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EXTREMELY LOW FREQUENCY (ELF) VERTICAL ELECTRIC FIELD EXPOSURE --ETC(U)
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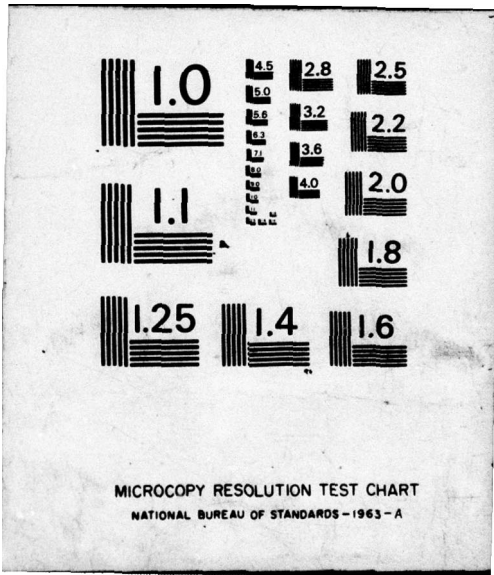
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EXTREMELY LOW FREQUENCY (ELF)
VERTICAL ELECTRIC FIELD EXPOSURE OF RATS:
A SEARCH FOR GROWTH, FOOD CONSUMPTION
AND BLOOD METABOLITE ALTERATIONS.

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ABSTRACT

Three hundred eighty-four young male rats were exposed to 45 Hertz, vertical, electric fields in nonmetallic cages, to detect possible effects on growth, food and water consumption, selected blood biochemical and hematological constituents and pathological observations. Three experiments, each using six groups of 16 animals exposed to field strengths of 0, 2, 10, 20, 50, and 100 V/m (RMS), were performed; all variables were analyzed for statistical differences and the existence of a "dose-relationship" of these field strengths. One further experiment, employing 48 control animals and 48 animals exposed to 20 V/m (RMS), was also performed to minimize the likelihood of missing a true effect. Although some differences were found in experiments E, F, and H, neither a dose-relationship nor a biological effect was observed. In experiment G, no statistical differences ($p < 0.05$) were observed for any variables. It was concluded that no biological effects from exposure to these electric fields were observed on growth, food consumption and water consumption, nor the blood concentrations of total protein, globulin, glucose, cholesterol, triglycerides and total lipid, nor on the hematological values for red blood cells, white blood cells, segmented neutrophils, lymphocytes, monocytes, eosinophils, hematocrit or hemoglobin. In addition, necropsy and histopathological examination of tissue from 15 organ systems did not reveal any changes.

I. INTRODUCTION

Extremely Low Frequency (ELF) radiation generally denotes electromagnetic radiation having frequencies from a few Hertz (sometimes including zero Hertz of dc) to several hundred Hertz. The natural or ambient levels of this type radiation have been reviewed by Polk;¹ however, the extent to which these fields may be interacting with biological systems has been and still is the subject of considerable research. The largest man-made ELF radiation comes essentially from commercial electrical power lines operating at 60 Hz. With the recent development of the Navy's ELF Communications System for operation at 45 or 75 Hz, another man-made source of this radiation will come into existence.

It is becoming increasingly apparent that at least certain animals can sense these fields and, in addition, even utilize this information. For example, some birds are affected by weak magnetic fields² and it is proposed that they may use terrestrial magnetic fields to aid in orientation.³ Kalmyn has presented data that suggest that sharks and rays can locate prey by the weak ELF electric fields they produce, and he proposed that certain fish also may be able to use terrestrial fields in obtaining orientational and navigational information. Other biological effects from ELF fields have been reported by Goodman *et al.* on Physarum polycephalum,⁴ and Cavalas-Medici on monkeys.⁵

Recently large 60 Hz electric fields have been reported to reduce the growth of rats⁶ and mice,⁷ and Noval et al.⁸ have reported that small 45 Hz vertical electric fields produced reduced growth, reduced abdominal body fat, and altered brain and liver enzyme activities. Because two independent investigators have reported lowered growth, this research represents a dedicated attempt to verify the existence of lowered growth rates in rats exposed to similar 45 Hz, vertical, electric fields and to determine if food consumption or blood metabolite concentrations were also perturbed. A preliminary report of this work has been submitted elsewhere.⁹

II. MATERIALS AND PROCEDURES

1. Animals

Male, approximately 180 gm, Har:(SD)(1), Sprague-Dawley rats, obtained from Hill Top Lab Animals, Inc., Scottdale, Pennsylvania, were used for all experiments. Animals were quarantined, evaluated for health status, and then randomly assigned to individual cages within the six exposure chambers of the irradiation facility. Body weight, food consumption and water consumption data were obtained three times each week during the exposure period and the 5-day pre-exposure acclimatization period. The diet was a standard commercial rodent feed (Wayne Lab-Blox, Allied Mills, Inc., Chicago, Ill.)

obtained in pulverized form for food consumption measurements. Food and water were provided ad libitum.

2. Irradiation Facility

The irradiation facility has been described completely in a previous report.¹⁰ It was contained in a typical laboratory room maintained under slight positive air pressure minimizing outside contamination. Access was restricted to personnel concerned with this research, who wore clean laboratory jackets, masks and gloves. Room air was circulated at 23 room volumes per hour and filtered by HEPA and activated alumina filters. Illumination was provided 12 hours each day, beginning at 6:00 a.m., from room and chamber lights. Temperature was controlled at $22^{\circ} \pm 2^{\circ}\text{C}$ and continuously recorded; relative humidity was not controlled but a continuous record indicated it remained between 25% to 55%.

There were six identical exposure chambers contained in three racks, each rack consisting of an upper and a lower chamber. Each exposure chamber contained 16 nonmetallic cages described previously,¹⁰ providing food from a 250-cm³ glass jar and water from a glass sipper tube and 250-cm³ glass bottle. Chambers were horizontal, parallel plate capacitors with an upper plate of aluminum screen, a lower plate of aluminum sheet, and an average plate separation of 46.4 ± 0.3 cm (S.D.).

A signal-generating and signal-monitoring system provided the 45 Hz voltage, which could be independently varied from a nominally zero

field strength value up to 1000 V/m (RMS) for each chamber. This system contained two signal generators to provide a backup generator if the primary signal generator failed and to sound an alarm if both systems failed. Voltage and frequency were routinely measured to within +0.5%.

The 45 Hz exposure field and existing ELF fields were measured by the IIT Research Institute, Chicago, Illinois, to provide quantitative information. Data were obtained for electric and magnetic fields at 15, 45, 60 and 180 Hz and were presented in the report of this facility.¹⁰ The largest ambient fields were found at 60 Hz as expected because this is the frequency used for electric power. Even though these 60 Hz field strengths were typical of those found within office and residential environments,¹¹ the possibility of this electric field perturbing the results of these experiments was considered in the following manner. The average value of the 60 Hz electric field per cage was obtained for each animal position. These average field strengths were separated into four groups for use in determining if an interaction could be found with the exposure field.

3. Experimental Design

Four experiments (lettered E through H) were performed using the six exposure chambers, each containing 16 animals housed one per cage (see Table 1). Five field strengths of 2, 10, 20, 50 and 100 V/m (RMS) were used in experiments E, F and H in an attempt to observe a

dose-versus-effect relationship. In addition, these values cover the range of field strengths reported by Noval et al.⁸ to have produced the effects previously mentioned. Experiment G was designed to maximize the number of animals for one field strength by using three chambers as controls and three chambers at a field strength of 20 V/m (RMS) (see Table 2). This configuration minimizes the chance of making a type-II error, which is failing to declare a result significant for a fixed α -level. The field strength of 20 V/m (RMS) was chosen because this value produced the effects observed by Noval et al.⁸, and it represents a field strength approximately one hundred times larger than the ELF Communication System would generate. Because of the large number of animals in each 45 Hz group, they can be further classified into the four 60 Hz field strength groups (see Table 2). This two-way classification was analyzed with the two-way analysis of variance technique to determine if the 45 Hz and 60 Hz fields interacted.

Chambers were permanently numbered from one through six for reference, and chamber bias was minimized by utilizing each chamber as a control or for a given field strength only once (see Table 3).

After the exposure period, animals were individually withdrawn from the exposure room one at a time, given an intraperitoneal injection of chloral hydrate at a dose of 36 mg per 100 g of body weight, and placed in a clean cage until one animal from each group had been obtained and all six of these animals became unconscious. In this manner,

six animals at a time were taken to a separate room where euthanasia was completed by heart puncture and exsanguination. Three milliliters of anticoagulated blood were used for hematological analysis. The remainder of the sample was allowed to clot for 1 hour at room temperature, then was centrifuged to remove the clot, separated into aliquots and frozen at -60°C for later biochemical analysis. For experiments G and H, this procedure was modified in three ways to eliminate variability caused by recent food consumption and aggressive behavior exhibited by the six animals when placed together in one cage. First, food was withdrawn at 4:00 p.m. on the day before euthanasia; second, animals were kept in separate cages until euthanasia; and third, plasma was obtained from blood containing 5×10^{-3} M potassium ethylenediamine tetraacetate.

4. Biochemical Analysis

Total protein and globulin assays were performed on the Auto Analyzer (Technicon Corp., Tarrytown, N.Y.) by the technique of Sobocinski *et al.*¹² Glucose, cholesterol, triglycerides and total lipids were assayed using commercial reagents and standards from Boehringer Mannheim Corporation (B.M.C., 219 E. 44th Street, New York, N.Y.) with the following catalog numbers: 15715, 15738, 15989 and 15991, respectively. Unknowns and quantitative serum controls (Monitrol I and II, Dade Division, American Hospital Supply Corp., Miami, Florida) were assayed simultaneously in a random sequence.

5. Hematology

Red and white cell counts were performed on the Coulter Counter Model B (Coulter Electronics, Inc., 590 W. 20th Street, Hialeah, Florida). Hematocrit values were obtained by reading capillary tubes after centrifugation, and hemoglobin was estimated by the cyanmethemoglobin method employing Drabkin's solution from Hycel, Inc., Houston, Texas.

6. Pathology

Necropsies were performed on a minimum of four randomly selected animals from each group. Tissues from the skin, brain, salivary gland, lung, heart, stomach, duodenum, cecum or colon, liver, spleen, kidney, urinary bladder, adrenal gland, pancreas and testes were saved in 10% buffered formalin for histopathologic examination. Adrenal glands and spleen were weighed when removed from the body. Tissue preparation and staining were performed according to accepted methods, as outlined in the Armed Forces Institute of Pathology Manual.¹³ Hematoxylin and eosin (H & E) were routinely used, but selected samples were submitted to Gormori's methenamine silver stain, Brown-Brenn tissue gram stain and the periodic acid-Schiff (PAS) reaction.

7. Statistical Analysis

Histograms of individual observations were used to determine if nonparametric statistical tests should be employed. Body weight,

food consumption and water consumption data were analyzed using the t-test or analysis of variance followed by the Neuman-Keuls test¹⁴ if significance ($p < 0.05$) was observed. For biochemical and histological analyses, significance ($p < 0.05$) was tested employing the one-way analysis and multiple pairwise comparisons of the Kruskal-Wallis tests¹⁵ or the Mann-Whitney test.¹⁶

III. RESULTS

During these experiments the exposure facility operated without failure. Routine monitoring of the signal-generating systems, at least three times a week, revealed that the chamber voltages remained constant to within +4% and -2% and the 45 Hz frequency did not vary more than $\pm 0.2\%$.

In this research, growth is defined as the net change in body weight of the test animal. Due to the short duration of these experiments and the fact that these animals used were approximately the same age and observed for the same length of time, average per day values of growth, food consumption and water consumption per animal are valid measures to use in comparing groups within an experiment. These values were calculated by obtaining the total change in body weight or the total weight of food or water consumed for each animal over the 28-day exposure period and dividing by 28.

1. 60 Hz Ambient Electric Field Analysis

In an attempt to assess the possible effects of the ambient 60 Hz electric field, the average values of the field strength per cage were obtained and separated into four groups. Two-way analysis of variance, using the 45 Hz 60 Hz field strengths in a two-by-four classification shown in Table 2, was performed on the average per day values of growth, food consumption and water consumption of experiment G. The results of this analysis are summarized in Table 4 and graphically summarized in Appendix A. Differences between 45 Hz groups were not statistically significant ($p > 0.05$), nor was the interaction between the 45 Hz and 60 Hz fields found to be significant for growth, food consumption and water consumption. Further, there was no effect on growth attributable to the 60 Hz field. The statistical differences found in the food consumption and water consumption analyses occurred only between the highest and lowest field strength groups. Because these significant differences only occurred between exposure groups whose initial body weight and growth were markedly elevated, it is just as likely that these significant differences are attributable to the dependent relationship that food and water consumption have with both growth and initial body weight. The initial body weight, growth, food and water consumption are graphically summarized in Appendix A. To complete the 60 Hz analysis, the biochemical and hematological data were tested for significance; results

are presented in Table 5. Significance occurred in total protein and globulin data only between the highest and next-highest field strength groups, and in the red blood cell data only between the lowest and next-lowest field strength groups. Because no significant differences were observed for any variable between the highest and lowest field strength groups or between the two field strength groups with 36 animals each, no biological significance is attributed to these differences.

2. Growth, Food Consumption and Water Consumption at 45 Hz

Figure 1 summarizes the average body weight and the daily growth data for each group of the four experiments during the exposure period. Figures 2 and 3 summarize the cumulative and per-day food and water consumption, respectively, for each group of these experiments. These graphs, particularly the per-day graphs, illustrate the well-controlled nature of these variables. The small variations observed in the body-weight change/day graphs (e.g., in G experiment on days 10, 18 and 25) always occurred after the cage litter was changed and may result from the animal's attempt to mark his new bedding by defecation. Notice that these readily visible dips in the per-day growth produce a virtually indistinguishable displacement in the average body-weight curves. Statistical analysis of the average per-day growth, food and water consumption data versus 45 Hz field strengths (see Table 6) produced significance

in the growth and food consumption for experiment F. These average group values for each experiment are plotted against the applied 45 Hz field strength in Figure 4 to determine if a relationship to the applied field strength can be observed. In the growth analysis of experiment F, the control group was not found to be different from any irradiate, and only the 100 V/m group was found to be statistically different from the 2, 20 and 50 V/m groups but not from the control or 10 V/m groups. In the food consumption analysis of experiment F, the only significance was between the 20 V/m and the 100 V/m and 10 V/m groups.

3. Biochemistry and Hematology at 45 Hz

The individual values for each animal of the measured biochemical and hematological variables and statistical summaries for each group are presented in Appendix C. Table 7 summarizes the results from the statistical analysis of these data. Statistically significant findings ($p < 0.05$) for these variables are summarized below.

Total protein: In experiment H, the only significant difference occurred between the control group and the 100 V/m group (see Figure 5).

Globulin: In experiment H, the only significant difference occurred between the control group and the 100 V/m group (see Figure 5).

Glucose: In experiment E, the only significant difference found was between the control and 2 V/m groups. In experiment F, significant differences occurred only between the 100 V/m group and the control and 20 V/m groups. In experiment H, the only significant difference occurred between the control group and the 100 V/m group (see Figure 5).

Total Lipids: In experiment E, the only significant difference occurred between the 2 V/m group and 100 V/m group (see Figure 6).

Cholesterol: No significant differences were found (see Figure 6).

Triglycerides: No significant differences were found (see Figure 6).

Red Blood Cells: In experiment E, significant differences were found between the 2 V/m group and the 10, 20, 50 and 100 V/m groups and between the control group and the 2, 10 and 50 V/m groups (see Figure 7).

White Blood Cells: No significant differences were found (see Figure 7).

Segmented Neutrophils (POLY): No significant differences were found (see Figure 7).

Lymphocytes: No significant differences were found (see Figure 8).

Hematocrit: In experiment E, significant differences were found between the 2 V/m group and the control and 50 V/m (see Figure 8).

Hemoglobin: In experiment E, the only significant difference found was between the 2 V/m group and the 50 V/m group.

It was noted that the group-to-group variability (in Figures 5, 6, 7, and 8) and the within-group variability for glucose, total lipids, cholesterol, triglyceride, red blood cell, hematocrit and hemoglobin values were markedly reduced by the improved sacrifice technique. This improvement was probably caused by the fact that all animals were fasted for approximately equal times and were not excited due to placement in separate cages until euthanasia. There should be no differences in the plasma or serum values of the biochemical variables used in this study. After assaying for serum triglyceride in experiments E and F, it was discovered that the values for the standards were incorrect because of the presence of free glycerol. The values reported in Appendix C and the group medians of Figures 6 must be corrected by multiplying by 0.66. This constant factor does not alter the results from statistical analysis. The accuracy of this correction factor and of the measurements in experiments G and H were verified using two independent standards (Precilip, Boehringer-Mannheim Corp., New York, N.Y., and Triolein, Sigma Chemical Co., St. Louis, Mo.) and molar absorptivity of the reduced form of nicotinamide-adenine-dinucleotide (NADS).

4. Pathology at 45 Hz

All animals used in this analysis were coded and analyzed in a blind manner. No gross lesions or differences in adrenal and spleen weights were observed at necropsy, and no significant microscopic changes were present in any of the tissues. Incidental findings are as follows:

- a. Small (6-8 cells) foci of lymphocytes were present in 39 livers. This accumulation is routinely seen in our issue stock.
- b. Small accumulations of macrophages were present in 12 lungs. They were spread throughout all groups including the controls and were statistically insignificant.
- c. Small areas of tubular degeneration were present in 8 kidneys. Again, these were in all groups and controls. In addition, 2 polycystic kidneys were found. This lesion is expected to occur with a low rate of frequency in "normal" S-D rats.¹⁷

IV. DISCUSSION AND CONCLUSIONS

The results from research concerned with the effects from exposure to electric and magnetic ELF fields are extremely difficult to assess because of the number of variables that may influence experiments of

this type. Until recently, ELF radiation has not been included in the large number of variables that could influence biological experiments. Even when this radiation is not considered, it is virtually impossible to control--much less monitor--all of these variables. However, once ELF radiation is included as a potential source of biological effect, the number of variables becomes even larger.

