HEMATOLOGICAL RESPONSES IN CAPTIVE WHITE-WINGED DOVES (*ZENAIDA ASIATICA*) INDUCED BY VARIOUS RADIOTRANSMITTER ATTACHMENTS WITH OBSERVATIONS ON *HAEMOPROTEUS* SPP. SUSCEPTIBILITY

THESIS

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Master of SCIENCE

By

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ABSTRACT

HEMATOLOGICAL RESPONSES IN CAPTIVE WHITE-WINGED DOVES (*ZENAIDA ASIATICA*) INDUCED BY VARIOUS RADIOTRANSMITTER ATTACHMENTS WITH OBSERVATIONS ON *HAEMOPROTEUS* SPP. SUSCEPTIBILITY

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In the past several decades white-winged doves (*Zenaida asiatica*) have moved from a historically significant breeding range in the Lower Rio Grande Valley (LRGV) of Texas by increasing the periphery of the range northward, particularly in urban locales. Telemetry has provided researchers with detailed data of population demographics; however, attachment of various transmitter types can be invasive and compromising to the recipient. Clinical hematology parameters are efficient evaluators of physiological stress often overlooked in wildlife research. Hematological responses of captive white-winged doves induced by various transmitter attachment techniques were investigated, as well as, susceptibility to *Haemoproteus* spp. Two hundred ten captive dove at Texas

A&M University-Kingsville were fitted with external radiotransmitter attachments: double-loop body harness, cyanoacrylate glue, surgical implants (intracoelomic and subcutaneous, both fitted with external antennas) and a control. Blood collections from medial metatarsal vein were executed on all birds within 48 h for discrete WBC profile for a pretreatment sample. Five post-treatment samplings were taken during 20 August 1998 and 20 November 1998. Mixed Model Repeated Measures ANOVA revealed no significant differences in treatments across samplings occurred for any variable: total WBC counts, heterophil counts, lymphocyte counts, heterophil-lymphocyte ratio, basophil counts, eosinophil counts and monocyte counts. Scheffe post-hoc tests revealed that adult female white-winged doves had significantly higher total WBC counts than either adult males (P <.05) or hatch-year birds (P <.05). Significant post-treatment differences were indicated in total white blood cell (WBC) counts ($F_{5,220}$ = 18.0, P <.05), heterophil counts ($F_{5,115}$ = 5.2, P <.05), lymphocyte counts ($F_{5,115}$ = 3.3, P <.05), heterophil:lymphocyte ratio ($F_{5,220}$ = 5.0, P <.05), eosinophil counts ($F_{5,220}$ = 4.8, P <.05), and monocyte counts ($F_{5,220}$ = 14.6, P <.05). Though statistically non-significant, the greatest increase of WBC and heterophil count across all treatments was manifested by intracoelomic surgery. Regardless of treatment, in this captive scenario, WBC differentials returned to, or below, pretreatment hematologic means by the last sampling period. Chi Square values revealed no relationship between presence and prevalence of *Haemoproteus* spp. between radio-transmitter treatments and a control across sampling periods.

INTRODUCTION

Natural History.-- White-winged doves (*Zenaida asiatica*) are unique among North American Columbiformes. They are distinguished from their often sympatric congener, the mourning dove (*Zenaida macoura*), by a larger body size and conspicuous upper wing plumage (Johnsgard 1975). Cottam and Trefethen (1968) described the white-winged dove as an economically important game bird species in southern Texas and Arizona. In the last few decades, white-winged doves have steadily moved from a historically significant breeding range restricted to 4 counties in the Lower Rio Grande Valley (LRGV) of Texas and increased the periphery of the range northward, particularly in urban locales (Cottam and Trefethen 1968, George et al. 1994, Hayslette et al. 1996, Waggerman 1998).

Traditionally considered a neotropical migrant, based on initial observations in the LRGV by Sennett (1878), this bird's northward range expansion resulted from locally abundant resources depending on seasonal availability (George et al. 1994, Hayslette et al. 1996, Small et al. 1989). Coincidental with this range expansion has been an urbanization of white-

winged dove populations. West et al. (1993) estimated an urban breeding population of more than 1 million in the greater San Antonio, Texas, area. Dove numbers of this magnitude could theoretically constitute the highest density and productivity of white-winged doves in Texas, and represent a paradigm shift from historical observations (Attwater 1892). These geographic reallocations invariably bring variations in hatching success, weather, food availability, density, distribution and migratory effects on a population.

Bendire (1892) first described, in extensive detail, the habits and morphology of the white-winged dove in Pima County, Arizona. This early species account notwithstanding, subsequent published notes were scattered among various journals, and life history characteristics have been considerably modified (Cottam and Trefethen 1968, George et al. 1994). Although the white-winged dove has become catholic in their current Texas distribution, the relative confines of its historic range in the United States caused a paucity of scientific knowledge. The species may require management strategies specific to local demic populations, instead of the mantled protection enumerated in statewide regulations. Questions concerning stability or possible decline of some populations tend to suggest heterogeneous populations of both migratory and sedentary birds.

Alteration in geographic distributions of white-winged doves warrants the development of management strategies specific to newly established, localized populations. This approach is particularly credible because of current

trepidation regarding the stability and possible decline of some populations and recently formed populations of both Mesoamerican migrants and resident individuals. The ambulatory nature and fecundity of white-winged dove provide a superb example of a species exploiting anthropogenic alterations and these abilities present a challenge for contemporary wildlife management. Consequently, gaps of information concerning life history, biological requirements, and management needs have yet to be fully determined.

Telemetry Complications.-- Telemetric studies provide researchers with detailed data, both spatially and temporally, of population demographics (Derleth and Sepik 1990, Schulz et al. 1996), habitat utilization (Drobney et al. 1998, Millspaugh et al. 1998), behavior (Howe and Flake 1988, Rautenstrauch et al. 1998), and other life history characteristics. The use of radio telemetry in wildlife studies is predicated on the assumption that transmitter attachment does not cause aberration in the normal behavior of the individual being monitored. Thus, if this assumption is erroneous, attachment of various transmitter types can be invasive and compromising to the recipient. Chemical immobilizing agents, physical restraint, and surgery may adversely affect the subject's recovery. If attachment of a transmitter initiates subclinical illness, data collected from a bird would be misleading and irreconcilable.

Birds are unique in their manifestations of symptoms and respond to disease states differently than other vertebrates (Rosskopf and Woerpel 1982).

Consequently, diagnostic laboratory tests should be relied upon to determine, monitor and assess recovery progress of avian subjects. Rosskopf and Woerffel (1981) discussed the compensatory ability of avian species to "mask" manifestations of disease. Because of this protective mechanism, clinical hematological laboratory testing is important in quantifying the severity of the avian subject's clinical condition (Rosskopf and Woerffel 1981).

Avian Hematology.-- Wildlife research has largely overlooked avian hematology and few, if any, studies enlist its usefulness as an efficient evaluator of physiological stress. McFarlane et al. (1989) and McFarlane and Curtis (1989) evaluated consequences of multiple concurrent stressors on young chickens using hematological parameters; however, little work has been performed on wild bird species. Lisano and Kennamer (1977) profiled eastern wild turkey (*Meleagris gallopavo silvestris*) blood parameters, but the study was descriptive and without induced treatment variables. Schulz et al. (2001) incorporated heterophil-lymphocyte (H:L) ratio as an indicator of stress in mourning doves (*Zenaida macoura*), but did not evaluate entire white blood cell (WBC) differentials or estimated count of WBC.

This study incorporates quantification of avian hematological parameters to establish physiological effects of invasive telemetry studies by evaluating 6 different transmitter attachments as treatment types and a control. The experimental design of this study has overcome limitations of the Schulz et al.

(2001) study– confinement of birds in limited space, a lack of hematological measurements on the effects of various treatments, and discrimination between sexes and age classes.

Haemoproteus susceptibility.-- *Haemoproteus* spp., an obligate blood protozoan parasite of birds, is transmitted by blood-sucking dipterans of the families Hippoboscidae and Ceratopogonidae (Springer 1997). Haemoproteids occur widely in avian populations, and have been well studied in Columbids, where first described in 1890 as *Haemoproteus columbae* Kruse (Bennett and Pierce 1990).

Currently, 7 species of *Haemoproteus* have been described from Columbids. However, some have questioned the validity of some of these species (Baker 1966). A taxonomic review of the *Haemoproteus* parasitemia by Bennett and Pierce proposed only *H. columbae* and *H. sacharovi* as legitimate species. Glass et al. (2002) found *H. columbae* and *H. sacharovi* prevalence in 76% and 16%, respectively, in a sample population of white-winged doves in Texas. *Haemoproteus* parasitemia, also known as "pigeon malaria," is not commonly associated with clinical signs in its hosts. According to Bennett et al. (1993) species of *Haemoproteus* are apparently relatively benign and most birds maintain subclinical signs of pathology. Tudor (1991) claimed the parasite has not been shown to cause any decrease in performance in racing pigeons; however, a diminished immunity in the avian host may predispose birds to abnormally heavy *Haemoproteus* spp. infections.

The purposes of this study were to investigate hematological effects of various radiotransmitter attachment protocols on captive, wild-caught, white-winged doves (*Zenaida asiatica*), specifically using hematological parameters and prevalence and susceptibility to the blood parasite *Haemoproteus* spp. Comparisons of doves are discriminated into age and gender classes, and overall effect of particular transmitter attachments. Blood characteristics were evaluated as an indicator of physiological stress, under captive conditions, over time using white blood cell parameters from peripheral blood samples.

METHODOLOGY

General study.-- Two hundred ten white-winged doves used in this study were wild-caught in Kingsville, Texas, using grain-laden, wire funnel live traps (Reeves et al. 1968). Captured birds were housed at facilities of Texas A&M University-Kingsville (TAMUK). All birds were acclimated at least 12 weeks during which time provisions included a commercially prepared pellet pigeon and dove feed (Layena Poultry feed, Purina Mills, Inc., St. Louis, Missouri, United States) and water *ad libitum*. If a bird failed to acclimate to captivity prior to the first sampling date, it was replaced with a newly captured dove. All white-winged doves were treated in accordance with guidelines and approval put forth by the United States Fish and Wildlife Service (USFW) permit # PRT-800477 and Texas state permit # SPR-0496-773.

