CONCENTRATIONS BY SITE AND ANIMAL NUMBER 99

Obs	Site	Ind_No	TREAT	_TYPE_	_FREQ_	T	STD	CV
72	E3	6	ATRAZINE	0	3	.	.	.
73	E3	7	ATRAZINE	0	6	63.25	42.27	66.832
74	E3	8	ATRAZINE	0	6	110.76	55.10	49.745
75	E3	9	ATRAZINE	0	6	136.19	118.46	86.983
76	E3	10	ATRAZINE	0	6	519.34	783.60	150.883
77	E4	1	ATRAZINE	0	6	501.40	214.98	42.876
78	E4	2	ATRAZINE	0	6	2196.90	244.47	11.128
79	E4	3	ATRAZINE	0	6	663.50	97.44	14.685
80	E4	4	ATRAZINE	0	6	396.55	37.25	9.392
81	E4	5	ATRAZINE	0	6	239.31	50.18	20.969
82	E4	6	ATRAZINE	0	6	4495.01	2233.98	49.699
83	E4	7	ATRAZINE	0	6	371.69	32.59	8.767
84	E4	8	ATRAZINE	0	6	103.61	44.09	42.550
85	E4	9	ATRAZINE	0	6	4473.15	870.89	19.469
86	E4	10	ATRAZINE	0	6	1838.00	170.56	9.280
87	E6	1	ATRAZINE	0	6	72.81	15.26	20.956
88	E6	2	ATRAZINE	0	6	37.52	10.78	28.742
89	E6	3	ATRAZINE	0	6	.	.	.
90	E6	4	ATRAZINE	0	6	99.46	19.78	19.888
91	E6	5	ATRAZINE	0	6	103.05	42.38	41.123
92	E6	6	ATRAZINE	0	6	154.92	30.48	19.675
93	E6	7	ATRAZINE	0	6	29.62	17.58	59.351
94	E6	8	ATRAZINE	0	6	.	.	.
95	E6	9	ATRAZINE	0	6	199.67	112.48	56.334
96	E6	10	ATRAZINE	0	6	70.86	10.91	15.391
97	E8	1	ATRAZINE	0	6	338.68	254.52	75.151
98	E8	2	ATRAZINE	0	6	2491.05	1026.81	41.220
99	E8	3	ATRAZINE	0	6	74.43	22.66	30.452
100	E8	4	ATRAZINE	0	6	186.29	26.58	14.270
101	E8	5	ATRAZINE	0	6	2214.21	1006.46	45.455
102	E8	6	ATRAZINE	0	6	110.45	18.60	16.842
103	E8	7	ATRAZINE	0	6	183.41	15.589	8.4997
104	E8	8	ATRAZINE	0	6	4381.40	601.186	13.7213
105	E8	9	ATRAZINE	0	6	74.89	28.512	38.0707
106	E8	10	ATRAZINE	0	6	34.50	15.136	43.8774
107	E8	11	ATRAZINE	0	6	109.70	24.201	22.0601
108	E8	12	ATRAZINE	0	6	348.47	37.360	10.7213
109	E8	13	ATRAZINE	0	5	.	.	.
110	E8	14	ATRAZINE	0	5	.	.	.
111	E8	15	ATRAZINE	0	5	.	.	.

ANOVA FOR FEMALE PLASMA TESTOSTERONE BETWEEN SITES 101

The ANOVA Procedure

Class Level Information

Class	Levels	Values
Site	8	C1 C3 C6 E1 E3 E4 E6 E8

Number of observations 111

NOTE: Due to missing values, only 102 observations can be used in this analysis.
Dependent Variable: T

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	134465197	19209314	1.97	0.0673
Error	94	916631986	9751404		
Corrected Total	101	1051097183			

R-Square	Coeff Var	Root MSE	T Mean
0.127928	168.4578	3122.724	1853.713

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Site	7	134465196.7	19209313.8	1.97	0.0673

Levene's Test for Homogeneity of T Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Site	7	5.972E15	8.531E14	1.23	0.2963
Error	94	6.54E16	6.958E14		

Bartlett's Test for Homogeneity of T Variance

Source	DF	Chi-Square	Pr > ChiSq
Site	7	114.0	<.0001

Dunnett's t Tests for T

NOTE: This test controls the Type I experimentwise error for comparisons of all treatments

against a control.

Alpha	0.05
Error Degrees of Freedom	94
Error Mean Square	9751404
Critical Value of Dunnett's t	2.70019

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

Site Comparison	Difference Between Means	Simultaneous 95% Confidence Limits	
C3 - C1	-965.2	-3700.9	1770.5
C6 - C1	-1524.7	-4225.9	1176.6
E4 - C1	-2024.3	-5318.5	1269.9
E8 - C1	-2673.3	-5782.4	435.8
E1 - C1	-2791.8	-7029.9	1446.3
E3 - C1	-3387.4	-6799.4	24.6
E6 - C1	-3456.3	-7010.0	97.5

NONPARAMETRIC COMPARISON OF FEMALE PLASMA TESTOSTERONE ACROSS SITES 105

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable T
Classified by Variable Site

Site	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	19	1173.0	978.50	116.343958	61.736842
C3	19	1145.0	978.50	116.343958	60.263158
C6	20	1122.0	1030.00	118.645129	56.100000
E1	5	171.0	257.50	64.520669	34.200000
E3	9	287.0	463.50	84.759955	31.888889
E4	10	634.0	515.00	88.863191	63.400000
E6	8	178.0	412.00	80.340940	22.250000
E8	12	543.0	618.00	96.280839	45.250000

Kruskal-Wallis Test

Chi-Square	20.0577
DF	7
Pr > Chi-Square	0.0054

Median Scores (Number of Points Above Median) for Variable T
Classified by Variable Site

Site	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	19	12.0	9.50	1.975719	0.631579
C3	19	10.0	9.50	1.975719	0.526316
C6	20	13.0	10.00	2.014797	0.650000
E1	5	2.0	2.50	1.095671	0.400000
E3	9	1.0	4.50	1.439369	0.111111
E4	10	8.0	5.00	1.509049	0.800000
E6	8	0.0	4.00	1.364326	0.000000
E8	12	5.0	6.00	1.635013	0.416667

Median One-Way Analysis

Chi-Square	20.5428
DF	7
Pr > Chi-Square	0.0045

MEAN FEMALE PLASMA TESTOSTERONE CONCENTRATIONS BY TREATMENT 107

Obs	TREAT	_TYPE_	_FREQ_	T	STD	CV
1	ATRAZINE	0	300	724.55	1270.60	175.364
2	CONTROL	0	360	2942.16	4636.87	157.601

ANOVA FOR FEMALE PLASMA TESTOSTERONE ACROSS TREATMENTS 108

The ANOVA Procedure

Class Level Information

Class	Levels	Values
TREAT	2	ATRAZINE CONTROL

Number of observations 111

NOTE: Due to missing values, only 102 observations can be used in this analysis.