Theoretically, ELF radiation can be separated easily into terrestrial and man-made radiation. This convenient separation allows this research to be considered in the following manner. The terrestrial fields were not measured for this research; however, this laboratory and the room which was used for exposure will probably not have their ELF-shielding characteristics changed within the near future. Therefore, if terrestrial fields become a serious consideration in assessing this work, these fields could probably be measured. Man-made ELF fields are found anywhere electric power is used at frequencies from 25 Hz to 60 Hz.¹⁸ For example, under certain high voltage power lines, electric field strengths of thousands of volts per meter are found,¹⁹ and in the laboratory, every electric appliance that is on becomes an ELF irradiator.¹⁰ To account for these fields, the IIT Research Institute measured the ELF fields of this exposure facility and found that the most significant field strength was for the electric field at 60 Hz.¹⁰ This electric field has been fully documented and its effect on these experiments was tested by employing

two-way analysis of variance. No significant differences ($p < 0.05$) were found in growth for the 45 Hz or 60 Hz fields; and further, no significant interaction was observed on growth, food consumption or water consumption by these two fields. These findings and the fact that no significant differences were found between the two 60 Hz groups of 36 animals each led to the conclusion that the 60 Hz fields in this experiment did not produce a biological effect nor would it have interfered with an analysis of only the 45 Hz data.

After analysis with the 45 Hz field strengths, no significant differences were observed in any experiment for the following variables: water consumption, blood cholesterol, blood triglycerides, white blood count, segmented neutrophils, lymphocytes, adrenal weights and spleen weights. No significant differences were observed in any of the histopathological analyses. For the following variables, the only observed significant differences occurred between irradiated groups: growth, food consumption, blood total lipids and hemoglobin. Significant differences between the control and irradiated groups only occurred for total protein, globulin, red blood cells and hemotocrit. Further, no dose-relationship was observed between the exposure field strength and any of the variables studied. The most unequivocal results came from experiment G, in which 48 animals were employed for both control and 20 V/m-exposed groups. No significant differences were observed for any of the variables measured in this experiment.

The findings of this research are consistent with the work of

Knickerbocker et al.²⁰ and Krueger and Reed.²¹ Knickerbocker et al. exposed male mice to a vertical electric field of 157,000 V/m, at 60 Hz, for 10 1/2 months (6 1/2 hours each day) and analyzed for differences in growth, reproduction, gross pathology and histopathology. Although they noted that the unexposed male progenies of the exposed animals did not grow to be as heavy as the male progenies of the control animals, no other statistical or biological differences were observed. Krueger and Reed exposed female mice to horizontal electric fields to 100 V/m at both 45 Hz and 75 Hz. No statistical differences were observed between exposed and control animals in rate of growth, serotonin levels of blood and brain, or susceptibility to challenge by influenza virus.

In a final attempt to determine if ambient fields could have lowered growth of all experimental groups, the following comparison was made. The average growth rate for 96 similar animals used in a pilot experiment was found to be 7.8 grams per day per animal. These animals were fed and handled using procedures identical to those in experiments E, F, G and H; however, they were caged in standard number two mesh and sheet stainless steel rat cages. At our request, IIT Research Institute determined that these cages provided better than -40 dB of electric field shielding at 60 Hz,²² which determined that these animals were grown for 28 days in an ambient 60 Hz electric field which was less than 0.010 V/m (RMS). Had the ambient electric fields present in E, F, G and H produced a growth reduction in all

experimental groups of at least 20%, the smallest growth reduction reported by Noval et al.,⁸ then these shielded animals should have growth rates greater than 9.2 grams per day per animal. The growth rate of these animals, 7.8 grams per day per animal, is well within the growth rates measured for the six groups of animals in experiment F (see Figure 4), which were as young as these pilot animals.

After exposing 384 young, male Sprague-Dawley rats for 28 days to 45 Hz vertical electrical field strengths of 2, 10, 20, 50 and 100 V/m (RMS), no biologically significant differences were observed in any of the measured variables. Further, no dose-relationship was found for any of these variables versus the applied 45 Hz field strengths. Finally, if indeed there were effects produced at ELF frequencies from electric field strengths of these magnitudes, then much of past biological research becomes jeopardized, because these field strengths are common to ordinary laboratories.

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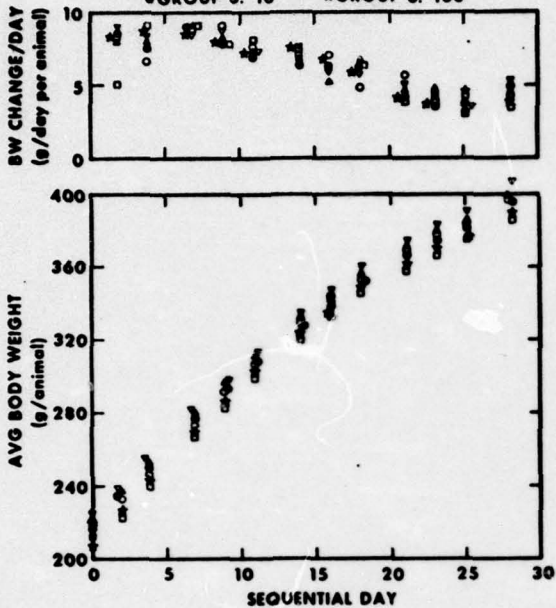
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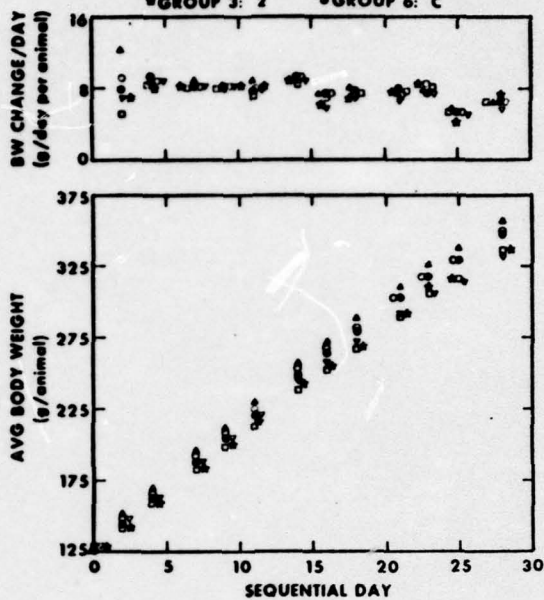
EXPERIMENT E

- | | |
|---------------|----------------|
| ▲ GROUP 1: C | ○ GROUP 4: 20 |
| ○ GROUP 2: 2 | ▼ GROUP 5: 50 |
| ● GROUP 3: 10 | * GROUP 6: 100 |



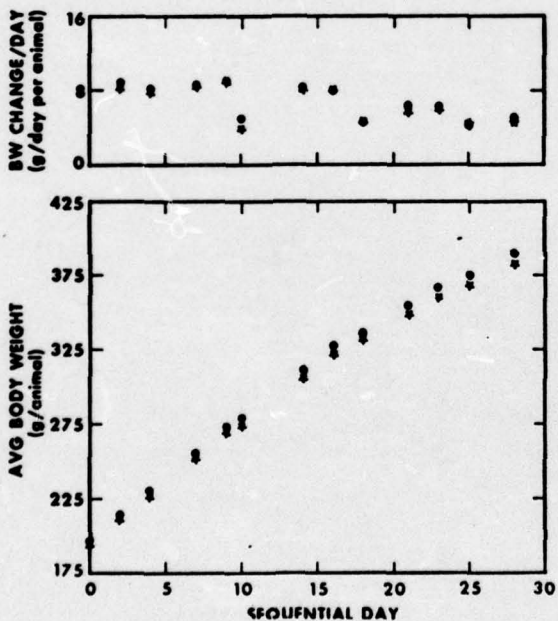
EXPERIMENT F

- | | |
|----------------|---------------|
| ▲ GROUP 1: 100 | ○ GROUP 4: 50 |
| ○ GROUP 2: 10 | ▼ GROUP 5: 20 |
| * GROUP 3: 2 | ● GROUP 6: C |



EXPERIMENT G

- ▲ GROUP 1: COMPOSITE OF THREE CONTROL GROUPS
- GROUP 2: COMPOSITE OF THREE IRRADIATED GROUPS (20 V/m)



EXPERIMENT H

- | | |
|---------------|----------------|
| ▲ GROUP 1: 50 | ○ GROUP 4: 10 |
| ○ GROUP 2: 20 | ▼ GROUP 5: 100 |
| ● GROUP 3: C | * GROUP 6: 2 |

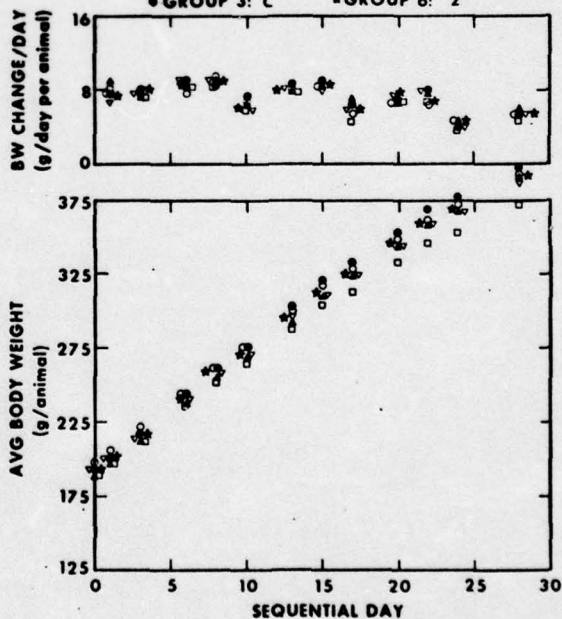


Figure 1. Graphical Summary of the Average Body Weight and Daily Growth for Each Group During Exposure.

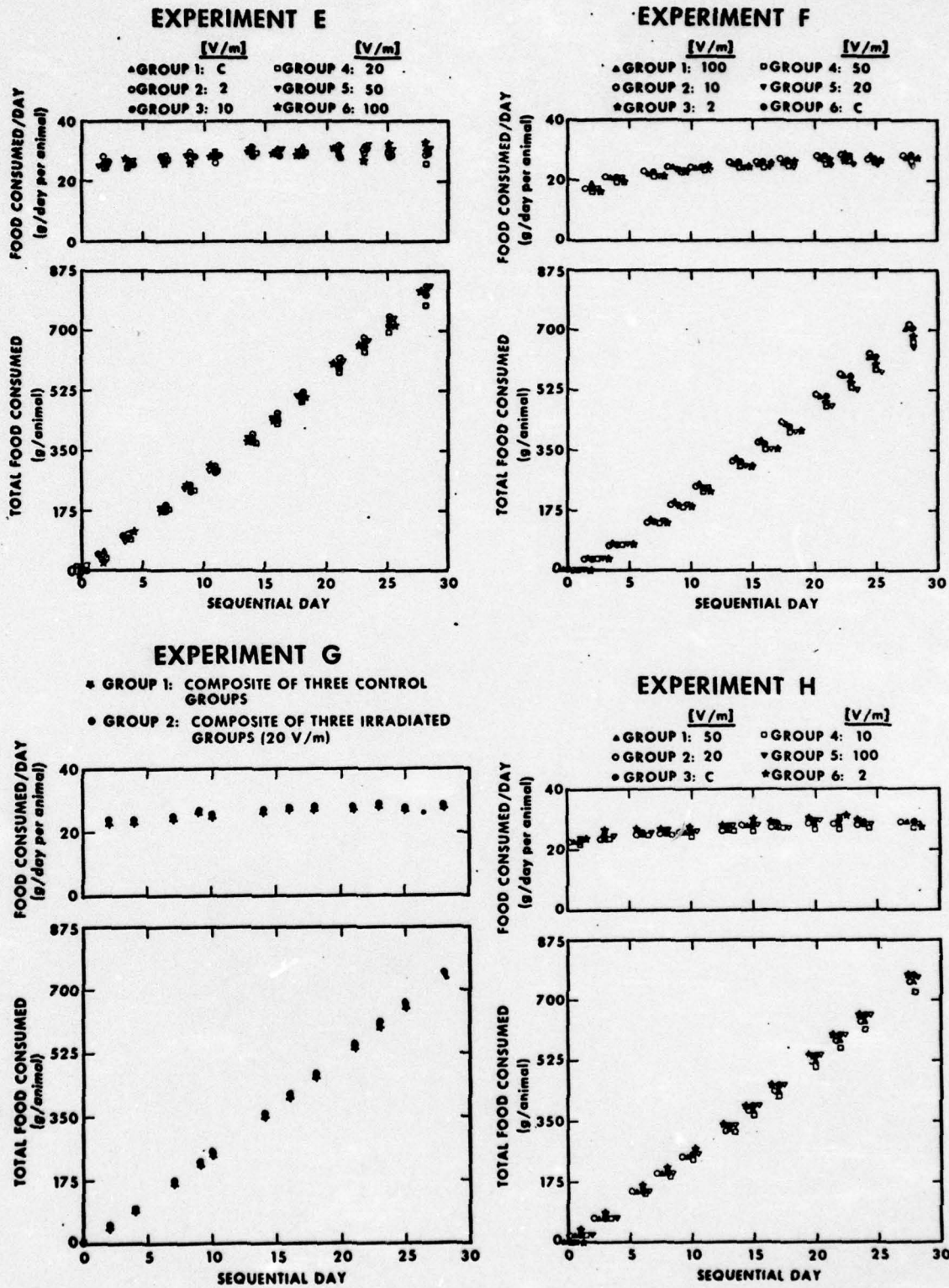
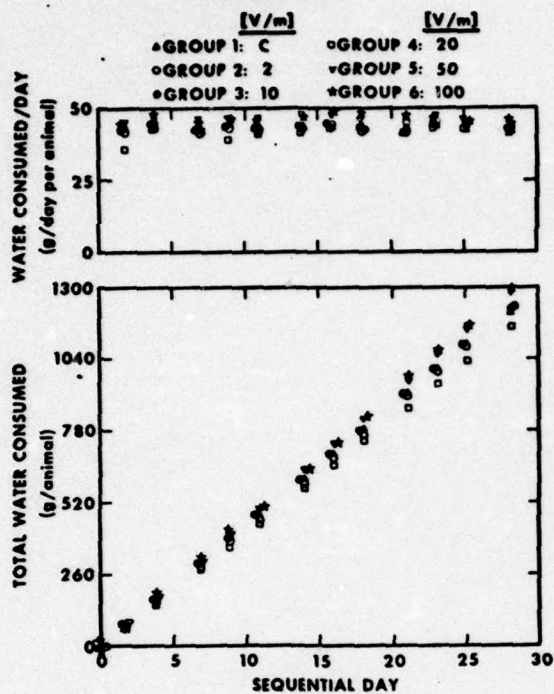
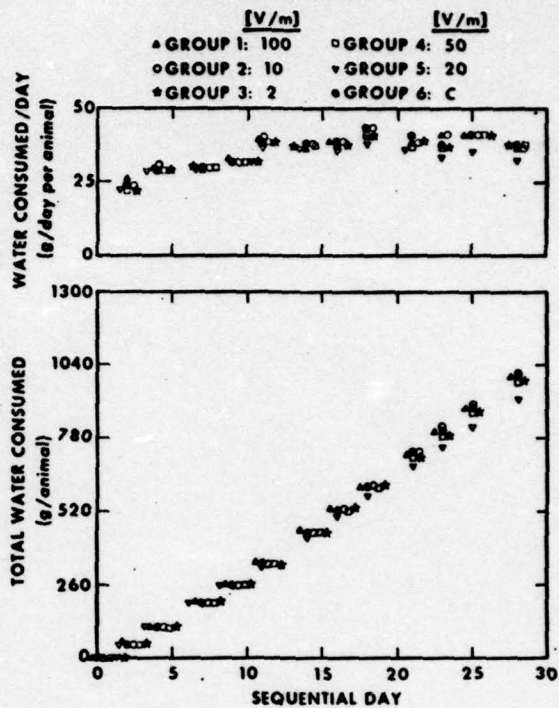


Figure 2. Graphical Summary of Food Consumption Data During Exposure.