Experimental design.-- The 210 wild-caught, white-winged doves were housed in 30 pens in 3 groups: males (9 pens), females (11 pens), and hatch-year (10 pens) in separate sets of 7 birds. Gender of adult doves was determined by discriminatory cloacal characteristics (Miller and Wagner 1955). All doves were

housed in outdoor pens measuring 1.83 m x 1.83 m x 1.83 m (6.11 m^3) and raised 0.67 m aboveground modeled after a design by Mirachi (1993). Alignment of pens consisted of 2 rows of 15 pens separated by a 1.9 cm plywood partition. Males, females, and hatch-years were segregated into pens containing 1 individual from each treatment and a control. Treatments included an external transmitter attached with cyanoacrylate glue, by double-loop body harness, surgical subcutaneous implant, surgical intracoelomic implant, subcutaneous surgery sham without implant, intracoelomic surgery without implant and a control.

Transmitters.-- The transmitters used for the various treatments consisted of nonfunctional "dummies" similar to Zenitsky's (1993) design. Because captive doves were used in the study, the option was a viable and economical choice. Both internal and external transmitter packages weighed less than 5.5 g. Implanted transmitters were obtained from Advanced Telemetry Systems (ATS, Insanti, Minnesota). Implant transmitters were sterilized prior to surgery by soaking in a 2% solution of chlorhexidine gluconate (Aspen Veterinary Resources, Kansas City, Missouri) for 10 min. All surgeries were conducted in a laboratory under sanitary protocol. A subsample of surgeries was timed to assess the efficiency of respective techniques by comparing time differences. A standard time of 3 min of 3.0% isoflourane delivery with an oxygen flow rate of 0.1 L/min was used to induce unconsciousness. The anesthesia time of 3 min

was standardized after a subsample of 10 birds exhibited unresponsiveness to touch or pain, yet maintained respiration and cardiac function. Following 3 min, isoflourane and oxygen rates were reduced to 2.5% and 0.8 L/min, respectively, for the duration of the surgery.

Subcutaneous transmitter implants (2.9 g) were dorsoventrally flattened design (25 mm x 12 mm x 6 mm) with 145 mm antenna with 0.5 mm diameter. After feather plucking and disinfection with isopropyl alcohol, implanted transmitters were inserted at base of cervical vertebra and mid-sagittal scapular area. An incision 2.5-4.0 cm longitudinally in dorsal area and an inclusion, made by blunt dissection along each side of the incision using metzambaum hemostats, provided space necessary for transmitter insertion. A 16-gauge, 3.5 cm needle inserted subcutaneously about 4.0 cm dorsocaudally from incision, and slightly lateral to vertebra and guided subcutaneously to the superior implant site established an opening for antenna to be channeled through a separate exit. The incision was closed using cyanoacrylate glue.

Capsule-shaped, intracoelomic transmitters were (3.7 g) 25 mm in length and 5 mm in diameter. Antennas were 150 mm in length and 0.5 mm in diameter. Feathers were plucked from a small triangular area between the superior end of the femur, the most caudal rib, and the vertebral column. Dorsoventral subcutaneous incisions 2.5-4.0 cm long were made to allow blunt dissection through skeletal muscle with hemostats into the abdominal cavity. Transmitters were placed into the coelomic cavity and a 16-gauge, 3.5 cm needle

inserted subcutaneously medial to the femur through the edge of the coelomic cavity into the incision area to allow exit of antenna. Incisions were sealed by cyanoacrylate glue.

Adhesive transmitters (3.5-3.8 g) were constructed using circular metal discs (8 mm diameter, 2 mm thickness) and fitted with 175 mm long, 0.5 mm diameter woven wire leads to simulate antennas. The disc was attached to an oval patch (Schulz 1998) about 40 mm in length with 25 mm width using epoxy resin compound (Titan Corporation, Lynwood, Washington). Feathers were clipped along the spinal feather tract from the dorso-lumbar region to a length of about 5 mm. After cleaning area with acetone, cyanoacrylate glue was applied and the transmitter secured for about 1 min until the glue adhered.

The backpack harness transmitters (3.5-3.8 g) were constructed from cylindrical wood dowels (5 mm diameter, 25 mm length) and sections of cotton coated rubber elastic bands as harnesses with 175 mm length, 0.5 mm diameter antennas. Harnesses fitted over the head and tail of a bird with transmitters resting on the back to prevent wing movement restriction.

The surgical sham procedures followed the specific protocol designated by subcutaneous and intracoelomic implantations, without deposition of the transmitter or antenna.

Blood collection.-- Blood was collected from the medial metatarsal vein using a 25-gauge needle and 1 cc syringe. Blood film smears were prepared on microscope

slides, using heparinized microhematocrit tubes (Fisher Scientific, Pittsburgh, Pennsylvania) for transfer, by the push method protocol (Campbell 1988, Hawkey and Dennett 1989, Jain 1993). For each sampling date, duplicate slides were made for each dove. Blood samples consisted of 6 collections: 1 pretreatment, and 5 post-treatment collections. Pretreatment sampling was performed on 18-19 August 1998 and post-treatment samples on 30-31 August, 8-9 September, 8-9 October, 29-30 October, and 19-20 November 1998. All blood samples drawn for specific collection periods were executed on all birds within 48 h for a proficient and temporally discrete WBC profile for all birds. Blood samples were affixed to slides immediately after being drawn and allowed to air dry. Blood samples were fixed with 95% methanol before staining with modified Wright-Giemsa, rinsed with buffer, then distilled water and air-dried. Staining of blood smears was accomplished with an Ames Hematek Slide Stainer (Miles Laboratory, Ames Division, Elkhart, Indiana). Stain solution consisted of 0.72% w/v polychrome methylene blue-eosin; 99.28% v/v methanol. Buffer contained 0.11% w/v KPO_4; 0.07% w/v $NaPO_4$; 7.5% methanol; 92.32% nonreactive ingredients and preservative. This modified Wright-Giemsa reagent system consisted of polychrome methylene blue-eosin stain based on the original stain proposed by Romanowsky (1891). Variations of these reagents are extensively tailored by other researchers for use in identification and quantification of vertebrate hematology and diagnostic parasitology (Kass 1990).

Blood analysis.-- Absolute WBC counts were performed with the mean value of 5 random fields of view (FOV). The FOV mean of WBC counts was multiplied by a correction factor of 2000 to calculate a total WBC for each sample for each sampling date for every bird. The fields of view and differential counts were performed on a Nikon E400 Eclipse light microscope at 500x using standard immersion oil with confirmation of similar granulocytes executed at 1000x oil immersion. I used Campbell (1988) and Hawkey and Dennett (1989) as guidelines in the recognition of blood cell morphology for WBC differentials with light microscopy. Differentials were accrued concurrently until a count of 100 WBC had been reached and a percentage recorded for all types of WBC. These included granulocytes (heterophils, eosinophils, and basophils), and agranulocytes (lymphocytes and monoytes).

Intraerythrocytic presence of *Haemoproteus* spp. was recorded for each sample to assess susceptibility of doves for the parasite after treatment effects in confined space. The infections were recognized by the characteristic gametocyte development in circulating erythrocytes and presence of pigment granules in infected erythrocytes. The identification of the parasite was facilitated by a modified Wright-Giemsa stain and performed simultaneously with the WBC count and differential. If, after the completion of the hematological profiles, a parasitemia was not determined in the 5 FOV, then the slide was randomly scanned at 500x oil immersion for 5 min for evidence of *Haemoproteus* spp. infection. Prevalence was graded as absence, low (at least 1

gametocyte per 5 FOV, but not more than 2 gametocytes for every FOV), and high (three or more gametocytes for all FOV).

Data analysis.-- Statistical analysis of hematological values were evaluated and performed by MANOVA and a mixed model factorial repeated measures ANOVA on the dependent variables: WBC count, WBC differential, and H:L ratios. The use of randomized block MANOVA is a widely used and suggested method for handling multiple dependent variables in an experimental design (Seal 1964, Cooley and Lohnes 1971, Digby and Kempton 1987, Southwood and Henderson 2000). A posteriori comparisons were performed using Bonferroni post-hoc criteria (Zar 1988). A contingency analysis was used to determine any increase in susceptibility to *Haemoproteus* spp. in response to treatment variables by comparing prevalence of the parasite in individual birds over time.

RESULTS

The objective of this study was to examine the effects of various transmitter placements on the hematological profile of white-winged doves. Multivariate Analysis of Variance (MANOVA) revealed significant differences among pens for the dependent variables (Table 1) in this experiment (Wilk's Lambda = 0.64, $P < .05$). Univariate tests revealed significant differences among pens for WBC counts ($F_{20, 694} = 7.9$, $P < .05$), heterophil counts ($F_{20, 694} = 1.9$, $P < .05$), basophil counts ($F_{20, 694} = 2.2$, $P < .05$), and monocyte counts ($F_{20, 694} = 1.7$, $P < .05$). These differences among pens justified the use of pen as a blocking variable for examining differences among the 6 treatments and a control. Using pen as a blocking variable because pens were nested within gender, a randomized block MANOVA revealed no significant differences among 6 treatments and a control (Wilk's Lambda = 0.96, $P > .05$) (Table 2).

Repeated Measures Analysis of Variance revealed significant trial-to-trial differences (Table 3) for total WBC counts ($F_{5,220} = 18.0$, $P < .05$), heterophil counts ($F_{5,115} = 5.2$, $P < .05$), lymphocyte counts ($F_{5,115} = 3.3$, $P < .05$), heterophil-lymphocyte

ratio ($F_{5,220}$ = 5.0, P <.05: Fig. 2), eosinophil counts ($F_{5,220}$ = 4.8, P <.05), and monocyte counts ($F_{5,220}$ = 14.6, P <.05).

No significant differences in treatments across trials occurred for any of the variables: total WBC counts ($F_{30,220}$ = 1.0, P >.05), heterophil counts ($F_{30,115}$ = 0.5, P >.05), lymphocyte counts ($F_{30,115}$ = 0.3, P >.05), basophil counts ($F_{30,220}$ = 1.0, P >.05), eosinophil counts ($F_{30,220}$ = 0.6, P >.05), monocyte counts ($F_{5,220}$ = 0.8, P >.05), and heterophil: lymphocyte ratio ($F_{30,220}$ = 1.9, P >.05: Table 11). Though statistically non-significant, the greatest increase of WBC across all treatments from pretreatment to 5th post-treatment was manifested by intracoelomic surgical implantation (Fig. 1).