Dependent Variable: T

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	98659132	98659132	10.36	0.0017
Error	100	952438051	9524381		
Corrected Total	101	1051097183			

R-Square	Coeff Var	Root MSE	T Mean
0.093863	166.4853	3086.160	1853.713

Source	DF	Anova SS	Mean Square	F Value	Pr > F
TREAT	1	98659131.80	98659131.80	10.36	0.0017

Levene's Test for Homogeneity of T Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
TREAT	1	4.797E15	4.797E15	6.77	0.0107
Error	100	7.081E16	7.081E14		

Bartlett's Test for Homogeneity of T Variance

Source	DF	Chi-Square	Pr > ChiSq

TREAT	1	50.9636	<.0001

Dunnett's t Tests for T

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

Alpha	0.05
Error Degrees of Freedom	100
Error Mean Square	9524381
Critical Value of Dunnett's t	1.98398

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

TREAT Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
CONTROL - ATRAZINE	1985.8	761.7	3209.9	***

MEAN MALE PLASMA ESTRADIOL CONCENTRATIONS BY SITE AND ANIMAL NUMBER 112

Obs	Site	Ind_No	TREAT	_TYPE_	_FREQ_	E2	STD	CV
1	C1	1	CONTROL	0	3	15.87	9.19	57.913
2	C1	2	CONTROL	0	3	4492.83	294.58	6.557
3	C1	3	CONTROL	0	3	2404.51	250.12	10.402
4	C1	4	CONTROL	0	3	8.01	2.40	29.951
5	C1	5	CONTROL	0	3	4130.31	228.71	5.537
6	C1	6	CONTROL	0	3	4077.53	326.52	8.008
7	C1	7	CONTROL	0	3	5541.93	1066.63	19.247
8	C1	8	CONTROL	0	3	12.86	4.63	35.962
9	C1	9	CONTROL	0	3	41.91	8.78	20.956
10	C1	10	CONTROL	0	3	31.25	11.07	35.417
11	C1	11	CONTROL	0	3	64380.80	0.00	0.000
12	C1	12	CONTROL	0	3	35.75	17.69	49.488
13	C1	13	CONTROL	0	3	.	.	.
14	C1	14	CONTROL	0	3	98.39	46.18	46.939
15	C1	15	CONTROL	0	3	24.46	3.23	13.187
16	C1	16	CONTROL	0	3	63399.39	0.00	0.000
17	C1	17	CONTROL	0	3	21.41	0.54	2.518
18	C1	18	CONTROL	0	3	13.60	7.82	57.470
19	C1	19	CONTROL	0	3	.	.	.
20	C1	20	CONTROL	0	3	55.10	19.47	35.334
21	C3	1	CONTROL	0	3	.	.	.
22	C3	2	CONTROL	0	3	4683.85	269.53	5.754
23	C3	3	CONTROL	0	3	6290.86	1152.91	18.327
24	C3	4	CONTROL	0	3	48.31	55.54	114.965
25	C3	5	CONTROL	0	3	40.76	9.89	24.262
26	C3	6	CONTROL	0	3	25.63	0.70	2.715
27	C3	7	CONTROL	0	3	23262.42	2510.43	10.792
28	C3	8	CONTROL	0	3	4743.00	257.49	5.429
29	C3	9	CONTROL	0	3	28.66	7.32	25.555
30	C3	10	CONTROL	0	3	6568.09	1080.88	16.456
31	C3	11	CONTROL	0	3	5361.80	893.98	16.673
32	C3	12	CONTROL	0	3	4603.38	113.50	2.466
33	C3	13	CONTROL	0	3	10.13	5.90	58.246
34	C3	14	CONTROL	0	3	62.73	23.13	36.871
35	C3	15	CONTROL	0	3	98.45	.	.
36	C3	16	CONTROL	0	3	315.76	84.04	26.617
37	C3	17	CONTROL	0	3	.	.	.
38	C6	1	CONTROL	0	3	.	.	.
39	C6	2	CONTROL	0	3	433.93	54.03	12.452
40	C6	3	CONTROL	0	3	4619.07	1398.84	30.284
41	C6	4	CONTROL	0	3	29462.37	0.00	0.000
42	C6	5	CONTROL	0	3	7268.35	.	.
43	C6	6	CONTROL	0	3	13.29	6.66	50.074

44	C6	7	CONTROL	0	3	4376.36	307.80	7.033
45	C6	8	CONTROL	0	3	7893.73	619.58	7.849
46	C6	9	CONTROL	0	3	18.34	7.19	39.233
47	C6	10	CONTROL	0	3	5383.19	1515.08	28.145
48	C6	11	CONTROL	0	3	16.80	9.09	54.124
49	C6	12	CONTROL	0	3	26817.92	834.57	3.112
50	C6	13	CONTROL	0	3	3.37	0.00	0.000
51	C6	14	CONTROL	0	3	12815.92	2261.06	17.643
52	C6	15	CONTROL	0	3	10.54	0.00	0.000
53	C6	16	CONTROL	0	3	6065.52	199.53	3.290
54	C6	17	CONTROL	0	3	9.45	0.00	0.000
55	C6	18	CONTROL	0	3	4763.25	1793.75	37.658
56	C6	19	CONTROL	0	3	82865.65	.	.
57	C6	20	CONTROL	0	3	5527.13	292.49	5.292
58	E1	1	ATRAZINE	0	3	193.25	37.43	19.368
59	E1	2	ATRAZINE	0	3	238.75	12.20	5.109
60	E1	3	ATRAZINE	0	3	6.11	0.00	0.000
61	E1	4	ATRAZINE	0	3	106.33	44.92	42.243
62	E1	5	ATRAZINE	0	3	187.66	47.96	25.559
63	E1	6	ATRAZINE	0	3	6.85	0.00	0.000
64	E1	7	ATRAZINE	0	3	8.03	0.00	0.000
65	E1	8	ATRAZINE	0	3	9991.09	2055.96	20.578
66	E3	1	ATRAZINE	0	3	201.97	70.70	35.004
67	E3	2	ATRAZINE	0	3	182.84	7.29	3.987
68	E3	3	ATRAZINE	0	3	507.43	53.75	10.592
69	E3	4	ATRAZINE	0	3	9399.57	1177.61	12.528
70	E3	5	ATRAZINE	0	3	244.15	39.68	16.254
71	E3	6	ATRAZINE	0	3	263.68	31.09	11.790