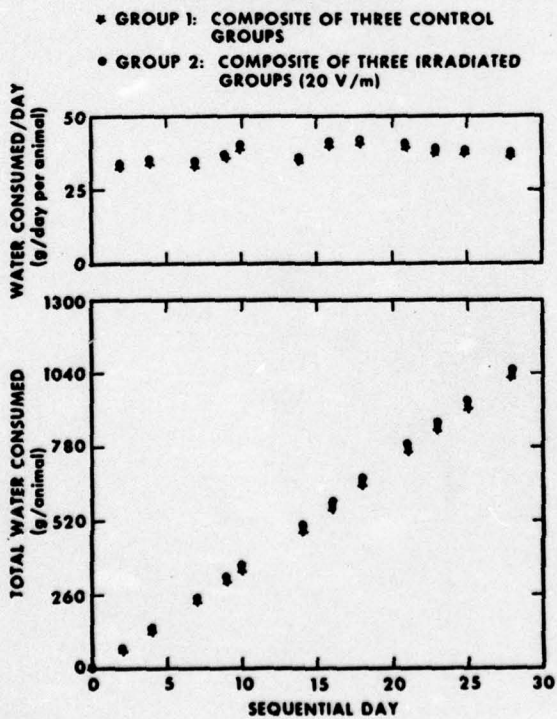
EXPERIMENT E



EXPERIMENT F



EXPERIMENT G



EXPERIMENT H

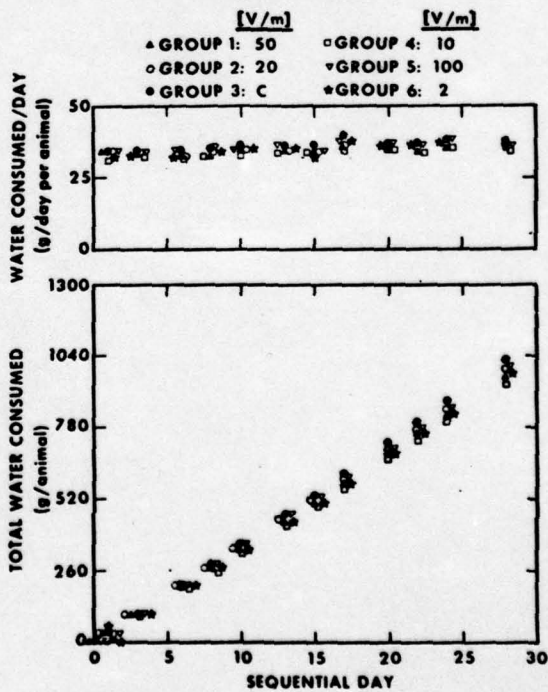


Figure 3. Graphical Summary of Water Consumption Data During Exposure.

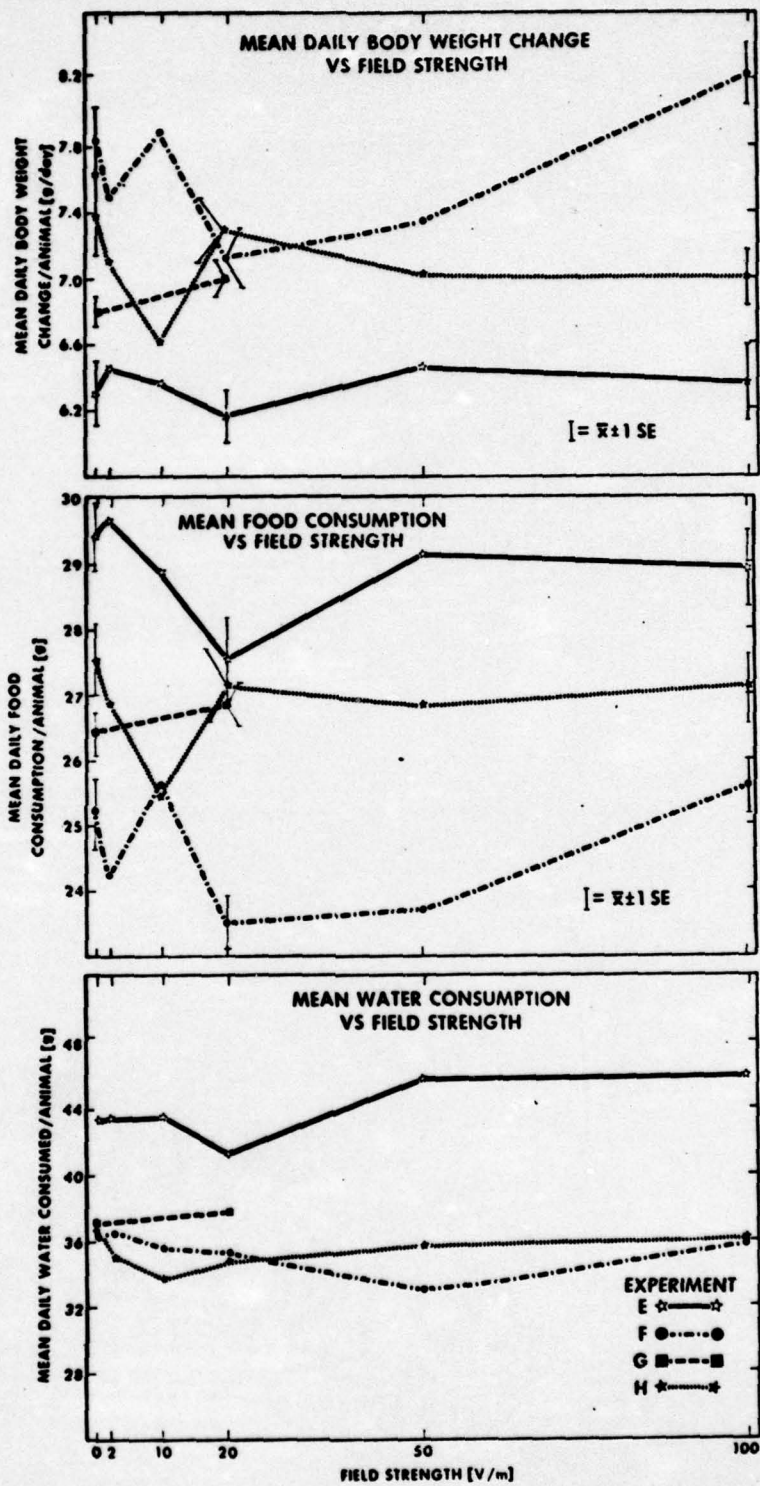


Figure 4. Summary of the Mean Growth, Food and Water Consumption Data Versus 45 Hz Field Strength.

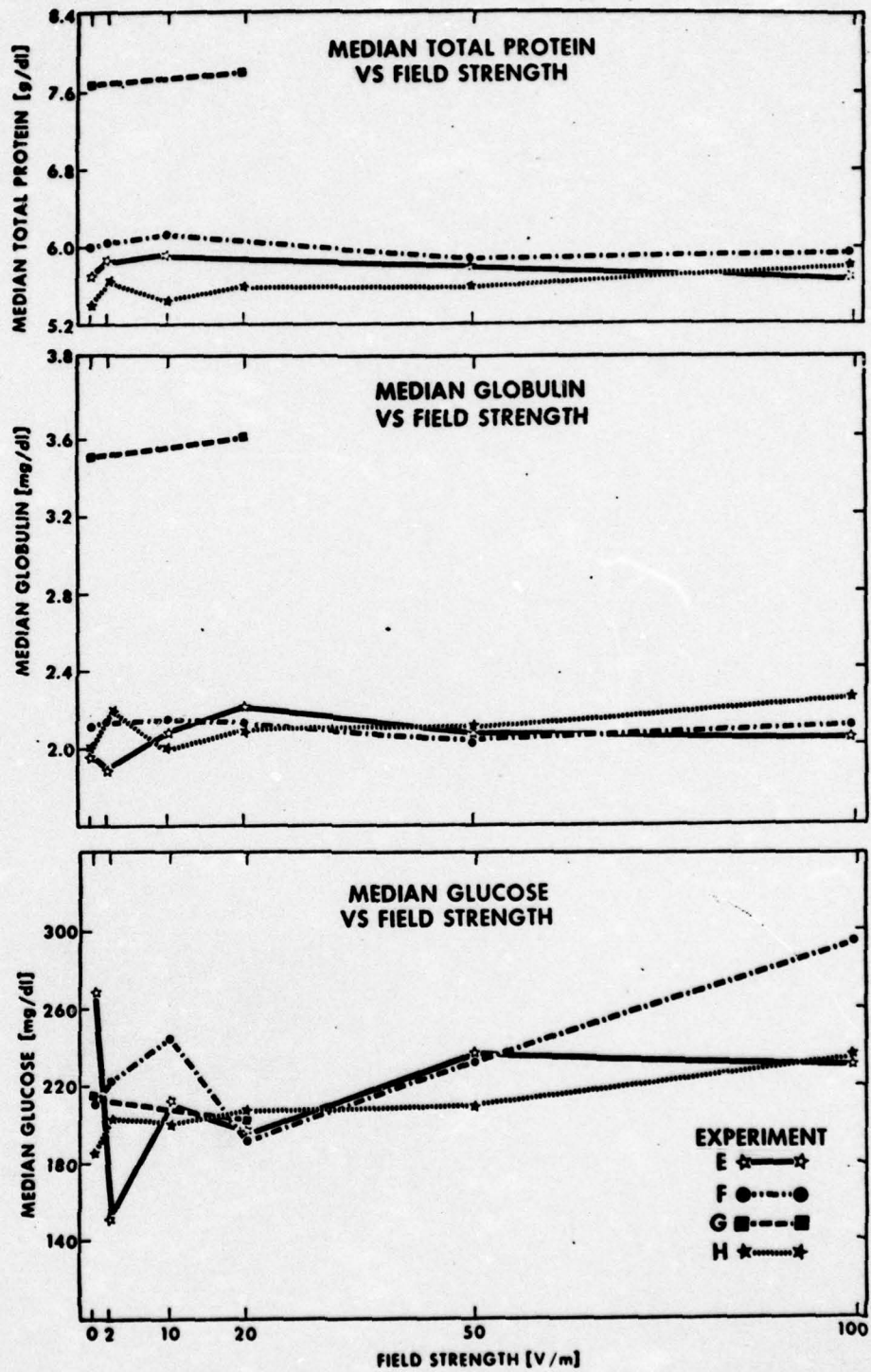


Figure 5. Summary of Median Total Protein, Globulin and Glucose Data Versus 45 Hz Field Strength.

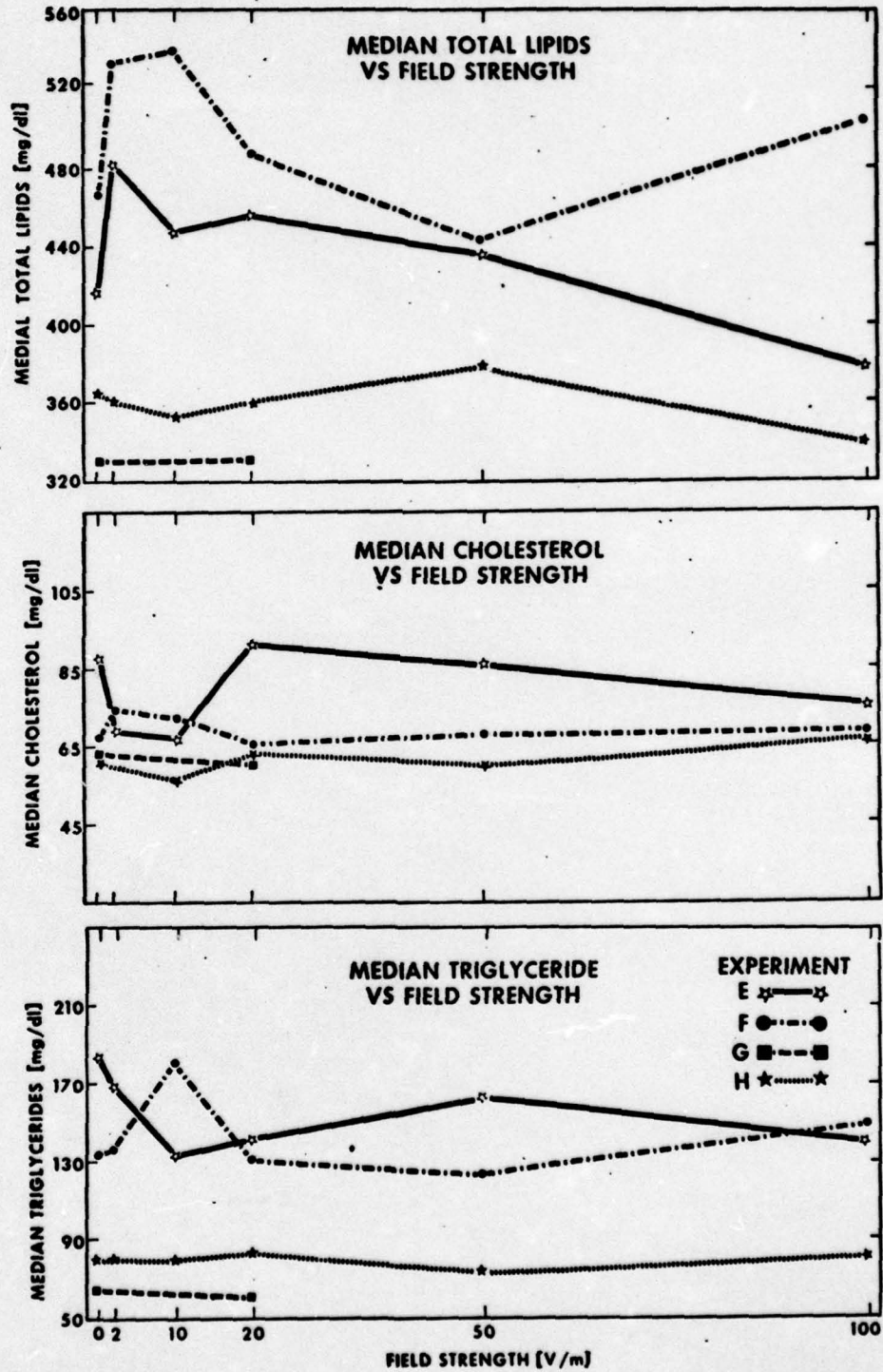


Figure 6. Summary of Median Total Lipid, Cholesterol and Triglyceride Data Versus 45 Hz Field Strength.

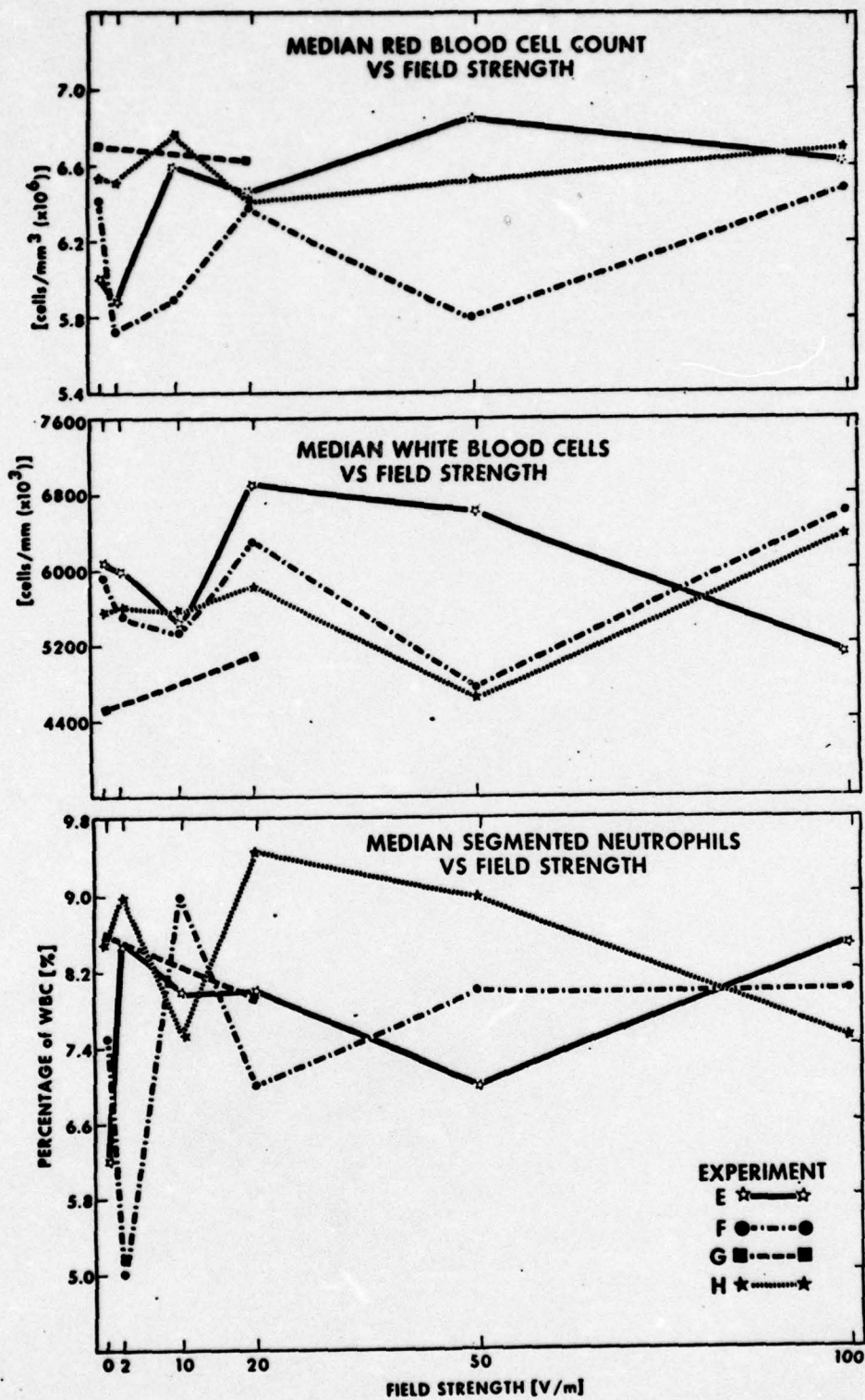


Figure 7. Summary of Median Red Blood Cell, White Blood Cell and Segmented Neutrophil Data Versus 45 Hz Field Strength.