All post-hoc tests were conducted by adjusting the experiment wise alpha level according to the Bonferroni criteria. Post-hoc pairwise comparison revealed significant increases in total WBC counts for all white-winged doves across all treatments from the pre-treatment trial to the first (t_{106} = -5.6, P <.003), second (t_{118} = -8.0, P <.003), and third (t_{131} = -7.1, P <.003) post-treatment trials. The fourth (t_{86} = 3.8, P <.003), and fifth (t_{116} = 8.9, P <.003) post-treatment trials were significantly lower than the second post-treatment trial.

Post-hoc pairwise comparison tests showed significant decreases in heterophil counts from the pre-treatment trial to the first (t_{106}=4.7, P <.003), second (t_{118} = 3.6, P <.003), third (t_{92} = 4.5, P <.003), and fourth (t_{107} = 3.9, P <.003) post-treatment trials. A significant increase in heterophil count occurred

between the first and second post-treatment trials (t_{90}= -3.7, P <.003), while a significant decrease in heterophil count occurred between the second and third post-treatment trials (t_{72}= 4.2, P <.003). The fifth post-treatment trial was significantly greater than the third post-treatment trial (t_{90}= -4.3, P <.003).

Post-hoc pairwise comparison tests indicated a significant increase in lymphocyte counts from the pre-treatment trial to the first post-treatment trial (t_{106}= -5.2, P <.003). There was a significant decrease in lymphocyte count between the first and second post-treatment trials (t_{90}= 3.7, P <.003), and a significant increase in lymphocyte count between the second and third post-treatment trials (t_{72}= -3.5, P <.003). Although the third and fourth post-treatment trials did not significantly differ (t_{66}= 0.4, P >.003), the fifth post-treatment trial was significantly less than the third post-treatment trial (t_{90}= 3.2, P <.003).

Post-hoc pairwise comparison tests revealed a significant decrease in eosinophil counts from the pre-treatment trial to the fourth post-treatment trial (t_{107}= 3.1, P <.003). The first (t_{106}= -2.2, P >.003), second (t_{118}= 1.5, P >.003), and third (t_{131}= -0.9, P >.003) post-treatment trials did not significantly differ from the pre-treatment trial. The eosinophil count decreased between the first and second post-treatment trials (t_{90}= 3.7, P <.003), and the fourth post-treatment trials (t_{101}= 3.5, P <.003). The second and third post-treatment trials did not significantly differ (t_{107}= -1.4, P >.003). The fifth post-treatment trial was significantly greater than the fourth post-treatment trial (t_{113}= -3.3, P <.003).

Post-hoc pairwise comparison tests indicated a significant increase in monocyte counts from the pre-treatment trial to the first post-treatment trial (t_{106} = -3.9, P <.003) and a significant decrease in monocyte count between the first and second post-treatment trials (t_{90} = 3.5, P <.003) and a significant increase in monocyte count from the second to the third post-treatment trials (t_{107} = -3.6, P <.003). The third and fourth post-treatment trials did not significantly differ (t_{101} = 0.7, P >.003); however, the fifth post-treatment trial was significantly less than the pre-treatment (t_{140} = 5.4, P <.003), as well as the first (t_{106} = 7.8, P <.003), second (t_{116} = 7.1, P <.003), third (t_{129} = 12.1, P <.003), and fourth (t_{113} = 11.6, P <.003) post-treatment.

MANOVA also showed significant differences among gender for the dependent variables (Wilk's Lambda = 0.82, P <.05; Table 4). Univariate tests revealed significant gender differences for total WBC counts ($F_{2,698}$ = 48.3, P <.05) and basophil counts ($F_{2,698}$ = 14.3, P <.05). Scheffe post-hoc tests revealed that adult female white-winged doves had significantly higher total WBC counts than either adult males (P <.05) or hatch-year birds (P <.05). Scheffe post-hoc tests also indicated that hatch-year birds had significantly higher basophil counts than either adult males (P <.05) or adult females (P <.05).

Means and standard errors of male and female dove across trials of the 6 radiotransmitter treatment variables were recorded and analyzed (Tables 5-10). Repeated Measures Analysis of Variance revealed significant gender differences

across trials for WBC counts ($F_{5,220}$ = 2.4, P <.05), lymphocyte count ($F_{5,220}$ = 5.7, P <.05), and eosinophil count ($F_{5,220}$ = 2.4, P <.05). No gender by treatment interaction for any variable occurred during pretreatment to 5th post-treatment sampling ($F_{20, 694}$ = .65, P >.05). No significant gender differences across samplings occurred for heterophil counts ($F_{5,220}$ = 1.0, P >.05), lymphocyte ($F_{5,220}$ = 1.1, P >.05), or monocyte counts ($F_{5,220}$ = 2.0, P >.05).

For the pre-treatment trial, female white-winged doves had an average WBC count 2,744.7 mm^3 higher than males (Fig. 3). The difference increased to 7,025.0 mm^3 for the first post-treatment trial and 9,116.3 mm^3 for the second post-treatment trial. The third (5,995.2 mm^3) and fifth (5,197.1 mm^3) post-treatment trial gender differences were also substantially greater than gender difference for the pre-treatment trial. The fourth post-treatment trial gender difference (2,006.7 mm^3) was the only post-treatment trial with gender difference similar to the gender difference for the pre-treatment trial. For the pre-treatment trial, females had an average eosinophil count 2.029 higher than males; however, for the first, second, third, and fifth post-treatment trials, males had an average eosinophil count higher than females by averages of -2.623%, -0.389%, -1.534%, and 0.644%, respectively. The fourth post-treatment trial gender difference (1.05) is the only post-treatment trial gender difference similar to the gender difference for the pre-treatment trial, in which females had a higher eosinophil count than males.

A contingency analysis comparing presence and prevalence of the *Haemoproteus* spp. blood parasite across 6 radiotransmitter treatments and control for each of the 6 trials showed no significant difference. Chi Square values revealed no relationship between presence of *Haemoproteus* spp. and 6 radio-transmitter treatments and a control during pre-treatment trial and first post-treatment trial ($\chi^2 = 6.29$, $P > .05$), second post-treatment trial ($\chi^2 = 5.59$, $P > .05$), third post-treatment trial ($\chi^2 = 2.01$, $P > .05$), fourth post-treatment trial ($\chi^2 = 6.70$, $P > .05$), or fifth post-treatment trial ($\chi^2 = 6.87$, $P > .05$).

DISCUSSION

This study is the first quantification of physiological stress resulting from radiotransmitter attachment by the use of hematological values in white-winged doves. Schulz et al. (1998, 2001) used heterophil-lymphocyte ratios in their assessment of stress induced by transmitter attachments in mourning doves, but they did not correlate stress with a total WBC count and complete WBC differentials in their analysis. The increase in total WBC count across samplings for all treatments and across gender and age groups is not accounted for. During migration increased likelihood of encountering pathogens uninitiated to the avian immune system may suggest elevation of total WBC count as an adaptive response to migration in this sample population of white-winged dove. A weakness to virulent pathogens associated with strenuous long-range migratory movements may be plausible. Nothing located within the scientific literature suggests this WBC elevation during migration. Pending further studies, I hypothesize that increase in WBC counts during the fall season is a genetically controlled phenomenon associated with migration. Prolonged periods of strenuous physical activity have been shown to induce a weakening of vertebrate

immune systems (Williams and Thorne 1996, Sayers et al. 1999), lymphocyte proliferation (Nesse et al. 2002), and specifically in birds: energy costs (Lasiewski 1962, Kendeigh 1970) and muscle damage during migration (Guglielmo et al. 2001). Consequently, I suggest that birds undergo a time correlated increase in WBC as an adaptive preventative response to potential pathological effects associated with high-energy expenditure required during migratory exertion.

Statistical Analysis.-- Multivariate Analysis of Variance revealed significant differences among pens for WBC counts, heterophil counts, basophil counts and monocyte counts. Difference among pens might be attributed to the categorical segregation of gender and age. This assumption is based on the inconclusive findings of the Multivariate Analysis of Covariance with means of individual pens as a blocking variable.

Repeated Measures ANOVA showed significant differences across sampling dates for all treatments, for both gender and age for WBC count, lymphocyte differentials (Table 12), heterophil differentials (Table 13), eosinophil and monocyte counts and heterophil:lymphocyte ratios (Table 11). However, significant differences between treatments did not exist although counts of total WBC and heterophil means for surgical sham and surgical implantation remained elevated for all such treatments through the 3rd post-treatment sampling period.

A significant increase in heterophil count occurred between the first and second post-treatment trials, but a significant decrease occurred by the third trial, with a subsequent significant increase by the fifth trial. This fluctuation did not occur with lymphocyte counts. There was a significant increase between the first and second post-treatment trials and a significant decline between the third and fifth post-treatments. This suggests that in a controlled captivity scenario, increased WBC count, heterophil and lymphocyte percentages indicated physiological stress in all white-winged doves across treatments, and gender and age class from 20 August through 9 October. Values of lymphocyte differential were more indicative of absolute WBC count than either heterophil or heterophil-lymphocyte ratio. Furthermore, decreases in WBC types occurred for all genders and age class, regardless of transmitter attachment technique by 20 November.

Blood Analysis.-- The elevation of total WBC count may suggest a response to attachment technique, but not necessarily blood collection. Using observations of the same individual, Piersma et al. (2000) demonstrated an initial decline in WBC percentage. In their study a biweekly extraction of 30% of blood volume did not negatively affect either body mass or plumage. Variability between WBC types and fluctuations were not unique to total WBC count. Eosinopenia, in sampling trials, in concert with monocytopenia may suggest a stress-mediated response (Jain 1993). Mechanisms of induced eosinopenia may include

sequestering of monocytes but stress induced corticosteroid or catchecolamine release needs to be established (Jain 1993). Eosinophilia was consistent with parasitism, but increases were followed by decreased counts and monocytopenia; this juxtaposition of values leads to uncertain conclusions. Basophilia in hatch-year birds was significantly different from adult birds. Tissue necrosis, chlamydia, respiratory disease, haemolytic anemia or parasitism has been loosely associated with increased basophilic counts (Rosskopf et al. 1982, Campbell 1988, Hawkey and Dennett 1989, Jain 1993, Seigel 1995). In maturing turkeys, chickens, and ducks, basophilia may result after severely stressing birds (Maxwell et al. 1992). The low percentage of basophils in the differential and smaller sample size in hatch-year doves does not warrant any claims of severe stress in the present study but could be accounted for by larger subsamples of differential counts to specifically address basophils and stressors similar to studies by McFarlane and Curtis (1989) and McFarlane et al. (1989).