MEAN MALE PLASMA ESTRADIOL CONCENTRATIONS BY SITE AND ANIMAL NUMBER 113

Obs	Site	Ind_No	TREAT	_TYPE_	_FREQ_	E2	STD	CV
72	E3	7	ATRAZINE	0	3	7777.23	759.22	9.762
73	E3	8	ATRAZINE	0	3	182.68	27.28	14.934
74	E3	9	ATRAZINE	0	3	5.14	0.00	0.000
75	E3	10	ATRAZINE	0	3	149.09	13.68	9.179
76	E4	1	ATRAZINE	0	3	7943.10	3964.57	49.912
77	E4	2	ATRAZINE	0	3	150.47	18.66	12.403
78	E4	3	ATRAZINE	0	3	79.94	52.95	66.242
79	E4	4	ATRAZINE	0	3	36.94	21.52	58.246
80	E4	5	ATRAZINE	0	3	3410.68	436.81	12.807
81	E4	6	ATRAZINE	0	3	3640.90	352.58	9.684
82	E4	7	ATRAZINE	0	3	.	.	.
83	E4	8	ATRAZINE	0	3	6524.77	286.56	4.392
84	E4	9	ATRAZINE	0	3	20742.65	2690.87	12.973
85	E4	10	ATRAZINE	0	3	23.56	24.36	103.364
86	E6	1	ATRAZINE	0	3	108.45	39.44	36.370
87	E6	2	ATRAZINE	0	3	29.56	18.42	62.328
88	E6	3	ATRAZINE	0	3	103.20	11.59	11.230
89	E6	4	ATRAZINE	0	3	129.57	48.82	37.675
90	E6	5	ATRAZINE	0	3	166.00	15.83	9.538
91	E6	6	ATRAZINE	0	3	63.51	12.19	19.192
92	E6	7	ATRAZINE	0	3	180.53	104.00	57.608
93	E6	8	ATRAZINE	0	3	6032.94	293.69	4.868
94	E6	9	ATRAZINE	0	3	131.07	19.68	15.011
95	E6	10	ATRAZINE	0	3	.	.	.
96	E8	1	ATRAZINE	0	3	86.70	21.36	24.632
97	E8	2	ATRAZINE	0	3	192.36	28.20	14.662
98	E8	3	ATRAZINE	0	3	2861.36	166.52	5.820
99	E8	4	ATRAZINE	0	3	.	.	.
100	E8	5	ATRAZINE	0	3	134.59	26.26	19.513
101	E8	6	ATRAZINE	0	3	129.23	58.11	44.970

ANOVA FOR MALE PLASMA ESTRADIOL BETWEEN SITES 114

The ANOVA Procedure

Class Level Information

Class	Levels	Values
Site	8	C1 C3 C6 E1 E3 E4 E6 E8

Number of observations 101

NOTE: Due to missing values, only 93 observations can be used in this analysis.
Dependent Variable: E2

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	1231861396	175980199	1.00	0.4368
Error	85	14951054355	175894757		
Corrected Total	92	16182915750			

R-Square	Coeff Var	Root MSE	E2 Mean
0.076121	253.8687	13262.53	5224.170

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Site	7	1231861396	175980199	1.00	0.4368

Levene's Test for Homogeneity of E2 Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Site	7	2.821E18	4.031E17	0.82	0.5770
Error	85	4.201E19	4.943E17		

Bartlett's Test for Homogeneity of E2 Variance

Source	DF	Chi-Square	Pr > ChiSq
Site	7	92.5314	<.0001

Dunnett's t Tests for E2

NOTE: This test controls the Type I experimentwise error for comparisons of all treatments

against a control.

Alpha	0.05
Error Degrees of Freedom	85
Error Mean Square	1.7589E8
Critical Value of Dunnett's t	2.70761

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

Site Comparison	Difference Between Means	Simultaneous 95% Confidence Limits	
C6 - C1	2174	-9637	13986
E4 - C1	-3538	-18198	11122
C3 - C1	-4523	-17077	8031
E3 - C1	-6375	-20537	7788
E1 - C1	-6924	-22182	8335
E6 - C1	-7494	-22154	7166
E8 - C1	-7585	-25738	10568

NONPARAMETRIC COMPARISON OF MALE PLASMA ESTRADIOL BETWEEN SITES 118

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable E2
Classified by Variable Site

Site	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	18	711.0	846.0	102.834819	39.500000
C3	15	735.0	705.0	95.734006	49.000000
C6	19	1055.0	893.0	104.946018	55.526316
E1	8	284.0	376.0	72.984017	35.500000
E3	10	517.0	470.0	80.632913	51.700000
E4	9	484.0	423.0	76.954532	53.777778
E6	9	366.0	423.0	76.954532	40.666667
E8	5	219.0	235.0	58.708319	43.800000

Kruskal-Wallis Test

Chi-Square	6.2571
DF	7
Pr > Chi-Square	0.5101

Median Scores (Number of Points Above Median) for Variable E2
Classified by Variable Site

Site	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	18	7.0	8.903226	1.915216	0.388889
C3	15	8.0	7.419355	1.782969	0.533333
C6	19	13.0	9.397849	1.954536	0.684211
E1	8	4.0	3.956989	1.359269	0.500000
E3	10	6.0	4.946237	1.501724	0.600000
E4	9	5.0	4.451613	1.433217	0.555556
E6	9	1.0	4.451613	1.433217	0.111111
E8	5	2.0	2.473118	1.093396	0.400000

Median One-Way Analysis

Chi-Square	9.5763
DF	7

Pr > Chi-Square 0.2139

MEAN MALE PLASMA ESTRADIOL CONCENTRATIONS BY TREATMENT 120

Obs	TREAT	_TYPE_	_FREQ_	E2	STD	CV
1	ATRAZINE	0	132	2013.51	4174.05	207.302
2	CONTROL	0	171	6878.78	15084.70	219.293

ANOVA FOR MALE PLASMA ESTRADIOL ACROSS TREATMENTS 121

The ANOVA Procedure

Class Level Information

Class	Levels	Values
TREAT	2	ATRAZINE CONTROL

Number of observations 101

NOTE: Due to missing values, only 93 observations can be used in this analysis.

ANOVA FOR MALE PLASMA ESTRADIOL ACROSS TREATMENTS 122

The ANOVA Procedure

Dependent Variable: E2

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	755878968	755878968	4.46	0.0375
Error	91	15427036782	169527877		
Corrected Total	92	16182915750			

R-Square	Coeff Var	Root MSE	E2 Mean
0.046708	249.2317	13020.29	5224.170

Source	DF	Anova SS	Mean Square	F Value	Pr > F
TREAT	1	755878968.2	755878968.2	4.46	0.0375

Levene's Test for Homogeneity of E2 Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
TREAT	1	1.63E18	1.63E18	3.08	0.0826
Error	91	4.814E19	5.291E17		

Bartlett's Test for Homogeneity of E2 Variance

Source	DF	Chi-Square	Pr > ChiSq
TREAT	1	63.5686	<.0001

Dunnett's t Tests for E2

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

Alpha	0.05
Error Degrees of Freedom	91
Error Mean Square	1.6953E8
Critical Value of Dunnett's t	1.98639

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

TREAT Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
CONTROL - ATRAZINE	5742	340	11144	***