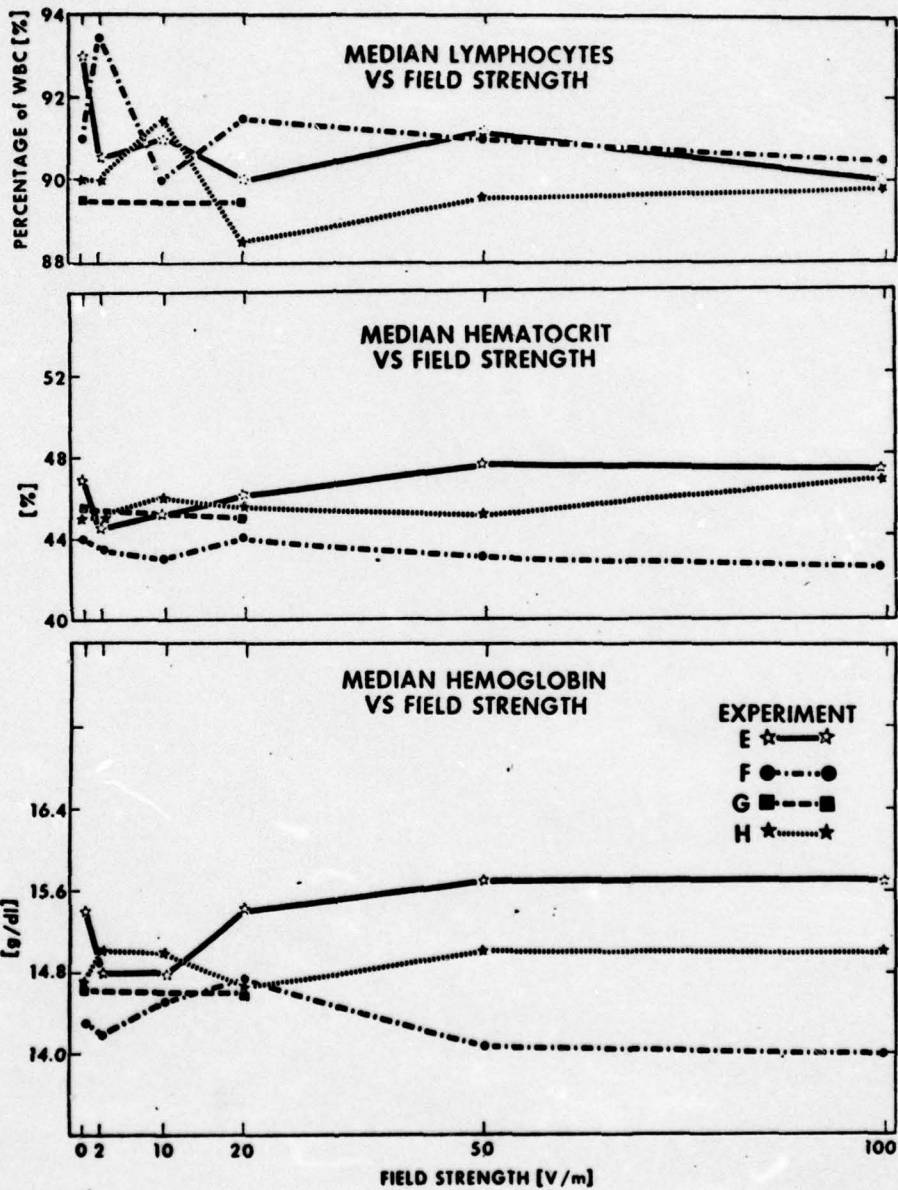


Figure 8. Summary of Median Lymphocyte, Hematocrit and Hemoglobin Data Versus 45 Hz Field Strength.

Table 1. Experimental Design and Animal Usage

EXPOSURE CONDITIONS (V/M)	EXPERIMENTAL GROUP			
	E	F	G	H
Controls	16	16	16,16,16	16
2	16	16		16
10	16	16		16
20	16	16	16,16,16	16
50	16	16		16
100	16	16		16
Animals/Group	96	96	96	96
Total Animals	384			

Table 2. The Number of Animals in Each Group of the 45 Hz and 60 Hz Two-Way Analysis of Experiment G.

FREQUENCY (Hz)	FIELD STRENGTH [V/m(RMS)]				Total Animals
	60 45	.21-.42	.53-.84	1.1-1.7	
F.S. [V/m(RMS)] 0	24	8	12	4	48
20	12	4	24	8	48
Total Animals	36	12	36	12	

Table 3. Applied 45 Hz Electric Field Strengths to Each Chamber per Experiment

EXPOSURE CHAMBER		45 Hz FIELD STRENGTH (V/m(RMS))			
NUMBER	POSITION	EXPERIMENT			
		E	F	G	H
1	U	C	100	20	50
2	L	2	10	C	20
3	U	10	2	20	C
4	L	20	50	C	10
5	U	50	20	C	100
6	L	100	C	20	2

16 animals per chamber

C denotes control group (no 45 Hz fields applied)

U denotes upper chambers

L denotes lower chambers

Table 4. Statistical Summary of the Two-Way Analyses of Variance on 45 Hz and 60 Hz Field Strengths of Experiment G

VARIABLE	FACTOR ONE 45 Hz	FACTOR TWO 60 Hz	INTERACTION
Δ BW/ Δ Day	-	-	-
Δ Food/ Δ Day	-	*	-
Δ Water/ Δ Day	-	**	-

- Not significant ($p > 0.05$)

* Significant ($p < 0.05$)

** Significant ($p < 0.01$)

Table 5. Statistical Summary of the Kruskal-Wallis Analysis on 60 Hz Field Strengths of Experiment G

VARIABLE	SIGNIFICANCE
TP	*
GLOB	**
GLY	-
TL	-
CHOL	-
TRIG	-
RBC	*
WBC	-
POLY	-
LYHS	-
HCT	-
HGB	-

- Not significant ($p > 0.05$)
 * Significant difference ($p < 0.05$)
 ** Significant difference ($p < 0.01$)

Table 6. Statistical Summary of the Analysis of Variance of Growth, Food Consumption and Water Consumption

VARIABLE	EXPERIMENT			
	E	F	G	H
Δ BW/ Δ Day	-	**	-	-
Δ Food/ Δ Day	-	**	-	-
Δ Water/ Δ Day	-	-	-	-

- Not significant ($p > 0.05$)
 * Significant difference ($p < 0.05$)
 ** Significant difference ($p < 0.01$)

Table 7. Statistical Summary of the Kruskal-Wallis Analysis of the Blood Biochemistry and Hematology Data

VARIABLE	EXPERIMENT			
	E	F	G	H
TP	-	-	-	*
GLOB	-	-	-	*
GLU	**	*	-	*
TL	**	-	-	-
CHOL	-	-	-	-
TRIG	-	-	-	-
RBC	**	**	-	-
WBC	-	-	-	-
POLY	-	-	-	-
LYHS	-	-	-	-
HCT	**	-	-	-
HGB	*	-	-	-
MONO	within normal limits			
EOS	within normal limits			

- Not significant ($p > 0.05$)
- * Significant difference ($p < 0.05$)
- ** Significant difference ($p < 0.01$)

APPENDIX A

Graphical Summary of Initial Body Weight, Growth,
Food and Water Consumption Data Versus Ambient 60 Hz Field Strengths

This appendix graphically summarizes the growth (Figure A-1), initial body weight (Figure A-2), food consumption (Figure A-3), and water consumption (Figure A-4) for experiment G versus the average value per cage for the ambient 60 Hz electric field strength.

Figure A-3.

60 Hz ANALYSIS
EXPERIMENT G
FOOD CONSUMPTION

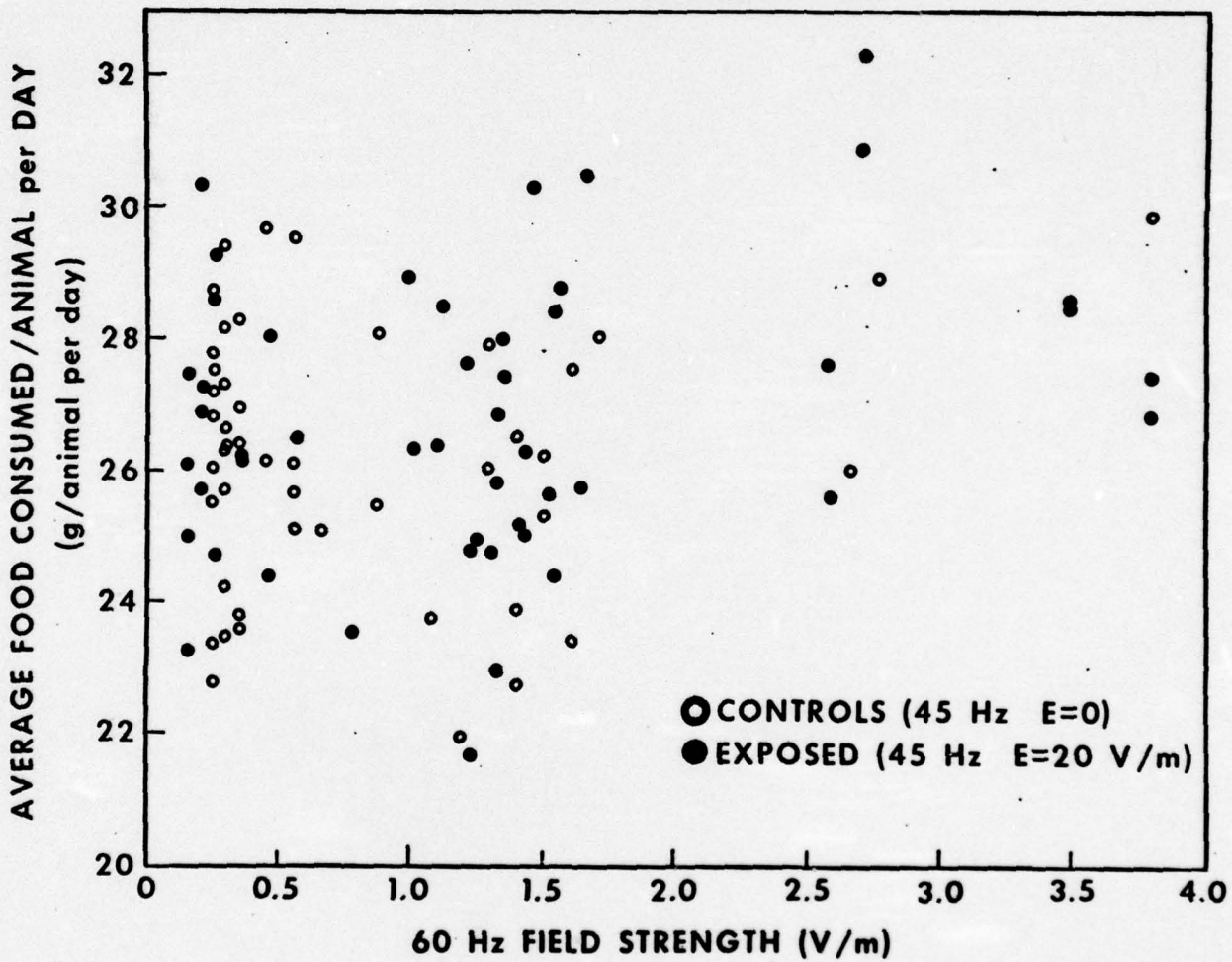
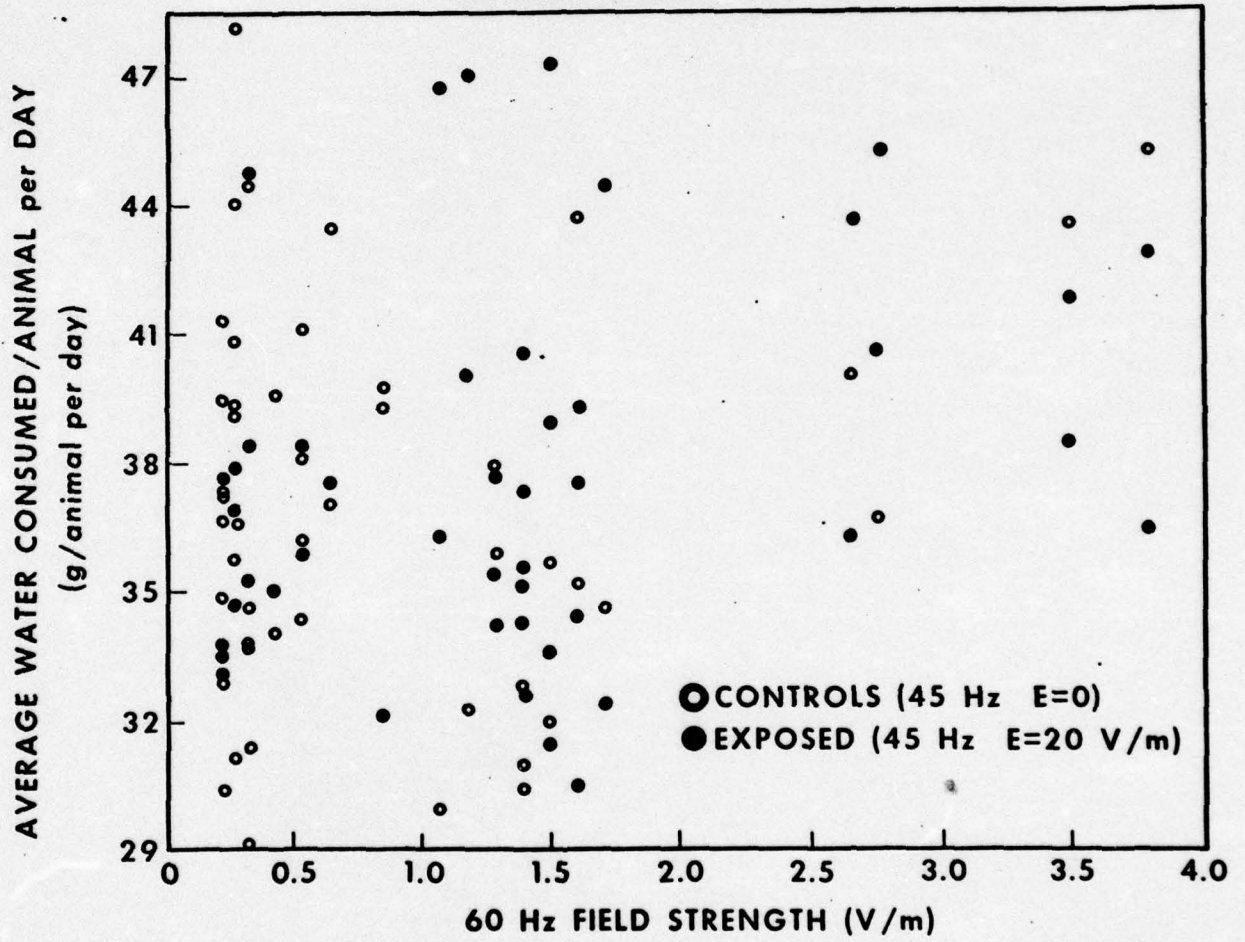


Figure A-4.

60 Hz ANALYSIS EXPERIMENT G

WATER CONSUMPTION



APPENDIX B

Daily Summary of Body Weight, Growth and Cumulative and Daily Consumption of Food and Water

The following seven Tables (B-1 through B-7) summarize the actual raw growth and consumption data for each experimental group of the four experiments, E, F, G, and H. In addition, the date for day during which data was obtained and a summary of the temperature and relative humidity history are provided.

The field strength and chamber position (either upper or lower) for any group can be obtained from Table 3 of the text.

The headings for each column are defined, proceeding from left to right, as:

- DATE:** date these data were obtained; expressed as day/month/last digit of the year
- DAY:** the number of days these animals have been exposed
- TEMP:** the average \pm the range of room temperature ($^{\circ}$ F), taken over the interval from the previous data day to this day
- HUMIDITY:** the average \pm the range of relative humidity (%RH), taken over the interval from the previous data day to this day
- N:** the number of animals in each group, either 16 or 48, or when an animal's food or water consumption could not be accurately measured due to an accident (e.g., bottle was spilled), it then becomes the smallest number of animals used for any one of the calculations for this date
- BODY WEIGHT:**
- XBAR** the average mass (g) per animal for this group
- SD** the standard deviation of XBAR (g)

CHG. BODY WT:

XBAR Average change in mass per day (g/day) per animal for this group, taken over the interval from the previous data day to this day

SD the standard deviation of XBAR (g)

FOOD CONSUMED AND WATER CONSUMED:

XBAR average food (water) consumed per day (g/day) per animal for this group, taken over the interval from the previous data day to this day

SD standard deviation of XBAR (g/day)

TOTAL TO DATE: average food (water) cumulative food consumed (g) per animal from day zero to this day

SD standard deviation TOTAL TO DATE (g)

SUPERSCRIPT* : this symbol is used to note that the data from all animals could not be used; there n = 16 for experiments E, F and H or n = 48 for experiment G. Further information is provided in the next paragraph.

It was necessary to delete three animals from experiment F of these experiments because they accidentally went without water over a weekend. This accident occurred early in this experiment, and these animals resumed normal drinking, eating and growth values; therefore, these animals were not deleted from the biochemical and hematological analyses. Because one animal was deleted from group two (see Table B-3) and two animals were deleted from group six (see Table B-4), asterisks indicate that less than the normal number of animals was used for each day.

Table B-1.