Female white-winged doves had significantly greater values for total WBC, heterophils, and lymphocytes than male doves (Fig. 3). This trend was consistent for WBC and lymphocytes in hatch-year doves; however, heterophil counts for hatching-year doves was more than double the mean count for mature female doves (Table 4). These findings are contrary with Campo and Davila (2002), who showed male birds had significantly greater heterophil to lymphocyte ratios than females in adult chickens, and the description by Maxwell et al. (1992) of heterophilia among various avian juveniles of

agriculturally important avian species. The housing of females for extended periods after the reproductive season may have intrinsic consequences on their WBC differentials. Significant variations for WBC ratio were observed in both sexes, which could be related to onset of sexual maturity or reduction in seasonal reproductive potentiality in response to migratory cues (Blyumental 1973, Baker 1978, Aidley 1981). In females, effect of age was also significant on heterophil and lymphocyte numbers (Campo and Davila 2002). Zaias et al. (2000) described similar hematological values between male and female, adult and juvenile, and captive and wild-caught brown pelicans (*Pelecanus occidentalis*). High degrees of variability between studies tends to suggest that hematological findings have relevance, which are only conspecific, or at best confamilial. Hematological profiles studies described by Rosskopf and Woerpel (1982), Rosskopf et al. (1982), and Speer (1995) included many economically important pet birds and showed significant differences between species, individuals (Rosskopf and Woerpel 1981), age, gender, captivity and distance traveled (Speer 1995). These characteristics combined with temporal variability- spatially and within species- specify that contingencies of all captive and field studies should include blood parameters to eliminate rival hypotheses. Additional studies should encourage age, gender, reproductive status, feeding habits, and captivity as important variables for physiologic assessment in any avian species.

Haemoproteus.-- Parasitemia prevalence of *Haemoproteus* spp had no relationship based on treatment type or transmitter attachment and the control. Because of captive conditions and confinement with infected birds, it would logically predispose uninfected individuals as susceptible reservoirs with physiological compromising treatments. This relationship was not detected and circumstances described in the results suggest a reservoir host that remains at relative static infection prevalence at the population level and subclinical manifestations of pathological cost of *Haemoproteus* spp. to the organism.

Many authors agree that this parasitemia is not commonly associated with clinical signs in its hosts (Bennett et al 1993), is seasonally abundant (Earlé et al 1991), timed with breeding season (Weatherhead and Bennett 1991, Hatchwell et al. 2000), and not always determined accurately via peripheral blood smears (Jarvi et al. 2001). *Haemoproteus columbae* is a cosmopolitan parasite of rock doves (Ailor 1972) and the most prevalent species of parasitemia found in white-winged doves (Stabler 1961; Glass et al 2002) and its conspecific, the mourning dove (Shamis and Forrester 1977). Huff (1932) first described the transmission of *Haemoproteus columbae* and implicated Hippoboscidae in *Zenaida macoura*. Shamis and Forrester (1977) described prevalence levels up to, and greater than, 90% in localized mourning dove populations, which are not unusual for infected individuals. Conversely, a depauperate presence of the parasitemia occurring in a different geographic area was described as well (Kinsley and Herman 1967), creating a mosaic scenario. Stabler's survey (1961) detected 100% pervasiveness

in his sample of 51 white-winged doves. Glass et al (2002) found infection rates of *H. columbae* at 76% and *H. sacharovi* at 16% in a study of white-winged dove samples from throughout Texas. However, Bennett et al. (1993) and Earlé et al. (1991) describe collection time, site, method, time of year, age of bird, and reproduction costs as confounding variables leading to no detection and false negatives. Although chronic effects to host birds may not be fully understood, no literature describes morbidity associated with columbids and this parasitemia. The reasons for varying intensity are unknown, but behavior or some physiological condition intrinsic to host species may affect susceptibility. My results did not demonstrate an increased susceptibility because of transmitter treatments in captivity over time for white-winged doves.

Expected Benefits and Management Implications.-- The value of quantifying clinical effects of transmitter attachments cannot be underestimated. Transmitter loads have been shown to cause a decrease in flight performance and metabolic compromise in homing pigeons (Gessaman and Nagy 1988, Gessaman et al. 1991). The importance of collecting data on subjects with reduced, or innocuous physiological stress is an overlooked parameter of avian telemetry studies. Effects of transmitters have been measured on nesting birds (Klaassen et al. 1992, Houston and Greenwood 1993, Pietz et al 1993, Rotella et al. 1993) behavior (Perry et al. 1981, Paton et al. 1991, Olsen et al. 1992a, Olsen et al. 1992b, Vaughn and Morgan 1992), behavior with surgical implants (Klugman and Fuller 1990),

and parenting capability (Wanless 1992). However, these researchers measured effects indirectly and thus, confounding variables and rival hypotheses tainted their design. The data collected in this study should aid in justifying an appropriate, less invasive method for transmitter surgeries in the field or laboratory.

A cost-effective, noninvasive technique for radio telemetry monitoring of the white-winged doves would provide improved data collection and galvanize management decisions. The migratory aspects and abundant urbanization of the breeding population distribution, game importance, and mosaic of life histories qualify this bird as a candidate for continued telemetry studies (Small et al. 1989; George et al. 1994).

Observations of *Haemoproteus* spp. susceptibility addressed a specific question of transmissibility and could provide meaningful information on the parasite's impact as a reservoir. The impact of white-winged doves on the urban environment, nutritional and nesting requirements, wintering ecology of nonmigratory birds, impact on conspecifics and estimates of recruitment and survival are all questions that need to be answered and ameliorated by information gathered in this study.

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Table 1.- Statistical profile for hematological absolute white blood cell differential for captive white-winged dove by pen with various radiotransmitter attachments during 20 August 1998 through 20 November 1998 at Texas A&M University-Kingsville in Kingsville, Texas.

	Total White Blood Cell Count		Heterophils		Lymphocytes		Basophils		Eosinophils		Monocytes	
Pens	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
1	13288.9	1003.8	3813.3	546.5	7718.1	762.3	324.9	52.86	626.4	183.92	392.2	70.95
2	12433.3	942.2	3397.9	392.4	7463.8	609.8	271.4	55.68	649.0	118.89	368.8	70.45
3	13990.5	684.5	3091.9	248.9	9766.9	590.4	349.6	40.87	526.5	141.85	521.3	71.84
4	12581.0	914.8	3607.0	283.3	7816.1	660.1	346.5	59.25	494.9	104.11	389.0	52.52
5	15062.9	1127.9	3909.7	349.7	10573.9	907.8	339.7	56.82	311.9	78.28	349.1	72.72
6	13641.0	964.2	3683.1	451.4	8781.3	671.9	361.9	67.53	560.7	80.67	351.2	62.57
7	13314.3	1341.9	3849.7	667.7	8033.7	574.1	370.4	64.05	578.1	112.13	238.7	57.95
8	11062.9	843.4	3443.8	349.4	6655.7	614.3	277.6	54.30	309.1	86.84	286.6	75.12
9	15775.6	1131.6	4593.6	443.8	10036.5	881.4	445.0	55.81	453.7	65.06	233.2	39.31
10	19790.5	1342.1	4771.2	437.3	13372.9	991.6	374.6	52.50	482.1	82.23	495.0	97.96
11	23381.0	1585.5	6764.0	802.1	14421.1	909.8	445.4	74.87	681.8	125.68	667.7	131.42
12	18607.4	1485.9	5057.6	675.2	12077.9	1012.5	418.7	73.41	405.3	69.42	397.6	86.41
13	19379.3	1480.1	5363.9	586.5	12510.2	1221.0	427.5	76.10	593.8	81.62	317.2	64.53
14	20258.1	1320.2	5055.6	683.1	13803.0	969.2	343.2	76.58	620.5	98.65	436.9	106.92
15	18675.9	1398.5	4016.9	355.8	13179.9	1105.1	291.2	59.08	738.1	139.82	396.8	69.91
16	18328.6	1340.6	5226.1	806.8	12021.0	832.0	374.1	87.61	655.9	116.67	419.6	73.41
17	16844.4	1269.9	4680.1	595.1	11121.2	872.7	393.0	77.77	439.7	62.51	395.7	67.97
18	21685.0	2034.2	8181.4	1918.4	12380.4	885.8	484.4	64.13	748.9	164.12	496.0	93.66
19	21842.1	1720.2	7192.1	1315.8	13078.3	1212.3	365.8	58.02	702.4	104.92	601.9	91.70
20	13353.9	708.5	4284.1	554.1	7964.9	556.1	336.3	49.85	495.6	87.94	415.7	75.15
21	13463.4	1046.2	4825.7	653.5	7763.2	728.5	499.6	62.29	341.6	59.75	333.3	55.47
Total:	16027.3	284.4	4584.0	147.2	10141.5	190.8	362.1	12.90	536.6	22.26	378.4	16.47

Table 2.- Statistical profile for hematological absolute white blood cell differential for captive white-winged dove by treatment with various radiotransmitter attachments during 20 August 1998 through 20 November 1998 at Texas A&M University-Kingsville in Kingsville, Texas.

	WBC		Heterophils		Lymphocytes		Basophils		Eosinophils		Monocytes	
Treatment	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Control	16699.1	727.29	4476.6	289.70	10794.4	509.81	357.3	34.79	531.4	54.33	389.2	41.34
Subcutaneous Implant	17173.3	818.37	4514.2	335.50	11175.7	602.04	400.2	40.09	516.5	54.18	457.9	54.75
Harness	17052.4	1012.2	4885.2	652.78	10747.0	585.86	400.4	40.50	653.2	82.31	443.1	59.32
Intracoelomic Implant	16761.9	843.88	4913.7	536.37	10628.4	532.43	409.1	39.48	487.0	51.81	407.4	42.54
Subcutaneous Surgery	15215.7	734.50	4376.8	370.71	9402.2	491.01	351.1	35.28	558.9	77.11	393.1	45.34
Acrylate	16620.2	738.00	4674.0	316.07	10615.6	538.14	346.8	36.23	565.5	62.49	399.6	44.45
Intracoelomic Surgery	16987.0	940.51	4865.2	450.59	10853.7	618.52	308.2	32.09	553.9	72.23	401.2	50.28
Total	16027.3	284.39	4584.0	147.16	10141.5	190.84	362.1	12.90	536.6	22.26	378.4	16.47

Table 3.- Statistical profile for hematological absolute white blood cell differential for captive white-winged dove with various radiotransmitter attachments grouped by sampling dates inclusive from 20 August 1998 through 20 November 1998 at Texas A&M University-Kingsville in Kingsville, Texas.