MEAN MALE PLASMA TESTOSTERONE CONCENTRATIONS BY SITE AND ANIMAL NUMBER 125

Obs	Site	Ind_No	TREAT	_TYPE_	_FREQ_	T	STD	CV
1	C1	1	CONTROL	0	6	139.03	139.95	100.663
2	C1	2	CONTROL	0	6	2737.00	242.96	8.877
3	C1	3	CONTROL	0	6	1674.80	769.50	45.946
4	C1	4	CONTROL	0	6	83.59	28.35	33.911
5	C1	5	CONTROL	0	6	2696.11	388.14	14.396
6	C1	6	CONTROL	0	6	2581.18	188.89	7.318
7	C1	7	CONTROL	0	6	2896.29	226.63	7.825
8	C1	8	CONTROL	0	6	194.78	39.95	20.511
9	C1	9	CONTROL	0	6	144.59	27.16	18.786
10	C1	10	CONTROL	0	6	82.04	6.21	7.566
11	C1	11	CONTROL	0	6	32190.40	0.00	0.000
12	C1	12	CONTROL	0	6	113.76	24.18	21.255
13	C1	13	CONTROL	0	6	.	.	.
14	C1	14	CONTROL	0	6	59.60	13.25	22.232
15	C1	15	CONTROL	0	6	57.70	18.65	32.317
16	C1	16	CONTROL	0	6	21112.00	0.00	0.000
17	C1	17	CONTROL	0	6	31.36	5.77	18.406
18	C1	18	CONTROL	0	6	88.85	15.25	17.161
19	C1	19	CONTROL	0	6	68.54	4.30	6.279
20	C1	20	CONTROL	0	6	161.21	35.78	22.196
21	C3	1	CONTROL	0	6	.	.	.
22	C3	2	CONTROL	0	6	2208.90	518.72	23.483
23	C3	3	CONTROL	0	6	9935.35	1378.10	13.871
24	C3	4	CONTROL	0	6	592.11	68.26	11.528
25	C3	5	CONTROL	0	6	265.97	175.53	65.994
26	C3	6	CONTROL	0	6	654.53	239.70	36.622
27	C3	7	CONTROL	0	6	8145.75	547.31	6.719
28	C3	8	CONTROL	0	6	2755.58	1362.81	49.456
29	C3	9	CONTROL	0	6	.	.	.
30	C3	10	CONTROL	0	6	2611.80	296.82	11.364
31	C3	11	CONTROL	0	6	2376.55	142.75	6.006
32	C3	12	CONTROL	0	6	2372.41	421.51	17.767
33	C3	13	CONTROL	0	6	159.89	97.48	60.967
34	C3	14	CONTROL	0	6	3556.26	417.34	11.735
35	C3	15	CONTROL	0	6	221.63	28.98	13.076
36	C3	16	CONTROL	0	6	190.61	137.99	72.396
37	C3	17	CONTROL	0	6	.	.	.
38	C6	1	CONTROL	0	6	79.25	22.98	28.991
39	C6	2	CONTROL	0	6	1217.66	856.84	70.368
40	C6	3	CONTROL	0	6	3018.72	506.00	16.762
41	C6	4	CONTROL	0	6	12570.29	909.41	7.235
42	C6	5	CONTROL	0	6	3905.44	1376.31	35.241
43	C6	6	CONTROL	0	6	224.60	40.01	17.816

44	C6	7	CONTROL	0	6	1857.56	339.98	18.302
45	C6	8	CONTROL	0	6	4493.02	1951.16	43.426
46	C6	9	CONTROL	0	6	685.27	98.23	14.334
47	C6	10	CONTROL	0	6	2264.66	220.37	9.731
48	C6	11	CONTROL	0	6	602.58	86.20	14.305
49	C6	12	CONTROL	0	6	1928.61	329.99	17.110
50	C6	13	CONTROL	0	6	204.25	37.57	18.393
51	C6	14	CONTROL	0	6	5314.58	1069.39	20.122
52	C6	15	CONTROL	0	6	1034.23	35.23	3.4068
53	C6	16	CONTROL	0	6	3573.74	1077.58	30.1527
54	C6	17	CONTROL	0	6	9867.56	773.75	7.8413
55	C6	18	CONTROL	0	6	1494.39	143.13	9.5777
56	C6	19	CONTROL	0	6	7387.18	1162.12	15.7315
57	C6	20	CONTROL	0	6	1603.54	282.26	17.6021
58	E1	1	ATRAZINE	0	6	831.37	85.38	10.2698
59	E1	2	ATRAZINE	0	6	484.80	16.27	3.3550
60	E1	3	ATRAZINE	0	6	763.44	23.01	3.0134
61	E1	4	ATRAZINE	0	6	245.16	33.41	13.6296
62	E1	5	ATRAZINE	0	6	192.02	56.66	29.5075
63	E1	6	ATRAZINE	0	6	146.08	12.43	8.5100
64	E1	7	ATRAZINE	0	6	56.13	6.37	11.3552
65	E1	8	ATRAZINE	0	6	8262.43	1120.15	13.5572
66	E3	1	ATRAZINE	0	6	598.56	46.73	7.8074
67	E3	2	ATRAZINE	0	6	324.72	35.74	11.0078
68	E3	3	ATRAZINE	0	6	595.42	198.93	33.4092
69	E3	4	ATRAZINE	0	6	5124.19	260.81	5.0898
70	E3	5	ATRAZINE	0	6	440.39	59.79	13.5763

MEAN MALE PLASMA TESTOSTERONE CONCENTRATIONS BY SITE AND ANIMAL NUMBER 126

Obs	Site	Ind_No	TREAT	_TYPE_	_FREQ_	T	STD	CV
71	E3	6	ATRAZINE	0	6	255.93	28.83	11.2640
72	E3	7	ATRAZINE	0	6	3936.60	660.75	16.7849
73	E3	8	ATRAZINE	0	6	138.52	48.12	34.7396
74	E3	9	ATRAZINE	0	6	250.10	32.27	12.9048
75	E3	10	ATRAZINE	0	6	252.42	39.72	15.7351
76	E4	1	ATRAZINE	0	6	5144.47	203.92	3.9639
77	E4	2	ATRAZINE	0	6	1060.29	112.53	10.6135
78	E4	3	ATRAZINE	0	6	2872.23	1444.02	50.2754
79	E4	4	ATRAZINE	0	6	1546.88	560.44	36.2305
80	E4	5	ATRAZINE	0	6	1638.72	291.68	17.7991
81	E4	6	ATRAZINE	0	6	3915.86	898.21	22.9377
82	E4	7	ATRAZINE	0	6	.	.	.
83	E4	8	ATRAZINE	0	6	5112.10	796.32	15.5771
84	E4	9	ATRAZINE	0	6	15218.92	2038.78	13.3963
85	E4	10	ATRAZINE	0	6	4992.90	3455.19	69.2020
86	E6	1	ATRAZINE	0	6	185.87	12.22	6.5729
87	E6	2	ATRAZINE	0	6	86.22	22.24	25.7912
88	E6	3	ATRAZINE	0	6	685.96	218.27	31.8191
89	E6	4	ATRAZINE	0	6	124.22	6.12	4.9292
90	E6	5	ATRAZINE	0	6	179.40	42.24	23.5432
91	E6	6	ATRAZINE	0	6	63.85	8.17	12.7968
92	E6	7	ATRAZINE	0	6	92.07	3.03	3.2897
93	E6	8	ATRAZINE	0	6	2759.97	218.01	7.8989
94	E6	9	ATRAZINE	0	6	47.38	18.61	39.2792
95	E6	10	ATRAZINE	0	6	.	.	.
96	E8	1	ATRAZINE	0	6	241.58	54.17	22.4250
97	E8	2	ATRAZINE	0	6	503.73	56.20	11.1575
98	E8	3	ATRAZINE	0	6	1441.63	307.45	21.3265
99	E8	4	ATRAZINE	0	6	.	.	.
100	E8	5	ATRAZINE	0	6	876.52	152.11	17.3543
101	E8	6	ATRAZINE	0	6	81.07	20.93	25.8156

ANOVA FOR MALE PLASMA TESTOSTERONE BETWEEN SITES 127

The ANOVA Procedure

Class Level Information

Class	Levels	Values
Site	8	C1 C3 C6 E1 E3 E4 E6 E8

Number of observations 101

NOTE: Due to missing values, only 94 observations can be used in this analysis.