EXPERIMENT 2																	
GROUP 1																	
DATE	DAY	TEMP	HUMIDITY	N	BODY WEIGHT		CHG. BODY WT.		FOOD CONSUMED				WATER CONSUMED				
					XBAR	SD	XBAR	SD	XBAR	SD	SD	TOTAL TO DATE	SD	XBAR	SD	TOTAL TO DATE	SD
7/4/5	0	8+0-0	0+	0-0	16	221.93	12.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/4/5	2	72+0-0	20+	0-1	16	237.00	13.17	7.93	1.10	26.40	1.51	52.00	3.03	42.40	4.93	84.96	9.06
11/4/5	4	72+0-0	34+	1-2	16	253.60	14.69	7.94	1.90	26.30	1.00	105.57	5.97	44.51	5.42	173.97	20.10
14/4/5	7	72+0-1	30+	1-2	16	200.35	10.00	0.09	1.03	20.19	1.79	190.14	9.59	43.15	6.40	303.43	30.46
16/4/5	9	72+0-0	42+	2-1	16	296.76	16.74	0.20	1.13	20.75	1.64	247.64	12.33	44.10	5.07	391.78	49.94
18/4/5	11	71+1-0	42+	0-2	15	311.44	19.54	7.34	3.90	20.00	1.05	303.00	14.67	42.65	6.10	476.53	60.95
21/4/5	14	71+0-0	40+	0-2	16	332.05	23.51	6.07	1.67	29.00	2.50	393.43	19.97	43.14	6.63	605.94	80.45
23/4/5	16	72+0-0	42+	0-2	16	342.55	26.43	5.25	3.21	30.57	2.73	454.50	24.20	44.05	7.14	694.04	94.02
25/4/5	18	70+2-0	57+	0-1	16	355.01	20.56	6.63	2.97	31.43	3.25	517.44	29.60	43.63	7.00	701.31	106.20
28/4/5	21	71+0-0	43+	0-3	16	369.77	20.63	4.65	1.63	30.67	2.07	609.44	34.59	43.96	6.92	913.20	126.12
30/4/5	23	71+0-0	53+	0-1	16	379.23	29.14	4.73	1.67	31.66	3.99	672.77	39.35	43.96	6.99	1001.12	139.37
2/5/5	25	71+0-0	54+	0-1	16	305.19	20.20	2.90	1.40	29.92	3.22	734.07	44.60	42.46	6.36	1086.04	151.56

GROUP 2																	
DATE	DAY	TEMP	HUMIDITY	N	BODY WEIGHT		CHG. BODY WT.		FOOD CONSUMED				WATER CONSUMED				
					XBAR	SD	XBAR	SD	XBAR	SD	SD	TOTAL TO DATE	SD	XBAR	SD	TOTAL TO DATE	SD
7/4/5	0	8+0-0	0+	0-0	16	217.44	14.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/4/5	2	72+0-0	20+	0-1	16	233.93	14.50	0.24	1.02	20.32	3.99	56.64	7.90	42.23	6.13	84.45	12.27
11/4/5	4	72+0-0	34+	1-2	16	247.26	14.04	0.66	3.31	25.96	1.00	100.56	9.50	43.06	4.07	170.56	10.62
14/4/5	7	72+0-1	30+	1-2	16	273.93	21.75	0.09	5.00	20.33	0.06	193.54	22.44	41.51	11.95	295.90	50.74
16/4/5	9	72+0-0	42+	2-1	16	292.00	19.19	9.00	3.26	29.74	2.99	253.01	26.59	43.61	6.29	302.29	50.00
18/4/5	11	71+1-0	42+	0-2	13	307.34	10.56	7.63	1.67	20.32	9.44	305.65	24.00	42.06	5.40	400.36	65.26
21/4/5	14	71+0-0	40+	0-2	16	329.45	19.23	7.37	1.04	31.50	2.67	400.14	24.46	43.27	5.04	590.16	80.90
23/4/5	16	72+0-0	42+	0-2	16	343.50	10.90	7.05	1.50	30.67	2.05	461.40	20.46	44.95	6.02	600.06	91.72
25/4/5	18	70+2-0	57+	0-1	16	353.24	10.07	4.04	4.00	30.61	4.50	522.71	29.03	42.03	9.34	772.13	100.26
28/4/5	21	71+0-0	43+	0-3	16	370.27	19.22	5.00	1.07	32.14	2.91	619.12	32.37	45.14	0.37	907.54	120.00
30/4/5	23	71+0-0	53+	0-1	16	370.10	20.01	3.91	1.51	31.17	2.97	681.46	37.06	45.73	10.20	990.99	135.74
2/5/5	25	71+0-0	54+	0-1	16	304.53	20.00	3.21	1.55	29.90	2.54	741.41	30.40	41.07	6.14	1007.34	153.50

GROUP 3																	
DATE	DAY	TEMP	HUMIDITY	N	BODY WEIGHT		CHG. BODY WT.		FOOD CONSUMED				WATER CONSUMED				
					XBAR	SD	XBAR	SD	XBAR	SD	SD	TOTAL TO DATE	SD	XBAR	SD	TOTAL TO DATE	SD
7/4/5	0	8+0-0	0+	0-0	16	213.70	9.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/4/5	2	72+0-0	20+	0-1	16	226.09	17.35	0.57	0.24	24.01	4.00	49.63	0.17	30.33	9.65	76.67	19.30
11/4/5	4	72+0-0	34+	1-2	16	244.11	12.14	0.61	3.93	25.64	1.52	100.90	0.91	43.35	3.63	163.36	10.30
14/4/5	7	72+0-1	30+	1-2	16	270.94	12.72	0.94	1.29	27.72	1.45	104.00	11.22	42.03	3.66	209.45	25.36
16/4/5	9	72+0-0	42+	2-1	16	206.01	13.34	7.93	1.77	20.53	3.34	241.13	16.64	39.55	12.61	300.54	42.41
18/4/5	11	71+1-0	42+	0-2	16	301.31	14.99	7.25	1.62	27.04	1.04	296.02	10.20	41.45	4.00	451.44	40.93
21/4/5	14	71+0-0	40+	0-2	16	322.71	10.20	7.13	1.16	29.17	1.94	304.34	22.30	41.09	3.77	577.11	57.69
23/4/5	16	72+0-0	42+	0-2	16	335.13	16.65	6.21	1.43	29.30	2.49	443.10	25.79	42.09	3.47	662.09	63.15
25/4/5	18	70+2-0	57+	0-1	16	346.00	17.19	5.00	1.09	20.01	2.41	500.72	29.60	41.19	3.53	745.27	67.07
28/4/5	21	71+0-0	43+	0-3	16	357.04	22.05	3.65	3.23	20.10	4.03	505.03	41.32	40.02	0.53	865.33	83.73
30/4/5	23	71+0-0	53+	0-1	16	306.15	20.05	4.15	2.77	29.72	2.79	644.46	44.50	42.40	3.94	950.14	80.61
2/5/5	25	71+0-0	54+	0-1	16	373.73	20.00	3.79	1.04	20.94	1.61	701.31	46.79	41.07	4.20	1033.00	95.05

Table B-2.

EXPERIMENT 2																	
GROUP 4																	
DATE	DAY	TEMP	HUMIDITY	N	BODY WEIGHT		CHG. BODY WT.		FOOD CONSUMED				WATER CONSUMED				
					XBAR	SD	XBAR	SD	XBAR	SD	TOTAL TO DATE	SD	XBAR	SD	TOTAL TO DATE	SD	
7/4/5	0	0+0-0	0+	0-0	16	216.30	12.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/4/5	2	72+0-0	20+	0-1	16	230.40	19.97	6.75	6.06	25.49	4.06	50.90	9.73	39.93	10.20	79.06	20.40
11/4/5	4	72+0-0	34+	1-2	16	247.02	10.65	0.31	4.73	25.32	4.05	101.62	14.05	43.52	9.20	166.09	29.33
14/4/5	7	72+0-1	30+	1-2	16	273.07	19.41	0.95	1.10	27.71	2.15	104.76	10.04	43.02	5.72	295.96	43.27
16/4/5	9	72+0-0	42+	2-1	16	289.64	19.40	7.00	1.05	27.60	2.00	240.13	22.39	43.40	5.72	302.91	53.57
18/4/5	11	71+1-0	42+	0-2	16	305.07	19.50	0.12	1.29	20.91	2.23	297.95	26.31	44.01	5.19	470.94	63.00
21/4/5	14	71+0-0	40+	0-2	16	325.95	20.30	6.69	1.20	20.75	2.29	304.19	32.70	43.70	6.04	602.03	82.60
23/4/5	16	72+0-0	42+	0-2	16	330.75	21.54	6.40	1.53	29.02	3.30	443.02	37.14	44.05	5.30	690.13	92.92
25/4/5	18	70+2-0	57+	0-1	16	352.23	22.72	6.74	1.77	29.19	2.67	502.19	42.00	43.06	4.95	777.04	102.33
28/4/5	21	71+0-0	43+	0-3	16	366.74	23.04	4.04	1.50	29.69	2.63	591.26	40.77	43.07	5.07	909.45	119.22
30/4/5	23	71+0-0	53+	0-1	16	374.33	24.50	3.79	1.32	30.92	3.15	653.10	51.97	44.55	5.37	998.54	129.23
2/5/5	25	71+0-0	54+	0-1	16	382.59	24.22	4.13	2.20	20.36	2.23	710.90	55.99	44.14	6.12	1086.03	140.04
GROUP 5																	
DATE	DAY	TEMP	HUMIDITY	N	BODY WEIGHT		CHG. BODY WT.		FOOD CONSUMED				WATER CONSUMED				
					XBAR	SD	XBAR	SD	XBAR	SD	TOTAL TO DATE	SD	XBAR	SD	TOTAL TO DATE	SD	
7/4/5	0	0+0-0	0+	0-0	16	214.47	12.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/4/5	2	72+0-0	20+	0-1	16	231.05	13.67	0.29	1.29	25.57	1.00	51.13	3.75	42.30	4.52	84.60	9.03
11/4/5	4	72+0-0	34+	1-2	16	247.33	14.19	0.14	1.79	26.02	2.13	103.10	7.60	42.13	13.19	160.05	30.24
14/4/5	7	72+0-1	30+	1-2	16	273.40	17.30	0.72	1.50	27.32	2.71	105.14	15.43	43.47	5.24	299.26	41.99
16/4/5	9	72+0-0	42+	2-1	16	290.45	19.07	0.40	1.02	20.20	2.94	241.54	20.00	43.62	4.92	306.51	50.30
18/4/5	11	71+1-0	42+	0-2	16	305.40	19.23	7.52	2.02	20.55	1.92	290.64	22.69	44.40	4.59	475.31	56.74
21/4/5	14	71+0-0	40+	0-2	16	325.90	22.47	6.01	1.77	29.24	3.02	306.37	30.95	45.94	5.91	613.12	72.14
23/4/5	16	72+0-0	42+	0-2	16	339.37	24.12	6.73	1.40	29.50	2.36	445.37	34.99	45.07	4.10	704.05	79.35
25/4/5	18	70+2-0	57+	0-1	16	352.06	24.70	6.34	1.70	29.64	2.20	504.66	37.63	45.71	5.33	796.26	88.24
28/4/5	21	71+0-0	43+	0-3	15	365.54	26.20	4.50	0.92	30.00	2.44	595.04	43.24	44.06	4.64	920.44	99.00
30/4/5	23	71+0-0	53+	0-1	16	373.27	26.32	3.06	1.24	26.06	12.24	640.76	47.35	44.56	3.70	1017.55	105.76
2/5/5	25	71+0-0	54+	0-1	16	381.44	27.10	4.09	1.47	29.04	3.29	711.11	54.63	45.02	5.00	1107.60	110.36
GROUP 6																	
DATE	DAY	TEMP	HUMIDITY	N	BODY WEIGHT		CHG. BODY WT.		FOOD CONSUMED				WATER CONSUMED				
					XBAR	SD	XBAR	SD	XBAR	SD	TOTAL TO DATE	SD	XBAR	SD	TOTAL TO DATE	SD	
7/4/5	0	0+0-0	0+	0-0	16	215.45	10.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/4/5	2	72+0-0	20+	0-1	16	232.04	10.79	0.30	1.16	26.46	1.90	52.91	3.97	44.05	4.60	89.70	9.21
11/4/5	4	72+0-0	34+	1-2	16	249.04	19.40	0.50	1.50	27.23	2.12	107.36	7.90	40.62	6.20	106.94	20.00
14/4/5	7	72+0-1	30+	1-2	16	275.41	20.45	0.79	0.00	20.44	3.00	192.60	16.73	46.05	5.50	327.40	36.17
16/4/5	9	72+0-0	42+	2-1	16	291.56	22.97	0.07	1.00	29.06	2.77	250.79	21.96	47.11	5.73	421.69	46.56
18/4/5	11	71+1-0	42+	0-2	14	305.57	23.00	7.01	1.60	20.50	1.92	307.79	23.69	47.30	5.99	516.01	57.43
21/4/5	14	71+0-0	40+	0-2	16	329.29	27.07	7.91	1.91	30.09	3.30	399.00	33.29	40.02	7.70	663.07	79.96
23/4/5	16	72+0-0	42+	0-2	16	341.64	27.33	6.10	1.51	31.55	3.51	462.96	39.53	40.43	0.56	750.99	95.63
25/4/5	18	70+2-0	57+	0-1	16	352.96	29.97	5.66	2.94	30.23	4.90	523.41	40.39	46.09	11.14	852.17	114.77
28/4/5	21	71+0-0	43+	0-3	16	366.47	32.90	4.90	1.72	32.21	2.93	620.04	55.12	40.04	9.74	990.67	142.47
30/4/5	23	71+0-0	53+	0-1	16	374.01	34.03	4.17	1.52	31.62	4.35	683.20	62.44	40.63	10.35	1095.92	161.40
2/5/5	25	71+0-0	54+	0-1	16	382.06	35.42	4.02	1.45	30.57	4.31	744.41	70.03	45.07	9.43	1106.06	165.27

Table B-3.

EXPERIMENT 1																			
GROUP 1																			
DATE	DAY	TEMP	HUMIDITY	N	BODY WEIGHT		CHG. BODY WT.		FOOD CONSUMED				WATER CONSUMED						
					KGAR	SD	KGAR	SD	KGAR	SD	KGAR	SD	KGAR	SD	KGAR	SD	KGAR	SD	
12/ 5/5	0	0+0-0	0+	0- 0	16	127.24	10.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14/ 5/5	2	72+1-1	62+	2- 2	16	152.09	12.70	12.43	1.66	10.75	1.52	37.49	3.84	24.90	2.53	49.97	5.07		
16/ 5/5	4	72+1-0	56+	1- 1	16	170.14	12.03	9.03	1.09	21.25	1.94	79.99	6.39	29.44	2.05	100.06	10.00		
19/ 5/5	7	72+1-0	57+	1- 1	16	196.42	15.03	6.76	1.41	22.30	2.00	147.13	12.30	29.25	2.00	196.62	10.33		
21/ 5/5	9	73+0-0	50+	0- 0	16	212.57	15.29	0.07	1.04	24.20	2.29	195.69	16.37	32.46	2.02	261.54	23.03		
23/ 5/5	11	74+0-1	63+	0- 3	16	230.32	16.90	0.90	1.79	24.59	2.27	244.07	20.52	39.20	4.43	340.11	31.03		
26/ 5/5	14	75+0-3	70+10-10	16	237.60	10.56	9.06	1.57	25.76	2.54	322.16	27.25	37.06	4.29	451.29	43.53			
28/ 5/5	16	70+0-1	64+	4- 4	16	272.03	20.27	7.40	1.62	25.79	2.13	373.75	30.70	30.77	4.72	520.03	51.00		
30/ 5/5	18	72+0-0	50+	2- 0	16	200.06	20.40	0.11	1.03	26.11	2.00	425.90	34.34	40.45	3.70	609.73	50.40		
2/ 6/5	21	72+1-0	61+	1- 0	15	311.30	22.00	7.51	1.61	27.77	2.10	509.30	30.77	30.00	4.34	727.54	60.37		
4/ 6/5	23	71+0-1	62+	1- 0	15	327.02	22.92	7.02	2.56	20.90	3.42	567.33	41.71	40.90	4.41	803.54	75.24		
6/ 6/5	25	66+2-0	60+	0- 0	16	330.44	24.57	5.71	1.01	20.40	2.45	624.12	44.00	41.40	4.51	897.29	82.02		
9/ 6/5	28	71+0-0	63+	0- 0	16	357.97	25.50	6.51	0.97	27.09	1.96	707.00	49.64	36.96	4.17	1003.10	92.60		
GROUP 2																			
DATE	DAY	TEMP	HUMIDITY	N	BODY WEIGHT		CHG. BODY WT.		FOOD CONSUMED				WATER CONSUMED						
					KGAR	SD	KGAR	SD	KGAR	SD	KGAR	SD	KGAR	SD	KGAR	SD	KGAR	SD	
12/ 5/5	0	0+0-0	0+	0- 0	16	129.65	0.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14/ 5/5	2	72+1-1	62+	2- 2	15	140.20	9.37	9.32	3.60	10.10	1.05	36.35	3.57	25.07	3.45	50.13	6.66		
16/ 5/5	4	72+1-0	56+	1- 1	15	166.44	11.22	9.00	2.00	21.35	1.60	79.05	6.31	30.63	4.20	111.40	14.12		
19/ 5/5	7	72+1-0	57+	1- 1	15	191.72	12.00	0.43	2.43	23.00	1.75	140.30	10.04	29.01	3.57	200.03	23.90		
21/ 5/5	9	73+0-0	50+	0- 0	15	200.21	13.04	0.24	2.56	24.02	2.06	197.95	13.47	32.40	3.50	265.79	30.45		
23/ 5/5	11	74+0-1	63+	0- 3	15	224.54	14.00	0.17	2.76	24.09	2.10	247.72	17.11	40.15	4.06	346.09	30.70		
26/ 5/5	14	75+0-3	70+10-10	15	252.26	10.12	9.24	2.77	25.70	2.00	324.01	22.05	37.97	4.52	459.29	51.30			
28/ 5/5	16	70+0-1	64+	4- 4	15	267.53	16.57	7.63	2.34	26.26	2.10	377.33	26.54	30.70	4.23	537.55	50.67		
30/ 5/5	18	72+0-0	50+	2- 0	15	202.30	17.97	7.43	2.50	27.60	3.12	432.09	20.71	43.41	5.51	624.37	60.95		
2/ 6/5	21	72+1-0	61+	1- 0	14	302.05	10.01	7.22	3.09	20.21	1.92	517.34	33.61	39.60	6.21	743.17	63.70		
4/ 6/5	23	71+0-1	62+	1- 0	15	319.69	20.99	0.55	4.30	29.41	2.59	576.16	30.12	41.27	4.47	825.71	91.04		
6/ 6/5	25	66+2-0	60+	0- 0	15	330.33	22.97	5.32	1.99	20.26	1.73	632.60	40.99	41.04	3.92	907.79	90.04		
9/ 6/5	28	71+0-0	60+	0- 0	15	350.70	23.55	6.79	2.30	20.39	2.70	717.06	40.12	36.77	5.20	1010.09	111.71		
GROUP 3																			
DATE	DAY	TEMP	HUMIDITY	N	BODY WEIGHT		CHG. BODY WT.		FOOD CONSUMED				WATER CONSUMED						
					KGAR	SD	KGAR	SD	KGAR	SD	KGAR	SD	KGAR	SD	KGAR	SD	KGAR	SD	
12/ 5/5	0	0+0-0	0+	0- 0	16	120.90	12.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14/ 5/5	2	72+1-1	62+	2- 2	16	142.90	12.37	6.97	1.55	16.51	1.45	33.01	2.00	22.67	3.41	45.34	6.02		
16/ 5/5	4	72+1-0	56+	1- 1	16	159.09	12.70	0.10	1.04	19.79	2.00	72.59	6.49	20.01	2.20	102.95	9.27		
19/ 5/5	7	72+1-0	57+	1- 1	16	184.63	10.13	0.51	1.40	21.39	2.34	130.70	12.05	20.02	2.57	192.40	14.02		
21/ 5/5	9	73+0-0	50+	0- 0	15	200.91	17.26	0.14	0.04	23.02	3.11	104.41	10.41	32.00	2.73	250.24	10.02		
23/ 5/5	11	74+0-1	63+	0- 3	16	217.14	10.00	0.12	1.35	24.20	3.70	232.96	25.43	30.59	3.56	333.43	25.40		
26/ 5/5	14	75+0-3	70+10-10	16	243.45	21.02	0.77	1.30	24.59	3.00	306.73	33.72	37.16	4.17	444.91	36.42			
28/ 5/5	16	70+0-1	64+	4- 4	16	293.63	22.01	6.09	1.32	25.13	3.12	356.99	39.36	30.15	4.37	521.22	43.94		
30/ 5/5	18	72+0-0	50+	2- 0	16	260.54	24.56	6.97	1.61	25.90	3.72	403.95	46.23	41.49	4.63	601.20	51.00		
2/ 6/5	21	72+1-0	61+	1- 0	16	292.56	27.27	7.00	1.39	26.71	3.36	465.09	55.16	39.03	4.06	721.30	63.06		
4/ 6/5	23	71+0-1	62+	1- 0	16	309.05	30.40	0.25	1.94	26.06	3.06	542.01	59.90	37.60	5.30	796.51	73.00		
6/ 6/5	25	66+2-0	60+	0- 0	16	317.00	30.43	4.20	1.70	26.33	2.96	595.40	64.49	40.51	6.00	877.53	83.44		
9/ 6/5	28	71+0-0	60+	0- 0	16	330.62	34.99	7.01	1.95	27.46	3.30	677.00	72.49	37.40	5.42	909.73	97.51		