	WBC		Hetrophils		Lymphocytes		Basophils		Eosinophils		Monocytes	
Sampling	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Pretreatment	13035.4	554.94	5235.0	435.88	6709.8	270.72	3.30	.26	3.22	.31	252.4	24.70
1st Post	18692.6	778.06	4173.9	363.69	12694.6	499.96	2.56	.25	4.62	.42	602.4	54.50
2nd Post	20593.3	789.80	6204.1	396.14	12943.4	496.17	2.36	.17	2.53	.24	491.1	52.50
3rd Post	18508.3	640.63	4100.0	229.55	12471.0	457.74	2.05	.16	3.70	.33	570.0	38.45
4th Post	15718.3	865.34	4512.1	507.18	10000.2	528.67	2.29	.20	2.22	.22	532.9	49.04
5th Post	12643.1	438.46	3640.0	164.88	8175.5	335.77	2.28	.17	4.01	.30	72.4	11.03

Table 4.- Statistical profile for hematological absolute white blood cell differential for captive white-winged dove with various radiotransmitter attachments grouped by gender and age from 8 August 1998 through 20 November 1998 at Texas A&M University-Kingsville in Kingsville, Texas.

	Male		Female		Hatch-year		Total	
Variable	Mean	SE	Mean	SE	Mean	SE	Mean	SE
WBC	13498.8	339.29	19383.2	467.00	13463.4	1046.2	16027.3	284.39
Heterophils	3709.2	139.75	5567.9	284.43	4825.7	653.47	4583.9	147.16
Lymphocytes	8595.6	243.36	12352.0	302.93	7763.2	728.46	10141.5	190.84
Basophils	345.5	19.01	389.1	20.44	499.6	62.29	362.1	12.90
Eosinophils	498.8	36.56	598.0	33.44	341.6	59.75	536.6	22.26
Monocytes	349.3	21.60	469.1	28.43	333.3	55.47	378.4	16.47
Heterophil/Lymphocyte	0.53	0.02	0.69	0.12	1.16	0.32	0.64	0.32

Table 5.- Statistical profile for absolute white blood cell count for captive white-winged dove with various radiotransmitter attachments grouped by gender, age and sampling periods inclusive from 20 August 1998 through 20 November 1998 at Texas A&M University-Kingsville in Kingsville, Texas.

	Male		Female		Hatch-year		Total	
Sampling	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Pretreatment	11269.8	585.58	14392.1	887.75	14857.1	3074.2	13035.4	554.94
1st Post	15508.3	832.01	22515.4	1204.0	12914.3	1373.8	18692.6	778.06
2nd Post	15681.6	846.84	24293.8	1106.7	21142.9	2298.5	20593.3	789.80
3rd Post	15360.0	787.94	21903.0	856.00	12800.0	3226.6	18508.3	640.63
4th Post	13592.2	1001.9	19232.0	1560.11	10685.7	1406.7	15718.3	865.34
5th Post	10557.4	706.89	15868.5	864.10	8285.7	826.76	12643.1	438.46

Table 6.- Statistical profile for absolute heterophil cell count for captive white-winged dove with various radiotransmitter attachments grouped by gender, age and sampling periods inclusive from 20 August 1998 through 20 November 1998 at Texas A&M University-Kingsville in Kingsville, Texas.

	Male		Female		Hatch-year		Total	
Sampling	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Pretreatment	3553.9	327.54	6233.3	732.76	9481.7	2277.9	5235.0	435.88
1st Post	2991.3	371.55	5450.2	628.44	2888.0	376.10	4171.9	363.69
2nd Post	23.39	3.28	16.36	2.01	12.64	2.34	6204.1	396.14
3rd Post	3686.5	268.89	4754.6	393.29			4100.0	229.55
4th Post	3504.8	250.25	5652.2	1117.29	3619.4	698.99	4512.1	507.18
5th Post	3575.5	336.13	3901.4	314.62	2424.6	505.38	3640.0	164.88

Table 7.- Statistical profile for absolute lymphocyte cell count for captive white-winged dove with various radiotransmitter attachments grouped by gender, age and sampling periods inclusive from 20 August 1998 through 20 November 1998 at Texas A&M University-Kingsville in Kingsville, Texas.

	Male		Female		Hatch-year		Total	
Sampling	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Pretreatment	6666.0	347.25	7052.4	406.10	4078.9	1387.18	6709.8	270.72
1st Post	10862.5	593.03	15003.5	740.6	9013.7	1262.92	12694.6	499.96
2nd Post	9541.8	592.40	15497.1	629.63	13406.3	1587.67	12943.4	496.17
3rd Post	10013.7	516.04	15049.1	626.30	9122.0	2435.38	12471.0	457.74
4th Post	9070.4	806.46	12100.1	772.20	6078.9	715.15	10000.2	528.67
5th Post	6253.5	474.84	10957.6	674.39	5073.7	400.18	8175.5	335.77

Table 8.- Statistical profile for absolute basophil cell count for captive white-winged dove with various radiotransmitter attachments grouped by gender, age and sampling periods inclusive from 8 August 1998 through 20 November 1998 at Texas A&M University-Kingsville in Kingsville, Texas.

	Male		Female		Hatch-year		Total	
Sampling	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Pretreatment	420.4	47.17	347.5	48.83	609.7	103.66	394.6	33.07
1st Post	317.3	48.05	528.3	66.24	401.1	157.66	429.9	40.81
2nd Post	432.6	49.73	419.3	40.61	694.9	224.57	440.8	32.49
3rd Post	334.3	40.12	425.1	52.81	268.67	79.99	376.5	32.19
4th Post	289.3	52.60	409.0	56.27	474.3	147.72	342.8	35.61
5th Post	278.5	40.58	260.6	34.80	516.0	146.03	258.1	20.51

Table 9.- Statistical profile for absolute eosinophil cell count for captive white-winged dove with various radiotransmitter attachments grouped by gender, age and sampling periods inclusive from 20 August 1998 through 20 November 1998 at Texas A&M University-Kingsville in Kingsville, Texas.

	Male		Female		Hatch-year		Total	
Sampling	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Pretreatment	366.1	79.99	498.3	86.15	587.4	176.08	443.7	56.87
1st Post	889.8	119.50	841.2	100.59	142.9	81.74	830.5	74.89
2nd Post	404.2	70.61	585.3	79.17	629.7	219.28	513.9	52.94
3rd Post	749.5	106.76	604.8	72.49	316.0	61.51	660.4	60.64
4th Post	222.4	37.98	456.6	69.10	141.7	78.48	330.2	37.51
5th Post	388.8	67.45	630.69	73.42	228.0	73.26	497.1	39.11

Table 10.- Statistical profile for absolute monocyte cell count for captive white-winged dove with various radiotransmitter attachments grouped by gender, age and sampling periods inclusive from 20 August 1998 through 20 November 1998 at Texas A&M University-Kingsville in Kingsville, Texas.

	Male		Female		Hatch-year		Total	
Sampling	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Pretreatment	263.4	37.60	260.6	34.82	99.43	99.43	252.4	24.70
1st Post	447.4	69.96	772.5	86.71	468.6	89.59	602.4	54.50
2nd Post	285.2	41.55	626.2	87.41	697.1	150.78	491.1	52.50
3rd Post	573.2	51.98	596.0	60.05	317.3	106.01	570.0	38.45
4th Post	505.3	62.18	614.2	89.47	371.4	148.90	532.9	49.04
5th Post	61.5	14.61	118.2	25.79	43.4	28.25	72.4	11.03

Table 11.- Hetrophil-lymphocyte ratio means for captive white-winged dove with various radiotransmitter attachments grouped by gender, treatment and sampling periods inclusive from 20 August 1998 through 20 November 1998 at Texas A&M University-Kingsville in Kingsville, Texas.

	Male						Female					
	Sampling Period						Sampling Period					
Treatment	Pre	1st Post	2nd Post	3rd Post	4th Post	5th Post	Pre	1st Post	2nd Post	3rd Post	4th Post	5th Post
Control	0.843	0.256	0.596	0.501	0.345	0.667	0.593	0.155	0.289	0.385	0.319	0.416
Subcutaneous Implant	0.774	0.250	0.377	0.350	0.298	0.838	0.769	0.599	0.458	0.311	0.293	0.365
Harness	0.534	0.208	0.842	0.312	0.314	0.760	0.175	0.122	0.452	0.148	0.140	0.477
Intracoelomic Implant	0.399	0.206	0.649	0.405	0.513	0.753	0.395	0.215	0.391	0.295	0.628	0.441
Subcutaneous Surgery	0.362	0.576	0.534	0.442	0.585	0.765	0.870	0.116	0.415	0.229	0.464	0.243
Acrylate	0.445	0.320	0.460	0.246	0.488	0.582	0.482	0.667	0.379	0.291	0.310	0.426
Intracoelomic Surgery	0.793	0.193	0.388	0.489	0.418	0.632	0.682	0.442	0.871	0.374	0.644	0.415

Table 12.- Lymphocyte differential means for captive white-winged dove with various radiotransmitter attachments grouped by treatment and sampling periods inclusive from 20 August 1998 through 20 November 1998 at Texas A&M University-Kingsville in Kingsville, Texas.

	Sampling Period											
	Pre		1st Post		2nd Post		3rd Post		4th Post		5th Post	
Treatment	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Control	52.000	5.85	69.636	3.89	67.727	3.47	63.636	3.32	67.364	3.63	65.273	3.43
Subcutaneous Implant	47.667	5.09	68.333	11.60	63.444	4.05	73.333	3.50	66.556	3.32	53.667	7.67
Harness	60.000	3.80	73.667	3.84	57.444	5.42	65.778	3.70	68.444	5.36	56.667	3.45
Intracoelomic Implant	61.500	4.69	67.125	4.81	66.625	5.07	67.500	3.33	63.125	3.85	62.000	4.14
Subcutaneous Surgery	50.500	6.73	69.375	4.42	60.875	2.142	65.500	4.02	62.000	2.25	63.625	4.77
Acrylate	53.375	6.70	64.125	4.73	67.875	2.49	70.125	3.56	69.250	3.93	64.000	3.00
Intracoelomic Surgery	58.400	4.96	65.200	6.18	64.800	7.83	69.000	3.69	58.400	4.12	68.000	5.45

Table 13.- Heterophil differential means for captive white-winged dove with various radiotransmitter attachments grouped by treatment and sampling periods inclusive from 20 August 1998 through 20 November 1998 at Texas A&M University-Kingsville in Kingsville, Texas.