Dependent Variable: T

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	151109859	21587123	1.00	0.4339
Error	86	1848208528	21490797		
Corrected Total	93	1999318387			

R-Square	Coeff Var	Root MSE	T Mean
0.075581	182.8974	4635.817	2534.654

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Site	7	151109858.7	21587122.7	1.00	0.4339

Levene's Test for Homogeneity of T Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Site	7	5.575E16	7.964E15	0.96	0.4620
Error	86	7.098E17	8.254E15		

Bartlett's Test for Homogeneity of T Variance

Source	DF	Chi-Square	Pr > ChiSq
Site	7	68.1321	<.0001

Dunnett's t Tests for T

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

Alpha	0.05
Error Degrees of Freedom	86
Error Mean Square	21490797
Critical Value of Dunnett's t	2.70970

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

Site Comparison	Difference Between Means	Simultaneous 95% Confidence Limits	
E4 - C1	1079	-4004	6162
C6 - C1	-366	-4390	3658
C3 - C1	-957	-5382	3467
E1 - C1	-2160	-7454	3135
E3 - C1	-2341	-7248	2567
E8 - C1	-2903	-9217	3410
E6 - C1	-3063	-8146	2020

NONPARAMETRIC COMPARISON OF MALE PLASMA TESTOSTERONE ACROSS SITES 131

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable T
Classified by Variable Site

Site	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	19	674.0	902.50	106.213229	35.473684
C3	14	777.0	665.00	94.162979	55.500000
C6	20	1214.0	950.00	108.243553	60.700000
E1	8	305.0	380.00	73.801536	38.125000
E3	10	441.0	475.00	81.547532	44.100000
E4	9	655.0	427.50	77.821912	72.777778
E6	9	215.0	427.50	77.821912	23.888889
E8	5	184.0	237.50	59.354163	36.800000

Kruskal-Wallis Test

Chi-Square	25.9190
DF	7
Pr > Chi-Square	0.0005

Median Scores (Number of Points Above Median) for Variable T
Classified by Variable Site

Site	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	19	7.0	9.50	1.957203	0.368421
C3	14	8.0	7.00	1.735152	0.571429
C6	20	15.0	10.00	1.994616	0.750000
E1	8	3.0	4.00	1.359949	0.375000
E3	10	2.0	5.00	1.502686	0.200000
E4	9	9.0	4.50	1.434033	1.000000
E6	9	1.0	4.50	1.434033	0.111111
E8	5	2.0	2.50	1.093726	0.400000

Median One-Way Analysis

Chi-Square	25.0763
DF	7

Pr > Chi-Square 0.0007

MEAN MALE PLASMA TESTOSTERONE CONCENTRATIONS BY TREATMENT 133

Obs	TREAT	_TYPE_	_FREQ_	T	STD	CV
1	ATRAZINE	0	264	1750.49	2943.22	168.137
2	CONTROL	0	342	3113.39	5255.50	168.803

ANOVA FOR MALE PLASMA TESTOSTERONE ACROSS TREATMENTS 134

The ANOVA Procedure

Class Level Information

Class	Levels	Values
TREAT	2	ATRAZINE CONTROL

Number of observations 101

NOTE: Due to missing values, only 94 observations can be used in this analysis.

Dependent Variable: T

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	44714480	44714480	2.10	0.1503
Error	92	1954603906	21245695		
Corrected Total	93	1999318387			

R-Square	Coeff Var	Root MSE	T Mean
0.022365	181.8515	4609.305	2534.654

Source	DF	Anova SS	Mean Square	F Value	Pr > F
TREAT	1	44714480.50	44714480.50	2.10	0.1503

Levene's Test for Homogeneity of T Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
TREAT	1	1.147E16	1.147E16	1.30	0.2579
Error	92	8.145E17	8.853E15		

Bartlett's Test for Homogeneity of T Variance

Source	DF	Chi-Square	Pr > ChiSq
TREAT	1	16.9361	<.0001

Dunnett's t Tests for T

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

Alpha	0.05
Error Degrees of Freedom	92
Error Mean Square	21245695
Critical Value of Dunnett's t	1.98609

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

TREAT Comparison	Difference Between Means	Simultaneous 95% Confidence Limits	
CONTROL - ATRAZINE	1390.8	-513.2	3294.8

MEAN FEMALE AROMATASE ACTIVITY BY SITE AND ANIMAL NUMBER 138

Obs	Site	Ind_No	TREAT	_TYPE_	_FREQ_	A	STD	CV
1	C1	21	CONTROL	0	2	153.70	5.5665	3.6218
2	C1	22	CONTROL	0	2	26.59	1.0643	4.0021
3	C1	23	CONTROL	0	2	80.68	7.1499	8.8622
4	C1	24	CONTROL	0	2	160.21	13.3182	8.3131
5	C1	25	CONTROL	0	2	4.54	0.3710	8.1696
6	C1	26	CONTROL	0	2	138.02	3.7682	2.7301
7	C1	27	CONTROL	0	2	53.28	3.2616	6.1219
8	C1	28	CONTROL	0	2	28.71	1.6017	5.5786
9	C1	29	CONTROL	0	2	61.51	6.6017	10.7327
10	C1	30	CONTROL	0	2	31.80	3.7195	11.6980
11	C1	31	CONTROL	0	2	82.95	3.5850	4.3219
12	C1	32	CONTROL	0	2	13.51	0.1155	0.8547
13	C1	33	CONTROL	0	2	93.41	6.4528	6.9083
14	C1	34	CONTROL	0	2	8.99	0.0119	0.1329
15	C1	35	CONTROL	0	2	.	.	.
16	C1	36	CONTROL	0	2	84.56	1.5973	1.8888
17	C1	37	CONTROL	0	2	11.18	0.2770	2.4780
18	C1	38	CONTROL	0	2	52.10	4.7007	9.0231
19	C1	39	CONTROL	0	2	.	.	.
20	C1	40	CONTROL	0	2	68.07	5.0388	7.4027
21	C3	21	CONTROL	0	2	185.19	0.1718	0.0928
22	C3	22	CONTROL	0	2	50.45	3.9401	7.8098
23	C3	23	CONTROL	0	2	725.37	3.2272	0.4449
24	C3	24	CONTROL	0	2	328.68	8.1464	2.4785
25	C3	25	CONTROL	0	2	1409.86	50.6053	3.5894
26	C3	26	CONTROL	0	2	113.26	2.0057	1.7709
27	C3	27	CONTROL	0	2	59.76	2.5647	4.2918
28	C3	28	CONTROL	0	2	308.24	0.6218	0.2017
29	C3	29	CONTROL	0	2	120.86	2.6017	2.1527
30	C3	30	CONTROL	0	2	102.66	0.3044	0.2965
31	C3	31	CONTROL	0	2	790.03	4.1639	0.5271
32	C3	32	CONTROL	0	2	357.96	8.6876	2.4269
33	C3	33	CONTROL	0	2	886.19	0.6158	0.0695
34	C3	34	CONTROL	0	2	130.78	1.5195	1.1619
35	C3	35	CONTROL	0	2	47.21	1.4813	3.1376
36	C3	36	CONTROL	0	2	182.98	1.6464	0.8998
37	C3	37	CONTROL	0	2	70.96	1.4720	2.0742
38	C3	38	CONTROL	0	2	215.63	4.4122	2.0462
39	C3	39	CONTROL	0	2	279.03	1.4497	0.5195
40	C3	40	CONTROL	0	2	194.26	5.8231	2.9975
41	C6	21	CONTROL	0	2	33.45	0.3585	1.0717
42	C6	22	CONTROL	0	2	29.55	0.4214	1.4258