Table B-4.

EXPERIMENT 7																	
GROUP 4																	
DATE	DAY	TEMP	HUMIDITY	N	BODY WEIGHT		CHG. BODY WT.		FOOD CONSUMED				WATER CONSUMED				
					XBAR	SD	XBAR	SD	XBAR	SD	TOTAL TO DATE	SD	XBAR	SD	TOTAL TO DATE	SD	
12/5/5	0	0+0-0	0+0-0	0	16	131.01	12.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14/5/5	2	72+1-1	62+2-2	2	16	141.32	12.09	5.16	1.53	16.35	0.97	32.76	1.94	22.55	2.26	45.11	4.51
16/5/5	4	72+1-0	56+1-1	1	16	150.34	13.77	0.51	1.26	19.01	1.57	72.33	4.75	20.70	1.90	102.60	0.06
19/5/5	7	72+1-0	57+1-1	1	16	162.19	15.46	7.95	1.16	21.53	1.69	136.93	9.10	29.20	2.67	190.26	15.50
21/5/5	9	73+0-0	50+0-0	0	16	190.05	17.30	7.93	1.34	23.00	1.69	182.92	11.65	32.33	3.52	254.92	21.92
23/5/5	11	74+0-1	63+0-3	3	16	212.30	19.06	7.12	1.50	23.62	2.00	230.15	14.52	30.41	4.42	331.74	29.52
26/5/5	14	75+0-3	70+10-10	10	16	230.06	22.41	0.59	1.39	24.27	2.23	302.95	20.14	37.56	4.93	444.41	43.06
28/5/5	16	70+0-1	64+4-4	4	16	251.02	23.42	6.93	1.24	24.46	2.14	351.07	24.03	30.21	5.05	520.03	53.76
30/5/5	18	72+0-0	50+2-0	0	16	266.42	23.00	7.25	1.27	25.02	1.90	401.91	27.32	41.17	5.33	603.16	63.07
2/6/5	21	72+1-0	61+1-0	0	16	209.49	25.00	7.69	1.01	25.56	2.71	470.57	34.01	37.79	5.35	716.53	75.05
4/6/5	23	71+0-1	62+1-0	0	16	305.05	25.61	0.10	1.65	26.33	2.37	531.23	36.60	36.09	5.43	790.31	83.21
6/6/5	25	66+2-0	60+0-0	0	16	316.30	25.23	5.26	1.40	26.57	1.91	584.36	39.00	41.02	5.14	872.36	91.54
9/6/5	28	71+0-0	60+0-0	0	16	336.71	25.20	6.70	0.96	26.70	1.03	664.69	44.73	37.17	4.57	903.06	103.55

GROUP 5																	
DATE	DAY	TEMP	HUMIDITY	N	BODY WEIGHT		CHG. BODY WT.		FOOD CONSUMED				WATER CONSUMED				
					XBAR	SD	XBAR	SD	XBAR	SD	TOTAL TO DATE	SD	XBAR	SD	TOTAL TO DATE	SD	
12/5/5	0	0+0-0	0+0-0	0	16	132.90	11.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14/5/5	2	72+1-1	62+2-2	2	16	146.09	11.75	6.99	2.59	17.07	1.15	34.14	2.30	22.54	1.50	45.00	3.01
16/5/5	4	72+1-0	56+1-1	1	15	163.06	12.22	0.49	1.12	20.10	1.39	74.37	4.27	20.09	1.92	101.26	6.04
19/5/5	7	72+1-0	57+1-1	1	16	100.34	14.23	0.16	1.15	21.34	1.45	130.30	0.07	20.15	1.91	105.72	11.19
21/5/5	9	73+0-0	50+0-0	0	16	203.06	14.46	7.76	1.31	23.62	2.02	105.63	11.25	30.03	2.24	247.30	14.07
23/5/5	11	74+0-1	63+0-3	3	16	219.10	15.92	7.62	1.46	22.05	2.15	231.33	14.00	36.70	3.65	320.79	21.07
26/5/5	14	75+0-3	70+10-10	10	16	245.74	16.45	0.00	1.57	24.02	2.01	303.30	20.24	35.65	3.50	427.73	30.06
28/5/5	16	70+0-1	64+4-4	4	16	257.33	19.63	5.79	1.65	24.01	2.15	351.41	24.10	35.09	3.05	400.40	37.93
30/5/5	18	72+0-0	50+2-0	0	16	271.52	20.20	7.09	1.00	24.42	2.40	400.25	20.54	30.04	3.73	575.56	44.76
2/6/5	21	72+1-0	61+1-0	0	16	291.54	20.94	6.67	1.11	25.25	2.10	475.99	34.40	35.06	2.92	607.16	52.09
4/6/5	23	71+0-1	62+1-0	0	16	306.24	21.90	7.35	1.60	25.57	2.11	527.13	30.30	33.20	2.60	749.50	57.21
6/6/5	25	66+2-0	60+0-0	0	16	315.60	20.07	4.72	1.36	25.22	2.01	577.57	42.00	35.13	2.37	820.42	63.74
9/6/5	28	71+0-0	60+0-0	0	16	332.43	21.05	5.50	1.35	25.40	2.01	653.77	47.07	32.30	3.04	917.32	69.06

GROUP 6																	
DATE	DAY	TEMP	HUMIDITY	N	BODY WEIGHT		CHG. BODY WT.		FOOD CONSUMED				WATER CONSUMED				
					XBAR	SD	XBAR	SD	XBAR	SD	TOTAL TO DATE	SD	XBAR	SD	TOTAL TO DATE	SD	
12/5/5	0	0+0-0	0+0-0	0	16	129.04	12.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14/5/5	2	72+1-1	62+2-2	2	14	144.94	11.29	7.95	3.09	17.51	1.10	35.03	2.22	23.66	3.03	47.31	7.32
16/5/5	4	72+1-0	56+1-1	1	14	163.54	11.33	0.30	3.74	20.97	1.54	76.97	4.75	20.05	3.60	105.42	13.72
19/5/5	7	72+1-0	57+1-1	1	14	100.42	11.07	0.30	3.43	22.50	1.63	141.71	7.92	20.53	3.71	104.02	23.70
21/5/5	9	73+0-0	50+0-0	0	14	205.20	13.07	0.43	3.51	23.62	1.60	102.35	10.43	32.06	3.50	250.14	20.43
23/5/5	11	74+0-1	63+0-3	3	14	221.01	14.50	7.06	3.30	24.53	1.71	241.41	12.67	30.74	5.20	330.61	30.55
26/5/5	14	75+0-3	70+10-10	10	14	240.14	17.99	0.30	3.95	25.91	2.61	310.13	19.13	37.95	5.01	440.40	51.62
28/5/5	16	70+0-1	64+4-4	4	14	264.25	20.35	7.50	3.47	26.10	2.50	371.32	23.55	30.01	5.01	527.00	60.20
30/5/5	18	72+0-0	50+2-0	0	13	279.00	21.04	7.00	3.42	26.01	3.35	421.04	20.14	42.03	6.45	611.70	70.50
2/6/5	21	72+1-0	61+1-0	0	14	301.00	23.59	0.01	3.50	20.00	2.67	500.10	36.04	40.39	5.09	730.94	84.00
4/6/5	23	71+0-1	62+1-0	0	14	310.50	20.30	7.54	3.75	20.50	2.67	560.17	40.63	38.35	5.97	800.65	80.03
6/6/5	25	66+2-0	60+0-0	0	14	329.60	27.12	5.37	2.75	27.50	2.50	621.17	44.91	41.35	6.26	892.34	99.72
9/6/5	28	71+0-0	60+0-0	0	14	349.04	29.32	6.45	2.07	20.33	2.54	706.15	51.20	37.69	6.47	1005.40	114.03

Table B-5.

EXPERIMENT C																	
GROUP 1																	
DATE	DAY	TEMP	HUMIDITY	N	BODY WEIGHT		CHG. BODY WT.		FOOD CONSUMED				WATER		CONSUMED		
					XBAR	SD	XBAR	SD	XBAR	SD	TOTAL TO DATE	SD	XBAR	SD	TOTAL TO DATE	SD	
23/6/5	0	0+0-0	0+	0-0	48	136.07	10.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25/6/5	2	73+0-0	63+	0-1	48	213.78	11.50	0.06	1.26	23.53	1.76	47.06	3.53	33.44	3.65	66.08	7.38
27/6/5	4	72+0-0	62+	0-1	48	230.05	12.00	0.14	1.20	23.07	1.05	94.00	6.90	35.21	3.03	137.30	14.52
30/6/5	7	72+1-0	63+	0-1	48	255.60	14.05	0.54	1.05	24.00	2.04	169.39	12.03	34.84	3.02	241.02	25.44
2/7/5	9	70+1-0	62+	0-0	43	273.60	15.50	0.00	1.49	26.00	2.03	222.60	16.59	37.04	3.58	315.90	31.99
3/7/5	10	72+1-1	62+	2-0	40	270.62	16.37	4.95	2.34	25.00	2.15	248.47	10.45	40.00	4.45	355.98	35.56
7/7/5	14	71+1-0	62+	0-0	49	311.20	10.05	0.16	1.13	27.27	2.47	357.56	27.41	35.90	3.97	499.59	40.92
9/7/5	16	72+1-0	63+	1-0	40	327.29	19.60	0.00	1.45	27.09	2.93	413.35	32.49	40.94	5.33	501.48	59.60
11/7/5	18	72+0-1	62+	0-0	40	336.41	21.55	4.56	1.63	27.70	3.90	468.76	30.01	41.07	5.07	605.41	60.32
14/7/5	21	72+0-0	63+	1-1	40	355.33	23.21	6.31	1.26	27.00	3.01	552.69	45.00	40.05	6.27	707.36	85.15
16/7/5	23	73+1-0	63+	1-0	40	367.55	24.77	6.11	1.57	29.02	3.00	610.74	51.34	30.01	5.36	805.39	95.12
10/7/5	25	74+0-1	63+	0-0	40	375.09	24.09	4.17	1.61	27.44	2.43	665.61	55.66	30.16	5.70	941.70	104.79
21/7/5	20	74+0-0	64+	0-0	40	390.00	27.31	5.00	1.40	20.34	2.62	750.63	61.76	37.27	5.07	1053.51	110.90
GROUP 2																	
DATE	DAY	TEMP	HUMIDITY	N	BODY WEIGHT		CHG. BODY WT.		FOOD CONSUMED				WATER		CONSUMED		
					XBAR	SD	XBAR	SD	XBAR	SD	TOTAL TO DATE	SD	XBAR	SD	TOTAL TO DATE	SD	
23/6/5	0	0+0-0	0+	0-0	40	194.55	9.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25/6/5	2	73+0-0	63+	0-1	47	211.13	11.57	0.29	1.35	22.72	1.92	45.44	3.79	32.73	3.79	65.16	7.29
27/6/5	4	72+0-0	62+	0-1	40	226.75	12.35	7.01	1.25	23.41	2.10	92.26	7.69	34.20	3.05	133.56	14.31
30/6/5	7	72+1-0	63+	0-1	40	251.94	13.06	0.40	1.23	24.26	2.31	165.03	14.22	33.70	3.94	234.94	25.40
2/7/5	9	70+1-0	62+	0-0	40	269.03	15.59	0.04	1.94	26.35	2.49	217.72	10.59	36.04	4.61	307.03	33.72
3/7/5	10	72+1-1	62+	2-0	40	273.43	15.94	3.00	2.75	25.09	2.44	242.00	20.50	39.01	5.13	346.04	37.00
7/7/5	14	71+1-0	62+	0-0	40	305.94	10.59	0.13	1.09	26.07	2.42	350.20	20.40	35.23	4.50	406.90	55.07
9/7/5	16	72+1-0	63+	1-0	40	322.36	20.07	0.21	1.76	27.56	2.60	405.40	34.20	40.40	5.50	507.93	65.42
11/7/5	18	72+0-1	62+	0-0	40	331.77	21.17	4.70	1.53	27.42	2.46	460.24	30.41	41.25	5.91	600.43	75.64
14/7/5	21	72+0-0	63+	1-1	47	345.00	22.92	5.00	1.00	27.43	2.40	542.52	44.04	30.70	5.01	700.52	90.41
16/7/5	23	73+1-0	63+	1-0	43	360.79	24.32	5.09	0.00	20.30	2.04	590.30	40.07	30.00	5.47	840.01	90.01
10/7/5	25	74+0-1	63+	0-0	40	369.55	24.97	4.30	1.70	27.40	2.05	654.27	53.44	37.04	5.70	921.10	110.32
21/7/5	20	74+0-0	64+	0-0	47	303.95	26.02	4.00	1.36	27.00	2.50	730.24	00.20	37.16	6.14	1032.74	126.73

Table B-6.