	Sampling Period											
	Pre		1st Post		2nd Post		3rd Post		4th Post		5th Post	
Treatment	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Control	33.714	6.87	15.714	3.39	29.000	4.84	30.571	5.44	22.857	2.78	31.714	6.36
Subcutaneous Implant	36.333	6.33	21.500	4.91	24.167	4.82	23.000	4.13	20.167	2.71	34.167	5.91
Harness	28.167	4.25	13.500	2.00	36.000	6.95	17.000	4.31	18.667	4.51	36.167	5.10
Intracoelomic Implant	25.667	1.52	15.000	1.98	30.167	5.90	24.667	2.86	31.333	4.54	35.833	4.40
Subcutaneous Surgery	29.333	5.81	23.333	8.82	30.333	4.91	25.667	3.76	30.667	2.91	29.333	11.33
Acrylate	28.600	1.89	25.800	5.61	27.400	4.00	18.800	4.45	24.400	5.60	31.200	3.38
Intracoelomic Surgery	38.500	6.50	19.000	7.08	31.750	8.47	28.500	2.99	31.000	5.18	32.000	3.44

Figure 1.- Total white blood cell count (per mm³) for captive white-winged dove with various radiotransmitter attachments during 20 August 1998 through 20 November 1998 at Texas A&M University-Kingsville in Kingsville, Texas.

(Standard error bars represent post-hoc pairwise comparison using Bonferroni criteria.)

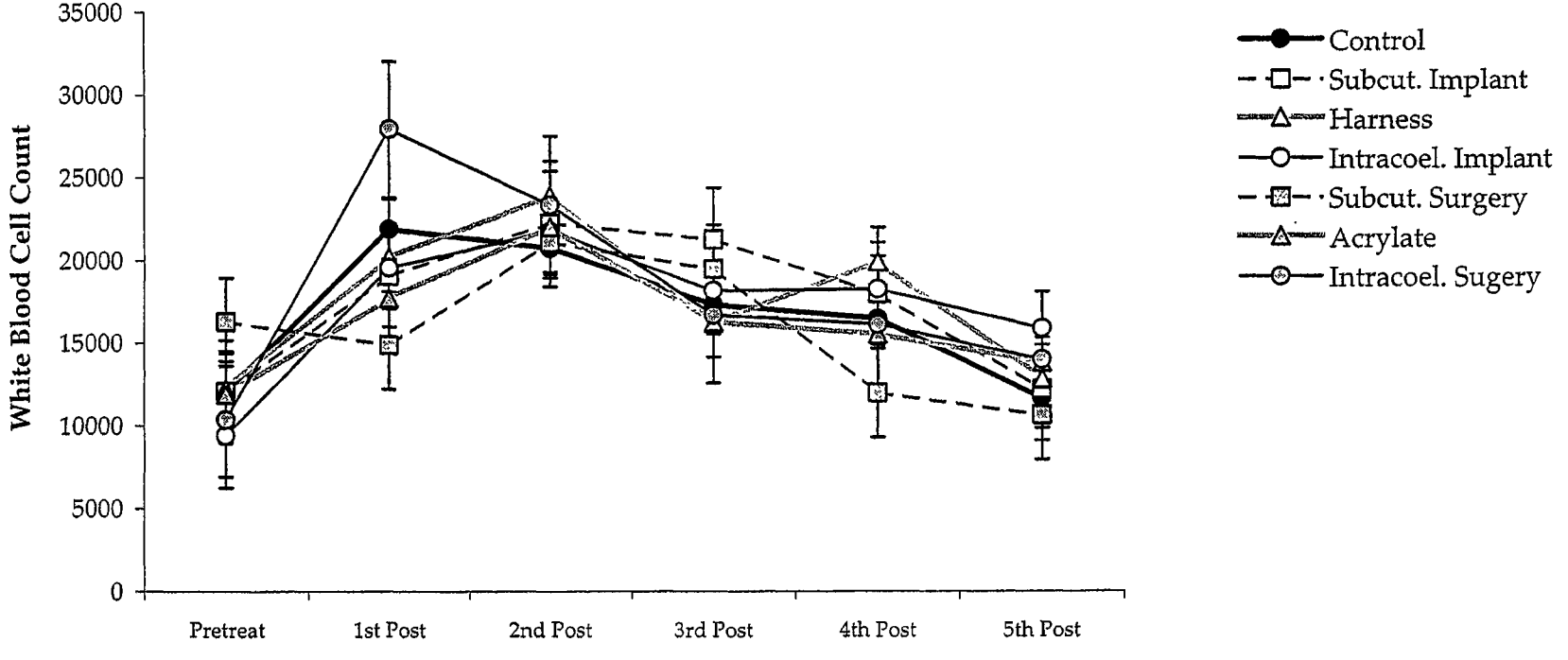


Figure 2.- Heterophil:lymphocyte ratio for captive white-winged dove with various radiotransmitter attachments grouped by sampling period during 20 August 1998 through 20 November 1998 at Texas A&M University-Kingsville in Kingsville, Texas.

(Standard error bars represent post-hoc pairwise comparison using Bonferroni criteria.)

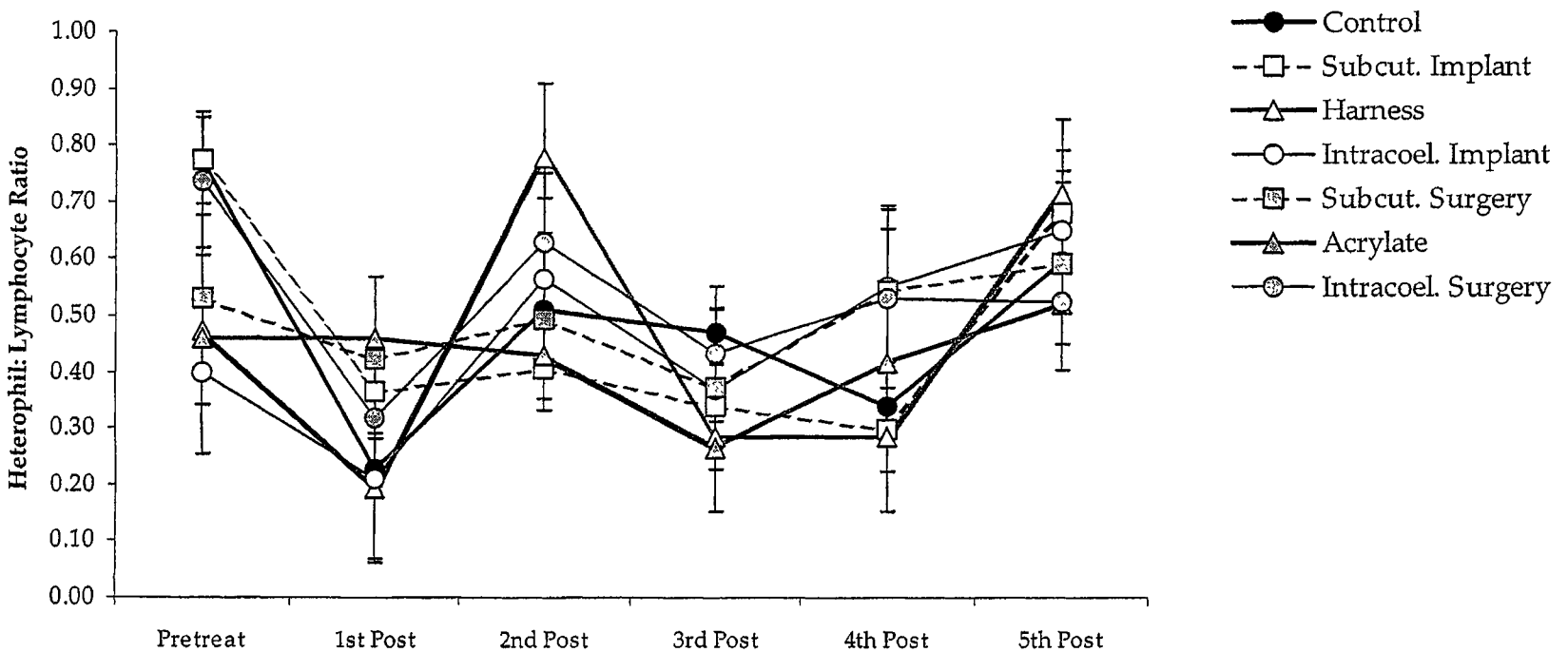
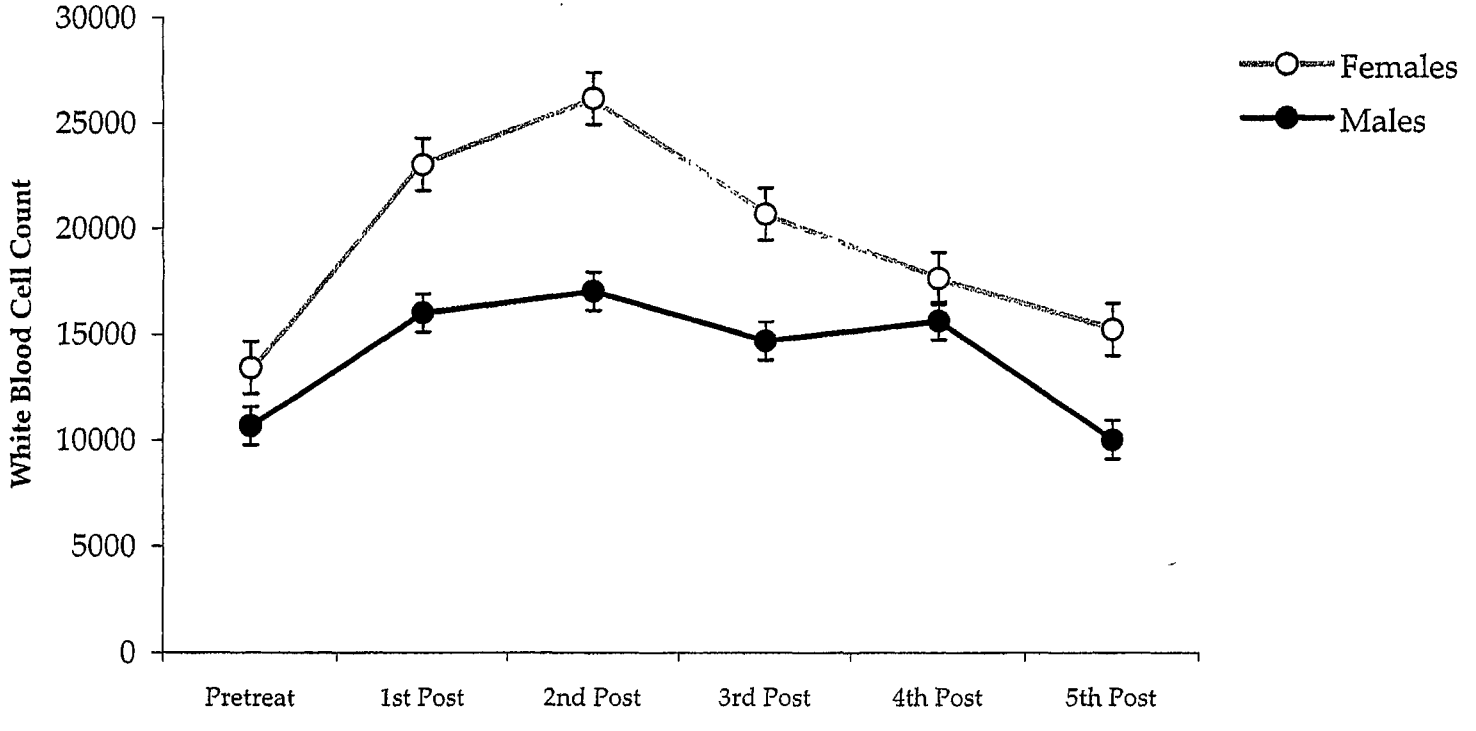