43	C6	23	CONTROL	0	2	4.03	0.3213	7.9645
44	C6	24	CONTROL	0	2	.	.	.
45	C6	25	CONTROL	0	2	19.69	0.7304	3.7097
46	C6	26	CONTROL	0	2	3.07	0.8702	28.3025
47	C6	27	CONTROL	0	2	0.23	0.0352	15.1253
48	C6	28	CONTROL	0	2	24.29	0.4593	1.8907
49	C6	29	CONTROL	0	2	.	.	.
50	C6	30	CONTROL	0	2	31.64	4.3236	13.6663
51	C6	31	CONTROL	0	2	.	.	.
52	C6	32	CONTROL	0	2	5.482	0.2420	4.4148
53	C6	33	CONTROL	0	2	4.245	0.5198	12.2429
54	C6	34	CONTROL	0	2	23.058	0.9027	3.9149
55	C6	35	CONTROL	0	2	24.524	0.0634	0.2584
56	C6	36	CONTROL	0	2	.	.	.
57	C6	37	CONTROL	0	2	22.756	0.0416	0.1830
58	C6	38	CONTROL	0	2	2.335	0.7771	33.2828
59	C6	39	CONTROL	0	2	18.042	3.0613	16.9672
60	C6	40	CONTROL	0	2	2.070	0.1799	8.6880
61	E1	1	ATRAZINE	0	2	78.142	0.2266	0.2899
62	E1	2	ATRAZINE	0	2	465.218	9.6807	2.0809
63	E1	3	ATRAZINE	0	2	34.272	1.5139	4.4172
64	E1	4	ATRAZINE	0	2	345.492	15.7471	4.5579
65	E1	5	ATRAZINE	0	2	153.642	1.7230	1.1214
66	E1	6	ATRAZINE	0	2	39.003	0.7964	2.0418
67	E3	1	ATRAZINE	0	2	25.565	0.8305	3.2488
68	E3	2	ATRAZINE	0	2	20.220	0.3865	1.9116
69	E3	3	ATRAZINE	0	2	149.341	2.2374	1.4982

MEAN FEMALE AROMATASE ACTIVITY BY SITE AND ANIMAL NUMBER 139

Obs	Site	Ind_No	TREAT	_TYPE_	_FREQ_	A	STD	CV
70	E3	4	ATRAZINE	0	2	129.350	0.7513	0.5808
71	E3	5	ATRAZINE	0	2	41.427	0.7490	1.8080
72	E3	6	ATRAZINE	0	2	19.066	0.6227	3.2662
73	E3	7	ATRAZINE	0	2	12.951	2.5439	19.6431
74	E3	8	ATRAZINE	0	2	91.475	2.0786	2.2723
75	E3	9	ATRAZINE	0	2	21.132	0.1224	0.5793
76	E3	10	ATRAZINE	0	2	31.900	0.2137	0.6699
77	E4	1	ATRAZINE	0	2	48.127	4.5793	9.5151
78	E4	2	ATRAZINE	0	2	39.544	3.2288	8.1650
79	E4	3	ATRAZINE	0	2	71.724	0.0110	0.0153
80	E4	4	ATRAZINE	0	2	17.726	2.3697	13.3684
81	E4	5	ATRAZINE	0	2	.	.	.
82	E4	6	ATRAZINE	0	2	78.712	2.6865	3.4131
83	E4	7	ATRAZINE	0	2	35.272	2.6168	7.4189
84	E4	8	ATRAZINE	0	2	137.632	3.3057	2.4019
85	E4	9	ATRAZINE	0	2	205.137	6.1020	2.9746
86	E4	10	ATRAZINE	0	2	143.463	8.7359	6.0893
87	E6	1	ATRAZINE	0	2	84.509	0.1741	0.2060
88	E6	2	ATRAZINE	0	2	61.436	1.5234	2.4797
89	E6	3	ATRAZINE	0	2	52.416	0.7188	1.3713
90	E6	4	ATRAZINE	0	2	56.748	1.8847	3.3211
91	E6	5	ATRAZINE	0	2	74.332	2.6188	3.5231
92	E6	6	ATRAZINE	0	2	105.314	1.3007	1.2351
93	E6	7	ATRAZINE	0	2	44.214	1.0374	2.3463
94	E6	8	ATRAZINE	0	2	162.100	6.6676	4.1133
95	E6	9	ATRAZINE	0	2	26.301	0.1825	0.6937
96	E6	10	ATRAZINE	0	2	247.262	5.6848	2.2991
97	E8	1	ATRAZINE	0	2	66.779	3.0958	4.6359
98	E8	2	ATRAZINE	0	2	41.074	2.6246	6.3900
99	E8	3	ATRAZINE	0	2	117.380	5.7140	4.8679
100	E8	4	ATRAZINE	0	2	288.086	17.8714	6.2035
101	E8	5	ATRAZINE	0	2	838.400	22.9345	2.7355
102	E8	6	ATRAZINE	0	2	775.106	55.8228	7.2020
103	E8	7	ATRAZINE	0	2	142.010	8.6639	6.10087
104	E8	8	ATRAZINE	0	2	616.996	29.9642	4.85647
105	E8	9	ATRAZINE	0	2	183.710	12.7623	6.94694
106	E8	10	ATRAZINE	0	2	436.498	28.6119	6.55487
107	E8	11	ATRAZINE	0	2	355.159	22.3086	6.28129
108	E8	12	ATRAZINE	0	2	407.640	12.3229	3.02299
109	E8	13	ATRAZINE	0	2	.	.	.
110	E8	14	ATRAZINE	0	2	.	.	.
111	E8	15	ATRAZINE	0	2	.	.	.

ANOVA FOR FEMALE AROMATASE ACTIVITY BETWEEN SITES 141

The ANOVA Procedure

Class Level Information

Class	Levels	Values
Site	8	C1 C3 C6 E1 E3 E4 E6 E8

Number of observations 111

NOTE: Due to missing values, only 101 observations can be used in this analysis.