EXPERIMENT N																		
GROUP 1																		
DATE	DAY	TEMP	HUMIDITY	N	BODY WEIGHT		CHG. BODY WT.		FOOD CONSUMED				WATER CONSUMED					
					XBAR	SD	XBAR	SD	XBAR	SD	TOTAL TO DATE	SD	XBAR	SD	TOTAL TO DATE	SD		
5/ 8/5	0	0+0-0	0+	0-	0	16	197.21	9.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
6/ 8/5	1	73+0-0	64+	0-	0	16	295.05	10.65	7.04	2.97	23.58	2.35	23.58	2.35	34.29	3.56	34.29	3.56
8/ 8/5	3	71+1-0	63+	0-	0	16	220.42	13.15	7.60	2.23	24.33	2.33	72.24	6.54	33.00	4.70	102.05	12.49
11/ 8/5	6	72+0-0	65+	0-	0	16	243.53	15.35	7.70	1.50	25.20	2.60	140.09	14.23	32.90	4.54	200.74	25.57
13/ 8/5	8	73+0-0	64+	0-	0	16	262.65	10.05	9.36	1.92	25.63	2.00	199.36	19.61	34.33	5.33	269.39	35.47
15/ 8/5	10	74+0-0	67+	0-	1	16	276.22	19.09	6.70	1.17	25.54	2.60	250.44	24.64	35.97	4.03	341.33	44.07
18/ 8/5	13	74+0-2	68+	1-	2	16	300.40	21.74	0.06	1.39	27.05	3.02	331.59	33.41	35.40	5.05	447.52	61.75
20/ 8/5	15	71+0-0	66+	0-	0	16	317.34	22.52	0.47	1.66	27.91	2.95	307.41	39.12	35.35	5.65	510.22	72.37
22/ 8/5	17	72+0-0	69+	0-	1	15	320.51	22.52	5.50	1.35	27.13	2.73	441.67	43.01	37.03	5.49	592.30	82.91
25/ 8/5	20	72+0-0	71+	0-	1	16	349.01	25.29	6.03	1.67	28.54	2.00	527.29	51.01	36.40	5.94	701.50	100.09
27/ 8/5	22	72+0-1	67+	0-	0	16	362.20	25.32	6.60	1.39	20.32	2.50	503.92	56.64	36.26	6.14	774.02	111.60
29/ 8/5	24	70+1-0	66+	0-	0	16	371.79	25.06	4.00	1.33	27.91	2.17	639.74	60.25	37.46	5.94	840.94	122.77
2/ 9/5	26	0+0-0	0+	0-	0	16	393.69	26.62	5.47	1.09	28.07	2.46	755.23	69.01	36.67	5.17	995.62	142.37
GROUP 2																		
DATE	DAY	TEMP	HUMIDITY	N	BODY WEIGHT		CHG. BODY WT.		FOOD CONSUMED				WATER CONSUMED					
					XBAR	SD	XBAR	SD	XBAR	SD	TOTAL TO DATE	SD	XBAR	SD	TOTAL TO DATE	SD		
5/ 8/5	0	0+0-0	0+	0-	0	16	100.10	13.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/ 8/5	1	73+0-0	64+	0-	0	16	197.17	14.40	9.07	2.09	23.06	2.09	23.06	2.09	33.76	4.45	33.76	4.45
8/ 8/5	3	71+1-0	63+	0-	1	16	211.74	16.29	7.20	1.29	23.00	1.09	70.01	5.67	33.04	4.27	101.44	12.57
11/ 8/5	6	72+0-0	65+	0-	0	16	237.37	10.20	8.54	1.24	25.10	1.70	146.33	10.67	32.59	4.31	199.22	25.19
13/ 8/5	8	73+0-0	64+	0-	0	16	255.64	20.44	9.14	1.65	25.67	2.17	197.60	14.35	32.96	4.79	265.13	34.09
15/ 8/5	10	74+0-0	67+	0-	1	16	260.07	21.01	6.61	1.03	25.70	2.13	249.00	10.11	35.10	4.02	335.32	43.57
18/ 8/5	13	74+0-2	68+	1-	2	16	292.52	23.16	7.09	1.31	26.06	2.25	329.64	24.29	34.50	4.02	430.04	57.32
20/ 8/5	15	71+0-0	66+	0-	0	16	309.04	25.04	6.66	1.40	27.03	2.50	305.31	20.74	34.39	4.69	507.63	66.01
22/ 8/5	17	72+0-0	69+	0-	1	16	324.11	25.07	7.14	1.40	27.35	3.30	440.01	33.77	36.01	5.01	579.64	76.64
25/ 8/5	20	72+0-0	71+	0-	1	16	343.96	26.74	6.61	1.09	29.06	3.31	527.20	41.79	35.23	4.93	605.34	89.73
27/ 8/5	22	72+0-1	67+	0-	0	16	359.01	20.11	7.52	1.35	20.50	2.25	504.36	45.60	34.19	4.67	753.73	90.13
29/ 8/5	24	70+1-0	66+	0-	0	16	360.44	20.94	4.72	2.06	20.19	2.40	640.74	49.50	35.67	4.92	825.06	107.30
2/ 9/5	26	0+0-0	0+	0-	0	16	392.05	31.59	5.90	1.30	29.19	2.45	757.49	50.15	35.04	4.70	960.43	124.03
GROUP 3																		
DATE	DAY	TEMP	HUMIDITY	N	BODY WEIGHT		CHG. BODY WT.		FOOD CONSUMED				WATER CONSUMED					
					XBAR	SD	XBAR	SD	XBAR	SD	TOTAL TO DATE	SD	XBAR	SD	TOTAL TO DATE	SD		
5/ 8/5	0	0+0-0	0+	0-	0	16	192.44	9.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/ 8/5	1	73+0-0	64+	0-	0	16	200.21	11.04	7.77	2.91	23.04	2.09	23.04	2.09	34.18	5.15	34.18	5.15
8/ 8/5	3	71+1-0	63+	0-	1	16	216.59	11.69	0.19	1.51	24.69	1.65	72.43	5.09	34.57	4.44	103.31	13.60
11/ 8/5	6	72+0-0	65+	0-	0	16	243.94	14.20	9.12	1.35	25.72	1.64	149.50	9.65	34.34	3.00	206.34	24.99
13/ 8/5	8	73+0-0	64+	0-	0	16	261.67	16.54	0.07	1.71	26.22	1.99	202.03	13.42	35.60	4.27	277.71	32.04
15/ 8/5	10	74+0-0	67+	0-	1	16	276.44	19.32	7.30	1.05	25.93	2.15	253.09	17.41	36.35	3.60	350.41	30.73
18/ 8/5	13	74+0-2	68+	1-	2	16	302.32	21.06	0.63	1.23	27.90	2.29	337.50	21.73	36.31	4.20	459.34	50.62
20/ 8/5	15	71+0-0	66+	0-	0	16	320.33	23.70	9.01	2.17	20.19	2.46	393.97	25.90	36.47	4.45	532.20	59.11
22/ 8/5	17	72+0-0	69+	0-	1	16	333.37	24.39	6.52	1.46	20.53	2.22	451.02	30.17	39.79	4.70	611.07	62.20
25/ 8/5	20	72+0-0	71+	0-	1	16	353.70	27.05	6.00	1.49	20.45	2.70	539.30	37.30	37.10	4.42	725.10	70.47
27/ 8/5	22	72+0-1	67+	0-	0	16	360.41	29.37	7.02	2.03	20.32	2.03	590.01	42.41	37.27	4.54	797.71	80.63
29/ 8/5	24	70+1-0	66+	0-	0	15	377.27	31.52	3.93	1.96	20.76	2.20	655.53	46.16	30.37	5.40	875.00	97.52
2/ 9/5	26	0+0-0	0+	0-	0	16	390.50	34.21	5.31	1.56	20.11	2.73	771.06	55.17	37.92	5.75	1024.60	115.92

Table B-7.

EXPERIMENT H																	
GROUP 4																	
DATE	DAY	TEMP	HUMIDITY	N	BODY WEIGHT		CHG. BODY WT.		FOOD CONSUMED				WATER		CONSUMED		
					XBAR	SD	XBAR	SD	XBAR	SD	TOTAL TO DATE	SD	XBAR	SD	TOTAL TO DATE	SD	
5/8/5	0	8+0-0	0+0-0	0	16	188.33	11.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/8/5	1	73+0-0	64+0-0	0	16	196.34	11.47	7.99	2.42	21.88	1.88	21.88	1.88	31.51	3.06	31.51	3.06
8/8/5	3	71+1-0	63+0-0	1	16	218.63	12.67	7.14	1.02	23.51	1.98	68.98	5.73	32.45	3.16	96.48	9.08
11/8/5	6	72+0-0	65+0-0	0	16	235.61	14.38	8.33	1.38	24.53	1.75	142.49	10.62	31.99	3.49	192.38	18.98
13/8/5	8	73+0-0	64+0-0	0	16	252.63	15.86	8.51	1.38	24.83	1.55	192.16	13.33	32.98	3.37	258.35	25.43
15/8/5	10	74+0-0	67+0-0	1	16	264.25	15.99	5.81	1.58	24.65	1.67	241.46	16.29	33.28	3.31	324.74	31.64
18/8/5	13	74+0-2	68+1-2	16	2	287.48	17.56	7.74	1.48	25.92	1.84	319.24	21.81	33.69	3.42	425.83	48.99
20/8/5	15	71+0-0	66+0-0	0	16	303.99	19.74	8.25	2.86	26.28	2.03	371.79	24.62	33.98	3.93	493.63	48.18
22/8/5	17	72+0-0	69+0-0	1	16	313.81	19.58	4.51	1.98	27.17	3.98	426.12	31.27	35.12	3.67	563.88	54.47
25/8/5	20	72+0-0	71+0-0	1	16	332.91	23.53	6.63	2.88	26.96	2.28	587.01	37.24	34.78	4.53	688.22	66.63
27/8/5	22	72+0-1	67+0-0	0	16	346.43	24.91	6.76	1.42	27.15	2.81	561.32	40.77	33.62	3.92	735.46	73.64
29/8/5	24	78+1-0	66+0-0	0	15	353.68	26.23	3.62	1.67	27.17	2.87	615.65	42.76	35.43	4.21	805.14	78.20
2/9/5	28	8+0-0	8+0-0	0	16	372.68	28.98	4.75	1.38	27.19	2.19	724.42	58.05	34.28	3.59	941.24	98.88

GROUP 5																	
DATE	DAY	TEMP	HUMIDITY	N	BODY WEIGHT		CHG. BODY WT.		FOOD CONSUMED				WATER		CONSUMED		
					XBAR	SD	XBAR	SD	XBAR	SD	TOTAL TO DATE	SD	XBAR	SD	TOTAL TO DATE	SD	
5/8/5	0	8+0-0	0+0-0	0	16	192.81	12.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/8/5	1	73+0-0	64+0-0	0	16	198.67	12.56	6.66	2.83	23.88	3.43	23.88	3.43	33.54	3.48	33.54	3.48
8/8/5	3	71+1-0	63+0-0	1	16	214.36	13.24	7.84	1.31	24.21	1.66	72.29	5.12	34.26	2.98	182.87	8.91
11/8/5	6	72+0-0	65+0-0	0	16	240.99	14.66	8.88	0.95	25.76	2.89	149.56	18.69	34.14	3.12	284.48	17.58
13/8/5	8	73+0-0	64+0-0	0	16	259.17	15.96	9.89	1.57	26.73	3.44	283.82	17.13	35.94	4.58	276.36	25.63
15/8/5	10	74+0-0	67+0-0	1	15	271.88	16.48	5.96	1.44	25.89	1.91	254.81	19.68	35.38	4.85	346.68	34.39
18/8/5	13	74+0-2	68+1-2	16	2	295.93	17.18	8.28	1.28	27.53	2.88	337.41	27.42	35.75	5.32	453.93	49.21
20/8/5	15	71+0-0	66+0-0	0	16	311.98	17.65	7.82	1.23	27.98	2.54	393.36	31.78	35.27	6.18	524.47	61.17
22/8/5	17	72+0-0	69+0-0	1	16	323.27	17.95	5.85	1.72	27.47	2.34	448.31	35.17	38.12	5.78	688.70	71.71
25/8/5	20	72+0-0	71+0-0	1	16	343.39	18.07	6.71	1.78	29.38	3.51	536.19	45.12	36.78	6.68	711.83	81.07
27/8/5	22	72+0-1	67+0-0	0	16	359.13	19.27	7.87	2.87	30.19	4.50	596.57	53.29	36.58	4.95	784.04	100.62
29/8/5	24	78+1-0	66+0-0	0	15	367.14	20.85	4.88	1.27	28.84	2.85	652.65	55.28	38.21	6.40	860.12	112.75
2/9/5	28	8+0-0	8+0-0	0	15	388.13	21.28	5.25	1.87	28.41	2.27	766.29	61.14	36.32	5.68	1085.83	134.42

GROUP 6																	
DATE	DAY	TEMP	HUMIDITY	N	BODY WEIGHT		CHG. BODY WT.		FOOD CONSUMED				WATER		CONSUMED		
					XBAR	SD	XBAR	SD	XBAR	SD	TOTAL TO DATE	SD	XBAR	SD	TOTAL TO DATE	SD	
5/8/5	0	8+0-0	0+0-0	0	16	192.32	9.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/8/5	1	73+0-0	64+0-0	0	16	199.98	10.28	7.24	2.88	23.24	2.51	23.24	2.51	32.54	3.68	32.54	3.68
8/8/5	3	71+1-0	63+0-0	1	16	215.82	10.98	7.73	1.39	26.37	6.48	75.98	14.26	33.83	4.16	98.61	11.75
11/8/5	6	72+0-0	65+0-0	0	16	241.56	13.85	8.85	1.13	25.84	5.65	153.49	29.87	31.99	4.41	194.56	24.69
13/8/5	8	73+0-0	64+0-0	0	16	259.19	15.13	8.82	1.31	25.49	3.58	284.47	35.37	33.93	4.96	262.42	34.29
15/8/5	10	74+0-0	67+0-0	1	16	271.41	15.58	6.11	1.71	26.43	2.63	257.32	39.57	34.81	4.76	332.83	42.95
18/8/5	13	74+0-2	68+1-2	15	2	295.48	17.11	8.82	0.96	27.36	4.64	339.27	53.82	35.87	5.48	437.24	57.53
20/8/5	15	71+0-0	66+0-0	0	16	312.72	18.98	8.62	1.71	27.48	4.89	394.22	59.79	33.88	6.18	583.41	67.89
22/8/5	17	72+0-0	69+0-0	1	16	324.45	19.18	5.87	1.85	27.79	2.41	448.88	62.89	37.83	5.64	577.47	78.48
25/8/5	20	72+0-0	71+0-0	1	16	346.18	20.72	7.22	1.38	29.26	4.23	537.58	75.10	36.34	5.70	686.49	84.49
27/8/5	22	72+0-1	67+0-0	0	16	359.74	22.54	6.82	1.73	30.95	7.48	598.48	88.19	35.87	4.65	758.22	103.19
29/8/5	24	78+1-0	66+0-0	0	16	368.43	22.76	4.34	1.67	28.58	3.31	656.47	94.39	36.95	4.48	832.12	111.58
2/9/5	28	8+0-0	8+0-0	0	15	398.37	25.39	5.49	1.31	28.28	2.14	789.64	97.86	36.37	6.83	977.27	133.51

APPENDIX C

Data and Statistical Summary of the Biochemical and Hematological Analyses

These tables present the raw data and a statistical summary for the biochemical and hematological analyses for each experimental group of the four experiments, E, F, G, and H. The average per day growth rate over the 28-day exposure period and the final weight are presented for convenience.

The field strength and chamber position (either upper or lower) for any group can be obtained from Table 3 of the text.

Note that in experiment F, animals numbered 231 (see Table C-4), 687 and 689 (see Table C-6) were deleted from the growth analyses as discussed in Appendix B. A 999.0 was used in the final weight (FNL WT) column and a 000.0 was used in the growth rate column (WT/DAY) to identify the deleted animals. When a 0.0 is encountered in the rest of these tables, it indicates that the biochemical and hematological determinations were not performed. This only occurred as a result of an insufficient quantity or a clotted sample.

Histograms of these data indicated that nonparametric techniques should be used for their analysis. However, the first quartile (Q1), median (MED), third quartile (Q3), the number of animals (N), the average (AVG), standard deviation (S.D.), and standard error (S.E.) are presented for the statistical summary.

The headings for each column are defined as (proceeding from left to right):

ID#	three-digit code randomly assigned to each animal of an experiment. The units and tens digits specify where each of the 96 animals was positioned. The hundreds digit specifies the chamber number (1-6).
T.P.	total blood protein (g/dl)
GLOB	blood globulin (mg/dl)
GLU	blood glucose (mg/dl)
T.L.	blood total lipids (mg/dl)
CHOL	blood cholesterol (mg/dl)
TRIG	blood triglycerides (mg/dl)
WT-DAY	final body mass-initial body mass/28, (g/day)
FNL WT	final body mass (g)
RBC	red blood cells (cells/mm ³ x 10 ⁶)
WBC	white blood cells (cells/mm ³ x 10 ³)
POLY	segment neutrophils (%)
LYHS	lymphocytes (%)
HCT	hematocrit (%)
HGB	hemoglobin (g/dl)

Table C-4.