Figure 3.- Total white blood cell count (per mm³) for captive white-winged dove with various radiotransmitter attachments grouped by gender and sampling periods during 20 August 1998 through 20 November 1998 at Texas A&M University-Kingsville in Kingsville, Texas. (Standard error bars represent post-hoc pairwise comparison using Bonferroni criteria.)



	Treatment
1	Control
2	Subcutaneous implant
3	Harness
4	Intracoelomic implant
5	Subcutaneous surgery
6	Acrylate
7	Intracoelomic surgery

	Sex
1	male
2	female
3	hatch-year

	Haemoproteus infection
0	None
1	very low
2	low
3	moderate
4	heavy

AVG: WBC mean of 5 fields of view at 500x oil immersion

TWBC: Absolute WBC count = AVG * 2000

ABS: Specific absolute count = WBC type * TWBC

Transformed Heterophil: Heterophil:lymphocyte ratio * heterophil count

Transformed Lymphocyte: Lymphocyte:heterophil ratio * lymphocyte count

**Sequence denotes pen and dove

Pre-Treatment Sampling

Pen	Bird	treat	sex	AVG	TWBC	Baso	Abs Baso	Eosin	Abs Eos	Hetero	Ab.Het.	Lym	Ab.Lym.	Mono	Abs Mon	*Haemo*	H:L Ratio	Trans H:L	Trans L:H
1	1	1	1	7.8	15600	2	312	0	0	24	3744	68	10608	6	936	2	0.353	8.47	192.7
1	2	2	1	11.2	22400	2	448	0	0	65	14560	31	6944	2	448	2	2.097	136.29	14.8
1	3	3	1	3.8	7600	2	152	2	152	22	1672	72	5472	2	152	2	0.306	6.72	235.6
1	4	4	1	3.4	6800	4	272	4	272	8	544	84	5712	0	0	2	0.095	0.76	882.0
1	5	5	1	8.6	17200	4	688	20	3440	33	5676	39	6708	4	688	2	0.846	27.92	46.1
1	6	6	1	4.8	9600	2	192	4	384	32	3072	60	5760	2	192	2	0.533	17.07	112.5
1	7	7	1	8.8	17600	6	1056	2	352	50	8800	38	6688	4	704	1	1.316	65.79	28.9
2	8	1	1	9.6	19200	6	1152	4	768	50	9600	38	7296	2	384	1	1.316	65.79	28.9
2	9	2	1	2.8	5600	0	0	6	336	28	1568	66	3696	0	0	1	0.424	11.88	155.6
2	10	3	1	4.8	9600	4	384	6	576	24	2304	66	6336	0	0	2	0.364	8.73	181.5
2	11	4	1	4.8	9600	6	576	1	96	37	3552	53	5088	3	288	0	0.698	25.83	75.9
2	12	5	1	9.8	19600	4	784	2	392	34	6664	52	10192	8	1568	1	0.654	22.23	79.5
2	13	6	1	8.8	17600	0	0	16	2816	45	7920	35	6160	4	704	1	1.286	57.86	27.2
2	14	7	1	5.2	10400	4	416	0	0	42	4368	52	5408	2	208	2	0.808	33.92	64.4
3	15	1	1	5.8	11600	4	464	0	0	60	6960	34	3944	2	232	2	1.765	105.88	19.3
3	16	2	1	4.6	9200	2	184	2	184	36	3312	56	5152	4	368	2	0.643	23.14	87.1
3	17	3	1	8.4	16800	2	336	4	672	43	7224	48	8064	3	504	1	0.896	38.52	53.6
3	18	4	1	2.8	5600	2	112	4	224	28	1568	64	3584	2	112	0	0.438	12.25	146.3
3	19	5	1	8.6	17200	4	688	0	0	24	4128	70	12040	2	344	0	0.343	8.23	204.2
3	20	6	1	4.2	8400	6	504	2	168	22	1848	66	5544	4	336	1	0.333	7.33	198.0
3	21	7	1	5.6	11200	2	224	0	0	40	4480	54	6048	4	448	0	0.741	29.63	72.9
4	22	1	1	6.2	12400	2	248	0	0	20	2480	71	8804	7	868	1	0.282	5.63	252.1
4	23	2	1	4	8000	6	480	2	160	40	3200	50	4000	2	160	1	0.800	32.00	62.5
4	24	3	1	5.2	10400	0	0	0	0	36	3744	62	6448	2	208	2	0.581	20.90	106.8
4	25	4	1	4.2	8400	4	336	2	168	22	1848	68	5712	4	336	1	0.324	7.12	210.2
4	26	5	1	4.6	9200	4	368	0	0	28	2576	64	5888	4	368	1	0.438	12.25	146.3
4	27	6	1	4.6	9200	1	92	1	92	27	2484	70	6440	1	92	1	0.386	10.41	181.5
4	28	7	1	4.6	9200	0	0	4	368	44	4048	52	4784	0	0	0	0.846	37.23	61.5
5	29	1	1	2.6	5200	3	156	8	416	8	416	81	4212	0	0	0	0.099	0.79	820.1
5	30	2	1	3.2	6400	0	0	0	0	36	2304	62	3968	2	128	1	0.581	20.90	106.8

5	31	3	1	5.4	10800	4	432	0	0	14	1512	80	8640	2	216	1	0.175	2.45	457.1
5	32	4	1	3.8	7600	4	304	2	152	50	3800	40	3040	4	304	1	1.250	62.50	32.0
5	33	5	1	1.6	3200	2	64	0	0	42	1344	56	1792	0	0	1	0.750	31.50	74.7
5	34	6	1	3.4	6800	4	272	0	0	28	1904	64	4352	4	272	1	0.438	12.25	146.3
5	35	7	1	5	10000	8	800	9	900	8	800	75	7500	0	0	1	0.107	0.85	703.1
6	36	1	1	3.4	6800	0	0	8	544	28	1904	64	4352	0	0	1	0.438	12.25	146.3
6	37	2	1	8.6	17200	10	1720	2	344	12	2064	72	12384	4	688	0	0.167	2.00	432.0
6	38	3	1	3	6000	4	240	0	0	22	1320	72	4320	2	120	1	0.306	6.72	235.6
6	39	4	1	4.4	8800	6	528	2	176	28	2464	64	5632	0	0	0	0.438	12.25	146.3
6	40	5	1	4.2	8400	2	168	0	0	40	3360	56	4704	2	168	2	0.714	28.57	78.4
6	41	6	1	8	16000	2	320	0	0	28	4480	70	11200	0	0	1	0.400	11.20	175.0
6	42	7	1	7.2	14400	2	288	0	0	12	1728	84	12096	2	288	1	0.143	1.71	588.0
7	43	1	1	7	14000	0	0	0	0	28	3920	68	9520	4	560	1	0.412	11.53	165.1
7	44	2	1	5.8	11600	4	464	2	232	14	1624	80	9280	0	0	1	0.175	2.45	457.1
7	45	3	1	4	8000	4	320	8	640	28	2240	60	4800	0	0	1	0.467	13.07	128.6
7	46	4	1	8	16000	2	320	2	320	16	2560	76	12160	4	640	1	0.211	3.37	361.0
7	47	5	1	1.4	2800	4	112	0	0	16	448	77	2156	3	84	1	0.208	3.32	370.6
7	48	6	1	3	6000	8	480	0	0	15	900	76	4560	1	60	2	0.197	2.96	385.1
7	49	7	1	9.2	18400	4	736	0	0	50	9200	42	7728	4	736	0	1.190	59.52	35.3
8	50	1	1	2	4000	2	80	0	0	16	640	80	3200	2	80	0	0.200	3.20	400.0
8	51	2	1	4.8	9600	0	0	4	384	30	2880	66	6336	0	0	2	0.455	13.64	145.2
8	52	3	1	6.4	12800	5	640	7	896	35	4480	53	6784	0	0	0	0.660	23.11	80.3
8	53	4	1	9.2	18400	8	1472	0	0	16	2944	74	13616	2	368	1	0.216	3.46	342.3
8	54	5	1	9	18000	4	720	10	1800	32	5760	54	9720	0	0	0	0.593	18.96	91.1
8	55	6	1	4.2	8400	6	504	0	0	28	2352	66	5544	0	0	0	0.424	11.88	155.6
8	56	7	1	6.2	12400	8	992	12	1488	12	1488	68	8432	0	0	0	0.176	2.12	385.3
9	57	1	1	5.4	10800	4	432	10	1080	52	5616	34	3672	0	0	1	1.529	79.53	22.2
9	58	2	1	5.4	10800	2	216	0	0	58	6264	39	4212	1	108	1	1.487	86.26	26.2
9	59	3	1	9.6	19200	5	960	6	1152	30	5760	57	10944	2	384	0	0.526	15.79	108.3
9	60	4	1	5.4	10800	3	324	0	0	27	2916	68	7344	2	216	0	0.397	10.72	171.3
9	61	5	1	7.6	15200	4	608	4	608	20	3040	70	10640	2	304	1	0.286	5.71	245.0