Dependent Variable: A

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	1731846.446	247406.635	6.57	<.0001
Error	93	3504430.360	37682.047		
Corrected Total	100	5236276.806			

R-Square	Coeff Var	Root MSE	A Mean
0.330740	125.8355	194.1186	154.2639

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Site	7	1731846.446	247406.635	6.57	<.0001

Levene's Test for Homogeneity of A Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Site	7	2.256E11	3.222E10	2.23	0.0385
Error	93	1.344E12	1.445E10		

Bartlett's Test for Homogeneity of A Variance

Source	DF	Chi-Square	Pr > ChiSq
Site	7	156.5	<.0001

Dunnett's t Tests for A

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

Alpha	0.05
Error Degrees of Freedom	93
Error Mean Square	37682.05
Critical Value of Dunnett's t	2.69659

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

Site Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
E8 - C1	291.64	96.56	486.72	***
C3 - C1	263.87	93.80	433.94	***
E1 - C1	121.86	-124.90	368.62	
E6 - C1	27.36	-179.09	233.82	
E4 - C1	22.27	-191.43	235.97	
E3 - C1	-9.86	-216.31	196.60	
C6 - C1	-48.57	-228.43	131.29	

NONPARAMETRIC COMPARISON OF FEMALE AROMATASE ACTIVITY ACROSS SITES 145

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable A
Classified by Variable Site

Site	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	18	756.0	918.0	112.689840	42.000000
C3	20	1505.0	1020.0	117.345643	75.250000
C6	16	227.0	816.0	107.517440	14.187500
E1	6	377.0	306.0	69.606034	62.833333
E3	10	351.0	510.0	87.948849	35.100000
E4	9	451.0	459.0	83.892789	50.111111
E6	10	532.0	510.0	87.948849	53.200000
E8	12	952.0	612.0	95.278539	79.333333

Kruskal-Wallis Test

Chi-Square	55.8636
DF	7
Pr > Chi-Square	<.0001

Median Scores (Number of Points Above Median) for Variable A
Classified by Variable Site

Site	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C1	18	7.0	8.910891	1.932520	0.388889
C3	20	16.0	9.900990	2.012363	0.800000
C6	16	0.0	7.920792	1.843819	0.000000
E1	6	4.0	2.970297	1.193675	0.666667
E3	10	3.0	4.950495	1.508236	0.300000
E4	9	5.0	4.455446	1.438679	0.555556
E6	10	5.0	4.950495	1.508236	0.500000
E8	12	10.0	5.940594	1.633933	0.833333

Median One-Way Analysis

Chi-Square	31.4784
DF	7
Pr > Chi-Square	<.0001

MEAN FEMALE AROMATASE ACTIVITY BY TREATMENT 147

Obs	TREAT	_TYPE_	_FREQ_	A	STD	CV
1	ATRAZINE	0	102	162.106	193.158	119.155
2	CONTROL	0	120	147.438	255.819	173.510

ANOVA FOR FEMALE AROMATASE ACTIVITY ACROSS TREATMENTS 148

The ANOVA Procedure

Class Level Information

Class	Levels	Values
TREAT	2	ATRAZINE CONTROL

Number of observations 111

NOTE: Due to missing values, only 101 observations can be used in this analysis.

Dependent Variable: A

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	5406.778	5406.778	0.10	0.7497
Error	99	5230870.029	52837.071		
Corrected Total	100	5236276.806			

R-Square	Coeff Var	Root MSE	A Mean
0.001033	149.0065	229.8632	154.2639

Source	DF	Anova SS	Mean Square	F Value	Pr > F
TREAT	1	5406.777677	5406.777677	0.10	0.7497

Levene's Test for Homogeneity of A Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
TREAT	1	1.966E10	1.966E10	0.60	0.4416
Error	99	3.26E12	3.293E10		

Bartlett's Test for Homogeneity of A Variance

Source	DF	Chi-Square	Pr > ChiSq
TREAT	1	3.7531	0.0527

Dunnett's t Tests for A

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

Alpha	0.05
Error Degrees of Freedom	99
Error Mean Square	52837.07
Critical Value of Dunnett's t	1.98422

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

TREAT Comparison	Difference Between Means	Simultaneous 95% Confidence Limits	
CONTROL - ATRAZINE	-14.67	-105.65	76.32

MEAN MALE AROMATASE ACTIVITY BY SITE AND ANIMAL NUMBER 152

Obs	Site	Ind_No	TREAT	_TYPE_	_FREQ_	A	STD	CV
1	C1	1	CONTROL	0	2	.	.	.
2	C1	2	CONTROL	0	2	.	.	.
3	C1	3	CONTROL	0	2	.	.	.
4	C1	4	CONTROL	0	2	.	.	.
5	C1	5	CONTROL	0	2	.	.	.
6	C1	6	CONTROL	0	2	.	.	.
7	C1	7	CONTROL	0	2	.	.	.
8	C1	8	CONTROL	0	2	.	.	.
9	C1	9	CONTROL	0	2	.	.	.
10	C1	10	CONTROL	0	2	.	.	.
11	C1	11	CONTROL	0	2	.	.	.
12	C1	12	CONTROL	0	2	.	.	.
13	C1	13	CONTROL	0	2	.	.	.
14	C1	14	CONTROL	0	2	.	.	.
15	C1	15	CONTROL	0	2	.	.	.
16	C1	16	CONTROL	0	2	.	.	.
17	C1	17	CONTROL	0	2	.	.	.
18	C1	18	CONTROL	0	2	.	.	.
19	C1	19	CONTROL	0	2	.	.	.
20	C1	20	CONTROL	0	2	.	.	.
21	C3	1	CONTROL	0	2	.	.	.
22	C3	2	CONTROL	0	2	.	.	.
23	C3	3	CONTROL	0	2	21.1445	.	.
24	C3	4	CONTROL	0	2	22.9172	13.5041	58.926
25	C3	5	CONTROL	0	2	20.3058	6.1536	30.305
26	C3	6	CONTROL	0	2	24.3767	22.0849	90.598
27	C3	7	CONTROL	0	2	22.2198	2.3277	10.476
28	C3	8	CONTROL	0	2	16.0041	12.6224	78.870
29	C3	9	CONTROL	0	2	6.8434	.	.
30	C3	10	CONTROL	0	2	22.5209	11.1054	49.311
31	C3	11	CONTROL	0	2	.	.	.
32	C3	12	CONTROL	0	2	5.9473	0.8273	13.910
33	C3	13	CONTROL	0	2	10.6430	12.5429	117.851
34	C3	14	CONTROL	0	2	52.5030	44.8708	85.463
35	C3	15	CONTROL	0	2	.	.	.
36	C3	16	CONTROL	0	2	4.2133	.	.
37	C3	17	CONTROL	0	2	.	.	.
38	C6	1	CONTROL	0	2	.	.	.
39	C6	2	CONTROL	0	2	.	.	.
40	C6	3	CONTROL	0	2	.	.	.
41	C6	4	CONTROL	0	2	.	.	.
42	C6	5	CONTROL	0	2	.	.	.
43	C6	6	CONTROL	0	2	.	.	.