GROUP 1											GROUP 2																				
EXPERIMENT	T.P.	GLOB	GLU	T.L.	CHOL	TRIG	MT/DAY	FML WT	RBC	MBC	POLY	LYMS	HCT	MCB	EXPERIMENT	T.P.	GLOB	GLU	T.L.	CHOL	TRIG	MT/DAY	FML WT	RBC	MBC	POLY	LYMS	HCT	MCB		
101	550	110	150	467	67	53	0	351	54	25	20	77	40	120	101	550	110	207	90	64	147	750	343	300	0	81	32	124	96		
102	580	110	150	458	67	53	0	335	54	25	20	77	40	120	102	580	110	160	458	67	53	750	335	300	0	94	32	114	97		
103	5670	120	225	518	67	126	0	364	54	24	10	90	40	130	103	5670	120	150	518	67	126	750	364	300	0	92	32	117	98		
104	620	120	225	516	67	126	0	414	54	24	10	90	40	130	104	620	120	150	516	67	126	750	414	300	0	97	32	112	99		
105	740	120	225	845	67	126	0	370	54	24	10	90	40	130	105	740	120	150	845	67	126	750	370	300	0	95	32	114	100		
106	750	120	225	453	67	126	0	322	54	24	10	90	40	130	106	750	120	150	453	67	126	750	322	300	0	97	32	114	101		
107	750	120	225	535	67	126	0	322	54	24	10	90	40	130	107	750	120	150	535	67	126	750	322	300	0	95	32	114	102		
108	750	120	225	541	67	126	0	322	54	24	10	90	40	130	108	750	120	150	541	67	126	750	322	300	0	95	32	114	103		
109	750	120	225	372	67	126	0	322	54	24	10	90	40	130	109	750	120	150	372	67	126	750	322	300	0	95	32	114	104		
110	750	120	225	472	67	126	0	322	54	24	10	90	40	130	110	750	120	150	472	67	126	750	322	300	0	95	32	114	105		
111	750	120	225	472	67	126	0	322	54	24	10	90	40	130	111	750	120	150	472	67	126	750	322	300	0	95	32	114	106		
112	750	120	225	472	67	126	0	322	54	24	10	90	40	130	112	750	120	150	472	67	126	750	322	300	0	95	32	114	107		
113	750	120	225	472	67	126	0	322	54	24	10	90	40	130	113	750	120	150	472	67	126	750	322	300	0	95	32	114	108		
114	750	120	225	472	67	126	0	322	54	24	10	90	40	130	114	750	120	150	472	67	126	750	322	300	0	95	32	114	109		
115	750	120	225	472	67	126	0	322	54	24	10	90	40	130	115	750	120	150	472	67	126	750	322	300	0	95	32	114	110		
116	750	120	225	472	67	126	0	322	54	24	10	90	40	130	116	750	120	150	472	67	126	750	322	300	0	95	32	114	111		
MEQ	550	940	257	464	53	100	0	336	74	52	20	70	32	120	MEQ	550	940	257	464	53	100	750	336	300	0	70	32	120	112		
AVG	290	160	246	541	79	150	0	323	650	22	12	96	42	140	AVG	290	160	246	541	79	150	750	323	300	0	96	42	140	113		
SS	140	121	316	127	137	152	0	323	21	22	7	1	1	101	SS	140	121	316	127	137	152	750	323	300	0	1	1	101	114		
	176	846	120	26	54	15	0	323	181	22	7	1	1	101		176	846	120	26	54	15	750	323	300	0	1	1	101	115		
117	600	40	207	90	64	147	0	300	0	0	15	81	32	124	117	600	40	207	90	64	147	750	300	0	81	32	114	96	124	97	
118	600	40	160	458	67	126	0	335	0	0	10	90	32	114	118	600	40	160	458	67	126	750	335	0	94	32	114	97	114	98	
119	600	40	150	518	67	126	0	364	0	0	10	90	32	114	119	600	40	150	518	67	126	750	364	0	92	32	114	98	114	99	
120	600	40	150	845	67	126	0	414	0	0	10	90	32	114	120	600	40	150	845	67	126	750	414	0	97	32	114	99	114	100	
121	600	40	150	453	67	126	0	370	0	0	10	90	32	114	121	600	40	150	453	67	126	750	370	0	95	32	114	100	114	101	
122	600	40	150	535	67	126	0	322	0	0	10	90	32	114	122	600	40	150	535	67	126	750	322	0	97	32	114	101	114	102	
123	600	40	150	541	67	126	0	322	0	0	10	90	32	114	123	600	40	150	541	67	126	750	322	0	95	32	114	102	114	103	
124	600	40	150	372	67	126	0	322	0	0	10	90	32	114	124	600	40	150	372	67	126	750	322	0	97	32	114	103	114	104	
125	600	40	150	472	67	126	0	322	0	0	10	90	32	114	125	600	40	150	472	67	126	750	322	0	95	32	114	104	114	105	
126	600	40	150	472	67	126	0	322	0	0	10	90	32	114	126	600	40	150	472	67	126	750	322	0	95	32	114	105	114	106	
127	600	40	150	472	67	126	0	322	0	0	10	90	32	114	127	600	40	150	472	67	126	750	322	0	95	32	114	106	114	107	
128	600	40	150	472	67	126	0	322	0	0	10	90	32	114	128	600	40	150	472	67	126	750	322	0	95	32	114	107	114	108	
129	600	40	150	472	67	126	0	322	0	0	10	90	32	114	129	600	40	150	472	67	126	750	322	0	95	32	114	108	114	109	
130	600	40	150	472	67	126	0	322	0	0	10	90	32	114	130	600	40	150	472	67	126	750	322	0	95	32	114	109	114	110	
131	600	40	150	472	67	126	0	322	0	0	10	90	32	114	131	600	40	150	472	67	126	750	322	0	95	32	114	110	114	111	
132	600	40	150	472	67	126	0	322	0	0	10	90	32	114	132	600	40	150	472	67	126	750	322	0	95	32	114	111	114	112	
MEQ	600	75	242	541	67	126	0	323	40	22	6	80	32	114	MEQ	600	75	242	541	67	126	750	323	300	0	80	32	114	96	114	97
AVG	100	125	242	541	67	126	0	323	46	22	6	80	32	114	AVG	100	125	242	541	67	126	750	323	300	0	80	32	114	97	114	98
SS	100	125	242	541	67	126	0	323	46	22	6	80	32	114	SS	100	125	242	541	67	126	750	323	300	0	80	32	114	98	114	99
	101	134	242	541	67	126	0	323	46	22	6	80	32	114		101	134	242	541	67	126	750	323	300	0	80	32	114	99	114	100

Table C-6.

EXPERIMENT F		GROUP 5												
ID#	T.P.	GLOB	GLU	T.L.	CHOL	TRIG	WT/DAY	FHL WT	RBC	WBC	POLY	LYMS	HCT	HGB
565	560	330	472	614	71	29	7	225	6	6310	6	93	45	15
566	560	221	165	523	87	16	2	225	4	2720	5	94	42	11
567	570	221	129	494	64	16	6	225	2	2720	10	92	42	11
568	570	222	135	422	71	16	7	225	6	4730	7	97	44	11
569	570	12	155	489	60	12	3	225	6	4500	9	89	43	11
570	580	11	129	498	56	12	6	225	6	4870	9	91	42	11
571	580	11	174	387	56	10	7	225	6	5490	16	92	46	11
572	580	12	228	481	55	13	7	225	6	6270	5	96	44	11
573	580	11	228	481	51	13	7	225	6	6270	5	96	44	11
574	580	22	228	481	51	13	7	225	6	6270	5	96	44	11
575	580	22	228	481	51	13	7	225	6	6270	5	96	44	11
576	580	22	228	481	51	13	7	225	6	6270	5	96	44	11
577	580	22	228	481	51	13	7	225	6	6270	5	96	44	11
578	580	22	228	481	51	13	7	225	6	6270	5	96	44	11
579	580	22	228	481	51	13	7	225	6	6270	5	96	44	11
580	580	22	228	481	51	13	7	225	6	6270	5	96	44	11
581	560	960	160	416	57	11	5	225	5	4500	5	91	43	13
582	570	122	129	494	64	16	2	225	4	4220	17	92	46	11
583	580	122	129	494	64	16	2	225	4	4220	17	92	46	11
584	580	122	129	494	64	16	2	225	4	4220	17	92	46	11
585	580	122	129	494	64	16	2	225	4	4220	17	92	46	11
586	580	122	129	494	64	16	2	225	4	4220	17	92	46	11
587	580	122	129	494	64	16	2	225	4	4220	17	92	46	11
588	580	122	129	494	64	16	2	225	4	4220	17	92	46	11
589	580	122	129	494	64	16	2	225	4	4220	17	92	46	11
590	580	122	129	494	64	16	2	225	4	4220	17	92	46	11
591	580	122	129	494	64	16	2	225	4	4220	17	92	46	11
592	580	122	129	494	64	16	2	225	4	4220	17	92	46	11
593	580	122	129	494	64	16	2	225	4	4220	17	92	46	11
594	580	122	129	494	64	16	2	225	4	4220	17	92	46	11
595	580	122	129	494	64	16	2	225	4	4220	17	92	46	11
596	580	122	129	494	64	16	2	225	4	4220	17	92	46	11
597	580	122	129	494	64	16	2	225	4	4220	17	92	46	11
598	580	122	129	494	64	16	2	225	4	4220	17	92	46	11
599	580	122	129	494	64	16	2	225	4	4220	17	92	46	11
600	580	122	129	494	64	16	2	225	4	4220	17	92	46	11

EXPERIMENT F		GROUP 6												
ID#	T.P.	GLOB	GLU	T.L.	CHOL	TRIG	WT/DAY	FHL WT	RBC	WBC	POLY	LYMS	HCT	HGB
601	760	700	200	426	52	11	0	225	0	0	4	9	40	7
602	760	2040	221	73	68	13	0	225	0	1400	1	9	43	16
603	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
604	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
605	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
606	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
607	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
608	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
609	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
610	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
611	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
612	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
613	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
614	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
615	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
616	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
617	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
618	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
619	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
620	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
621	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
622	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
623	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
624	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
625	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
626	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
627	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
628	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
629	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
630	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
631	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
632	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
633	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
634	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
635	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
636	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
637	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
638	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
639	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
640	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
641	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
642	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
643	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
644	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
645	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
646	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
647	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
648	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
649	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
650	760	222	229	427	55	13	0	225	0	2550	1	9	46	15

EXPERIMENT F		GROUP 6												
ID#	T.P.	GLOB	GLU	T.L.	CHOL	TRIG	WT/DAY	FHL WT	RBC	WBC	POLY	LYMS	HCT	HGB
651	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
652	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
653	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
654	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
655	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
656	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
657	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
658	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
659	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
660	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
661	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
662	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
663	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
664	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
665	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
666	760	222	229	427	55	13	0	225	0	2550	1	9	46	15
667	760	222	229	427	55	13								

Table C-11.

EXPERIMENT	T.P.	GROUP 5			TRIG	WT/DAY	FHL WT	RBC	MBC	POLY	LYMS	HCT	HGB
		H	GLU	T.L.									
565	5	50	244	339	122	200	6.670	2570	0	0	47	6	
566	5	100	277	335	100	400	6.820	270	0	0	47	15	
567	5	150	259	335	100	300	6.820	474	0	0	47	15	
568	5	200	280	400	234	200	6.410	610	0	0	43	15	
569	5	250	300	400	342	300	6.350	1000	0	0	42	15	
570	5	300	225	400	225	400	6.480	1940	0	0	44	15	
571	5	350	225	400	225	400	6.480	1940	0	0	44	15	
572	5	400	225	400	225	400	6.480	1940	0	0	44	15	
573	5	450	225	400	225	400	6.480	1940	0	0	44	15	
574	5	500	225	400	225	400	6.480	1940	0	0	44	15	
575	5	550	225	400	225	400	6.480	1940	0	0	44	15	
576	5	600	225	400	225	400	6.480	1940	0	0	44	15	
577	5	650	225	400	225	400	6.480	1940	0	0	44	15	
578	5	700	225	400	225	400	6.480	1940	0	0	44	15	
579	5	750	225	400	225	400	6.480	1940	0	0	44	15	
580	5	800	225	400	225	400	6.480	1940	0	0	44	15	
581	5	850	225	400	225	400	6.480	1940	0	0	44	15	
582	5	900	225	400	225	400	6.480	1940	0	0	44	15	
583	5	950	225	400	225	400	6.480	1940	0	0	44	15	
584	5	1000	225	400	225	400	6.480	1940	0	0	44	15	
585	5	1050	225	400	225	400	6.480	1940	0	0	44	15	
586	5	1100	225	400	225	400	6.480	1940	0	0	44	15	
587	5	1150	225	400	225	400	6.480	1940	0	0	44	15	
588	5	1200	225	400	225	400	6.480	1940	0	0	44	15	
589	5	1250	225	400	225	400	6.480	1940	0	0	44	15	
590	5	1300	225	400	225	400	6.480	1940	0	0	44	15	
591	5	1350	225	400	225	400	6.480	1940	0	0	44	15	
592	5	1400	225	400	225	400	6.480	1940	0	0	44	15	
593	5	1450	225	400	225	400	6.480	1940	0	0	44	15	
594	5	1500	225	400	225	400	6.480	1940	0	0	44	15	
595	5	1550	225	400	225	400	6.480	1940	0	0	44	15	
596	5	1600	225	400	225	400	6.480	1940	0	0	44	15	
597	5	1650	225	400	225	400	6.480	1940	0	0	44	15	
598	5	1700	225	400	225	400	6.480	1940	0	0	44	15	
599	5	1750	225	400	225	400	6.480	1940	0	0	44	15	
600	5	1800	225	400	225	400	6.480	1940	0	0	44	15	
601	5	1850	225	400	225	400	6.480	1940	0	0	44	15	
602	5	1900	225	400	225	400	6.480	1940	0	0	44	15	
603	5	1950	225	400	225	400	6.480	1940	0	0	44	15	
604	5	2000	225	400	225	400	6.480	1940	0	0	44	15	
605	5	2050	225	400	225	400	6.480	1940	0	0	44	15	
606	5	2100	225	400	225	400	6.480	1940	0	0	44	15	
607	5	2150	225	400	225	400	6.480	1940	0	0	44	15	
608	5	2200	225	400	225	400	6.480	1940	0	0	44	15	
609	5	2250	225	400	225	400	6.480	1940	0	0	44	15	
610	5	2300	225	400	225	400	6.480	1940	0	0	44	15	
611	5	2350	225	400	225	400	6.480	1940	0	0	44	15	
612	5	2400	225	400	225	400	6.480	1940	0	0	44	15	
613	5	2450	225	400	225	400	6.480	1940	0	0	44	15	
614	5	2500	225	400	225	400	6.480	1940	0	0	44	15	
615	5	2550	225	400	225	400	6.480	1940	0	0	44	15	
616	5	2600	225	400	225	400	6.480	1940	0	0	44	15	
617	5	2650	225	400	225	400	6.480	1940	0	0	44	15	
618	5	2700	225	400	225	400	6.480	1940	0	0	44	15	
619	5	2750	225	400	225	400	6.480	1940	0	0	44	15	
620	5	2800	225	400	225	400	6.480	1940	0	0	44	15	
621	5	2850	225	400	225	400	6.480	1940	0	0	44	15	
622	5	2900	225	400	225	400	6.480	1940	0	0	44	15	
623	5	2950	225	400	225	400	6.480	1940	0	0	44	15	
624	5	3000	225	400	225	400	6.480	1940	0	0	44	15	
625	5	3050	225	400	225	400	6.480	1940	0	0	44	15	
626	5	3100	225	400	225	400	6.480	1940	0	0	44	15	
627	5	3150	225	400	225	400	6.480	1940	0	0	44	15	
628	5	3200	225	400	225	400	6.480	1940	0	0	44	15	
629	5	3250	225	400	225	400	6.480	1940	0	0	44	15	
630	5	3300	225	400	225	400	6.480	1940	0	0	44	15	
631	5	3350	225	400	225	400	6.480	1940	0	0	44	15	
632	5	3400	225	400	225	400	6.480	1940	0	0	44	15	
633	5	3450	225	400	225	400	6.480	1940	0	0	44	15	
634	5	3500	225	400	225	400	6.480	1940	0	0	44	15	
635	5	3550	225	400	225	400	6.480	1940	0	0	44	15	
636	5	3600	225	400	225	400	6.480	1940	0	0	44	15	
637	5	3650	225	400	225	400	6.480	1940	0	0	44	15	
638	5	3700	225	400	225	400	6.480	1940	0	0	44	15	
639	5	3750	225	400	225	400	6.480	1940	0	0	44	15	
640	5	3800	225	400	225	400	6.480	1940	0	0	44	15	
641	5	3850	225	400	225	400	6.480	1940	0	0	44	15	
642	5	3900	225	400	225	400	6.480	1940	0	0	44	15	
643	5	3950	225	400	225	400	6.480	1940	0	0	44	15	
644	5	4000	225	400	225	400	6.480	1940	0	0	44	15	
645	5	4050	225	400	225	400	6.480	1940	0	0	44	15	
646	5	4100	225	400	225	400	6.480	1940	0	0	44	15	
647	5	4150	225	400	225	400	6.480	1940	0	0	44	15	
648	5	4200	225	400	225	400	6.480	1940	0	0	44	15	
649	5	4250	225	400	225	400	6.480	1940	0	0	44	15	
650	5	4300	225	400	225	400	6.480	1940	0	0	44	15	
651	5	4350	225	400	225	400	6.480	1940	0	0	44	15	
652	5	4400	225	400	225	400	6.480	1940	0	0	44	15	
653	5	4450	225	400	225	400	6.480	1940	0	0	44	15	
654	5	4500	225	400	225	400	6.480	1940	0	0	44	15	
655	5	4550	225	400	225	400	6.480	1940	0	0	44	15	
656	5	4600	225	400	225	400	6.480	1940	0	0	44	15	
657	5	4650	225	400	225	400	6.480	1940	0	0	44	15	
658	5	4700	225	400	225	400	6.480	1940	0	0	44	15	
659	5	4750	225	400	225	400	6.480	1940	0	0	44	15	
660	5	4800	225	400	225	400	6.480	1940	0	0	44	15	
661	5	4850	225	400	225	400	6.480	1940	0	0	44	15	
662	5	4900	225	400	225	400	6.480	1940	0	0	44	15	
663	5	4950	225	400	225	400	6.480	1940	0	0	44	15	
664	5	5000	225	400	225	400	6.480	1940	0	0	44	15	
665	5	5050	225	400	225	400	6.480	1940	0	0	44	15	
666	5	5100											

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Three hundred eight-four young male rats were exposed to 45 Hertz, vertical, electric fields of 0 to 100 V/m. It was concluded that no biological effects from exposure to these electric fields were observed on growth, food consumption and water consumption, nor the blood concentrations of total protein, globulin, glucose, cholesterol, triglycerides and total lipid, nor on the hematological values for red blood cells, white blood cells, segmented neutrophils, lymphocytes, monocytes, eosinophils, hematocrit or hemoglobin.		