44	C6	7	CONTROL	0	2	.	.	.
45	C6	8	CONTROL	0	2	.	.	.
46	C6	9	CONTROL	0	2	.	.	.
47	C6	10	CONTROL	0	2	.	.	.
48	C6	11	CONTROL	0	2	.	.	.
49	C6	12	CONTROL	0	2	.	.	.
50	C6	13	CONTROL	0	2	.	.	.
51	C6	14	CONTROL	0	2	.	.	.
52	C6	15	CONTROL	0	2	.	.	.
53	C6	16	CONTROL	0	2	.	.	.
54	C6	17	CONTROL	0	2	.	.	.
55	C6	18	CONTROL	0	2	.	.	.
56	C6	19	CONTROL	0	2	.	.	.
57	C6	20	CONTROL	0	2	.	.	.
58	E1	1	ATRAZINE	0	2	17.134	.	.
59	E1	2	ATRAZINE	0	2	.	.	.
60	E1	3	ATRAZINE	0	2	.	.	.
61	E1	4	ATRAZINE	0	2	.	.	.
62	E1	5	ATRAZINE	0	2	.	.	.
63	E1	6	ATRAZINE	0	2	.	.	.
64	E1	7	ATRAZINE	0	2	.	.	.
65	E1	8	ATRAZINE	0	2	.	.	.
66	E3	1	ATRAZINE	0	2	217.908	.	.
67	E3	2	ATRAZINE	0	2	.	.	.
68	E3	3	ATRAZINE	0	2	1.978	.	.
69	E3	4	ATRAZINE	0	2	0.675	.	.
70	E3	5	ATRAZINE	0	2	9.357	9.5111	101.647

MEAN MALE AROMATASE ACTIVITY BY SITE AND ANIMAL NUMBER 153

Obs	Site	Ind_No	TREAT	_TYPE_	_FREQ_	A	STD	CV
71	E3	6	ATRAZINE	0	2	.	.	.
72	E3	7	ATRAZINE	0	2	2.707	.	.
73	E3	8	ATRAZINE	0	2	.	.	.
74	E3	9	ATRAZINE	0	2	6.979	.	.
75	E3	10	ATRAZINE	0	2	.	.	.
76	E4	1	ATRAZINE	0	2	19.360	7.9034	40.823
77	E4	2	ATRAZINE	0	2	12.020	2.7125	22.567
78	E4	3	ATRAZINE	0	2	4.930	1.5075	30.578
79	E4	4	ATRAZINE	0	2	11.255	1.5916	14.142
80	E4	5	ATRAZINE	0	2	6.312	1.5449	24.477
81	E4	6	ATRAZINE	0	2	.	.	.
82	E4	7	ATRAZINE	0	2	7.929	0.4772	6.018
83	E4	8	ATRAZINE	0	2	44.522	26.0913	58.603
84	E4	9	ATRAZINE	0	2	21.735	2.4152	11.112
85	E4	10	ATRAZINE	0	2	33.740	16.4240	48.678
86	E6	1	ATRAZINE	0	2	.	.	.
87	E6	2	ATRAZINE	0	2	.	.	.
88	E6	3	ATRAZINE	0	2	.	.	.
89	E6	4	ATRAZINE	0	2	.	.	.
90	E6	5	ATRAZINE	0	2	.	.	.
91	E6	6	ATRAZINE	0	2	.	.	.
92	E6	7	ATRAZINE	0	2	.	.	.
93	E6	8	ATRAZINE	0	2	.	.	.
94	E6	9	ATRAZINE	0	2	.	.	.
95	E6	10	ATRAZINE	0	2	.	.	.
96	E8	1	ATRAZINE	0	2	.	.	.
97	E8	2	ATRAZINE	0	2	.	.	.
98	E8	3	ATRAZINE	0	2	.	.	.
99	E8	4	ATRAZINE	0	2	.	.	.
100	E8	5	ATRAZINE	0	2	.	.	.
101	E8	6	ATRAZINE	0	2	.	.	.

ANOVA FOR MALE AROMATASE ACTIVITY BETWEEN SITES 154

The ANOVA Procedure

Class Level Information

Class	Levels	Values
Site	8	C1 C3 C6 E1 E3 E4 E6 E8

Number of observations 101

NOTE: Due to missing values, only 28 observations can be used in this analysis.

Dependent Variable: A

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	2160.42889	720.14296	0.42	0.7416
Error	24	41331.85569	1722.16065		
Corrected Total	27	43492.28458			

R-Square	Coeff Var	Root MSE	A Mean
0.049674	179.2665	41.49892	23.14929

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Site	3	2160.428887	720.142962	0.42	0.7416

Levene's Test for Homogeneity of A Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Site	2	1.7871E8	89355288	2.78	0.0821
Error	24	7.717E8	32154336		

Bartlett's Test for Homogeneity of A Variance

Source	DF	Chi-Square	Pr > ChiSq
Site	2	34.2288	<.0001

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

Alpha	0.05
Error Degrees of Freedom	24
Error Mean Square	1722.161
Critical Value of Dunnett's t	2.54459

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

Site Comparison	Difference Between Means	Simultaneous 95% Confidence Limits	
E3 - C3	20.80	-32.00	73.60
E4 - C3	-1.16	-47.72	45.41
E1 - C3	-2.00	-111.91	107.91

NONPARAMETRIC COMPARISON OF MALE AROMATASE ACTIVITY ACROSS SITES 158

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable A
Classified by Variable Site

Site	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C3	12	199.0	174.00	21.540659	16.583333
E1	1	16.0	14.50	8.077747	16.000000
E3	6	54.0	87.00	17.860571	9.000000
E4	9	137.0	130.50	20.328551	15.222222

Kruskal-Wallis Test

Chi-Square	3.5546
DF	3
Pr > Chi-Square	0.3137

The NPAR1WAY Procedure

Median Scores (Number of Points Above Median) for Variable A
Classified by Variable Site

Site	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C3	12	8.0	6.00	1.333333	0.666667
E1	1	1.0	0.50	0.500000	1.000000
E3	6	1.0	3.00	1.105542	0.166667
E4	9	4.0	4.50	1.258306	0.444444

Median One-Way Analysis

Chi-Square	4.9286
DF	3
Pr > Chi-Square	0.1771

MEAN MALE AROMATASE ACTIVITY BY TREATMENT 160

Obs	TREAT	_TYPE_	_FREQ_	A	STD	CV
1	ATRAZINE	0	88	22.6808	42.1873	186.004
2	CONTROL	0	114	20.3370	17.8629	87.834

ANOVA FOR MALE AROMATASE ACTIVITY ACROSS TREATMENTS 161

The ANOVA Procedure

Class Level Information

Class	Levels	Values
TREAT	2	ATRAZINE CONTROL

Number of observations 101

NOTE: Due to missing values, only 28 observations can be used in this analysis.

Dependent Variable: A

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	338.13513	338.13513	0.20	0.6555
Error	26	43154.14945	1659.77498		
Corrected Total	27	43492.28458			

R-Square	Coeff Var	Root MSE	A Mean
0.007775	175.9896	40.74034	23.14929

Source	DF	Anova SS	Mean Square	F Value	Pr > F
TREAT	1	338.1351305	338.1351305	0.20	0.6555

Levene's Test for Homogeneity of A Variance
ANOVA of Squared Deviations from Group Means

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
TREAT	1	40590974	40590974	0.85	0.3663
Error	26	1.2481E9	48003230		

Bartlett's Test for Homogeneity of A Variance

Source	DF	Chi-Square	Pr > ChiSq
TREAT	1	17.1290	<.0001

Dunnett's t Tests for A

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

Alpha	0.05
Error Degrees of Freedom	26
Error Mean Square	1659.775
Critical Value of Dunnett's t	2.05558

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

TREAT Comparison	Difference Between Means	Simultaneous 95% Confidence Limits	
CONTROL - ATRAZINE	-7.022	-39.003	24.958