9	62	6	1	5.6	11200	12	1344	2	224	32	3584	52	5824	2	224	1	0.615	19.69	84.5
9	63	7	1	4.4	8800	0	0	1	88	22	1936	77	6776	0	0	1	0.286	6.29	269.5
10	64	1	2	2.4	4800	6	288	6	288	16	768	70	3360	2	96	1	0.229	3.66	306.3
10	65	2	2	5.6	11200	4	448	10	1120	44	4928	40	4480	2	224	0	1.100	48.40	36.4
10	66	3	2	3.2	6400	4	256	2	128	14	896	80	5120	0	0	1	0.175	2.45	457.1
10	67	4	2	4	8000	4	320	0	0	20	1600	76	6080	0	0	2	0.263	5.26	288.8
10	68	5	2	8.2	16400	2	328	4	656	40	6560	46	7544	8	1312	2	0.870	34.78	52.9
10	69	6	2	6.4	12800	2	256	0	0	30	3840	67	8576	1	128	1	0.448	13.43	149.6
10	70	7	2	4	8000	1	80	1	80	50	4000	46	3680	2	160	1	1.087	54.35	42.3
11	71	1	2	10.8	21600	2	432	2	432	28	6048	64	13824	4	864	1	0.438	12.25	146.3
11	72	2	2	8.4	16800	4	672	0	0	28	4704	64	10752	4	672	2	0.438	12.25	146.3
11	73	3	2	6.6	13200	2	264	4	528	38	5016	54	7128	2	264	4	0.704	26.74	76.7
11	74	4	2	9.6	19200	10	1920	4	768	29	5568	55	10560	2	384	1	0.527	15.29	104.3
11	75	5	2	6.2	12400	0	0	1	124	40	4960	58	7192	1	124	0	0.690	27.59	84.1
11	76	6	2	6.6	13200	6	792	0	0	32	4224	62	8184	0	0	1	0.516	16.52	120.1
11	77	7	2	7.8	15600	2	312	2	312	20	3120	72	11232	4	624	1	0.278	5.56	259.2
12	78	1	2	3.4	6800	12	816	0	0	26	1768	62	4216	0	0	2	0.419	10.90	147.8
12	79	2	2	6.6	13200	4	528	7	924	28	3696	61	8052	0	0	2	0.459	12.85	132.9
12	80	3	2	3.2	6400	7	448	1	64	14	896	76	4864	2	128	1	0.184	2.58	412.6
12	81	4	2	10.8	21600	6	1296	1	216	27	5832	61	13176	5	1080	3	0.443	11.95	137.8
12	82	5	2	6.6	13200	2	264	0	0	24	3168	74	9768	0	0	3	0.324	7.78	228.2
12	83	6	2	13.4	26800	2	536	2	536	28	7504	66	17688	2	536	1	0.424	11.88	155.6
12	84	7	2	9.8	19600	0	0	0	0	67	13132	31	6076	2	392	2	2.161	144.81	14.3
13	85	1	2	7.2	14400	2	288	0	0	34	4896	61	8784	3	432	3	0.557	18.95	109.4
13	86	2	2	7.4	14800	8	1184	4	592	21	3108	67	9916	0	0	1	0.313	6.58	213.8
13	87	3	2	5.2	10400	2	208	0	0	24	2496	71	7384	3	312	1	0.338	8.11	210.0
13	88	4	2	5.6	11200	18	2016	6	672	10	1120	60	6720	6	672	0	0.167	1.67	360.0
13	89	5	2	7.6	15200	2	304	2	304	55	8360	41	6232	0	0	0	1.341	73.78	30.6
13	90	6	2	4.8	9600	1	96	6	576	25	2400	68	6528	0	0	0	0.368	9.19	185.0
13	91	7	2	4.8	9600	2	192	6	576	18	1728	73	7008	1	96	1	0.247	4.44	296.1
14	92	1	2	8.2	16400	0	0	10	1640	44	7216	46	7544	0	0	1	0.957	42.09	48.1

14	93	2	2	11	22000	4	880	2	440	14	3080	80	17600	0	0	1	0.175	2.45	457.1
14	94	3	2	5	10000	12	1200	2	200	12	1200	68	6800	6	600	1	0.176	2.12	385.3
14	95	4	2	4.8	9600	6	576	2	192	28	2688	64	6144	0	0	1	0.438	12.25	146.3
14	96	5	2	8.6	17200	0	0	0	0	26	4472	72	12384	2	344	0	0.361	9.39	199.4
14	97	6	2	7.4	14800	0	0	4	592	42	6216	54	7992	0	0	1	0.778	32.67	69.4
14	98	7	2	8	16000	8	1280	10	1600	50	8000	28	4480	4	640	1	1.786	89.29	15.7
15	99	1	2	4.6	9200	0	0	0	0	40	3680	60	5520	0	0	1	0.667	26.67	90.0
15	100	2	2	5.4	10800	0	0	0	0	26	2808	70	7560	4	432	1	0.371	9.66	188.5
15	101	3	2	3.8	7600	0	0	6	456	34	2584	60	4560	0	0	0	0.567	19.27	105.9
15	102	4	2	4.8	9600	0	0	2	192	44	4224	54	5184	0	0	1	0.815	35.85	66.3
15	103	5	2	14.8	29600	1	296	3	888	31	9176	62	18352	3	888	0	0.500	15.50	124.0
15	104	6	2	6.8	13600	0	0	6	816	32	4352	58	7888	4	544	1	0.552	17.66	105.1
15	105	7	2	10.4	20800	0	0	4	832	28	5824	66	13728	2	416	2	0.424	11.88	155.6
16	106	1	2	10.4	20800	2	416	0	0	58	12064	40	8320	0	0	2	1.450	84.10	27.6
16	107	2	2	4.6	9200	0	0	3	276	34	3128	59	5428	4	368	2	0.576	19.59	102.4
16	108	3	2	3.4	6800	2	136	2	136	31	2108	63	4284	2	136	2	0.492	15.25	128.0
16	109	4	2	7.4	14800	0	0	4	592	34	5032	60	8880	2	296	1	0.567	19.27	105.9
16	110	5	2	3.4	6800	8	544	0	0	20	1360	68	4624	4	272	1	0.294	5.88	231.2
16	111	6	2	17.2	34400	1	344	2	688	59	20296	37	12728	1	344	1	1.595	94.08	23.2
16	112	7	2	5.8	11600	4	464	2	232	48	5568	42	4872	4	464	1	1.143	54.86	36.8
17	113	1	2	10	20000	2	400	4	800	42	8400	50	10000	2	400	2	0.840	35.28	59.5
17	114	2	2	5	10000	0	0	0	0	40	4000	58	5800	2	200	2	0.690	27.59	84.1
17	115	3	2	5.6	11200	2	224	0	0	42	4704	54	6048	2	224	1	0.778	32.67	69.4
17	116	4	2	6.4	12800	2	256	12	1536	54	6912	32	4096	0	0	1	1.688	91.13	19.0
17	117	5	2	5	10000	0	0	4	400	54	5400	42	4200	0	0	3	1.286	69.43	32.7
17	118	6	2	8.2	16400	1	164	2	328	36	5904	60	9840	1	164	1	0.600	21.60	100.0
17	119	7	2	4	8000	3	240	6	480	23	1840	68	5440	0	0	0	0.338	7.78	201.0
18	120	1	2	5.8	11600	2	232	6	696	30	3480	56	6496	6	696	0	0.536	16.07	104.5
18	121	2	2	9.4	18800	0	0	4	752	74	13912	22	4136	0	0	0	3.364	248.91	6.5
18	122	3	2																
18	123	4	2	4.8	9600	2	192	10	960	20	1920	65	6240	3	288	1	0.308	6.15	211.3

18	124	5	2	21.2	42400	0	0	13	5512	72	30528	14	5936	1	424	1	5.143	370.29	2.7
18	125	6	2	4.5	9000	2	180	3	270	79	7110	16	1440	0	0	1	4.938	390.06	3.2
18	126	7	2	6.6	13200	0	0	0	0	41	5412	58	7656	1	132	1	0.707	28.98	82.0
19	127	1	2	6.6	13200	2	264	6	792	63	8316	29	3828	0	0	1	2.172	136.86	13.3
19	128	2	2	3.2	6400	2	128	2	128	58	3712	36	2304	2	128	1	1.611	93.44	22.3
19	129	3	2	6.8	13600	1	136	4	544	38	5168	57	7752	0	0	0	0.667	25.33	85.5
19	130	4	2	25.4	50800	2	1016	0	0	86	43688	10	5080	2	1016	2	8.600	739.60	1.2
19	131	5	2	8	16000	0	0	2	320	88	14080	10	1600	0	0	0	8.800	774.40	1.1
19	132	6	2	7.4	14800	2	296	4	592	58	8584	36	5328	0	0	0	1.611	93.44	22.3
19	133	7	2	4.2	8400	4	336	6	504	52	4368	37	3108	1	84	1	1.405	73.08	26.3
20	134	1	2	10	20000	0	0	2	400	70	14000	24	4800	4	800	1	2.917	204.17	8.2
20	135	2	2	5.2	10400	2	208	2	208	46	4784	50	5200	0	0	1	0.920	42.32	54.3
20	136	3	2	7.8	15600	6	936	6	936	42	6552	44	6864	2	312	1	0.955	40.09	46.1
20	137	4	2	2.6	5200	10	520	6	312	52	2704	32	1664	0	0	0	1.625	84.50	19.7
20	138	5	2	3.8	7600	0	0	0	0	56	4256	40	3040	4	304	1	1.400	78.40	28.6
20	139	6	2	7.6	15200	0	0	18	2736	48	7296	34	5168	0	0	0	1.412	67.76	24.1
20	140	7	2	9.8	19600	0	0	0	0	78	15288	20	3920	2	392	1	3.900	304.20	5.1
21	141	1	3	5	10000	3	300	2	200	51	5100	44	4400	0	0	1	1.159	59.11	38.0
21	142	2	3	13.2	26400	4	1056	3	792	79	20856	14	3696	0	0	1	5.643	445.79	2.5
21	143	3	3	11.6	23200	2	464	4	928	41	9512	50	11600	3	696	0	0.820	33.62	61.0
21	144	4	3	9.2	18400	2	368	2	368	70	12880	26	4784	0	0	1	2.692	188.46	9.7
21	145	5	3	7	14000	6	840	10	1400	70	9800	14	1960	0	0	1	5.000	350.00	2.8
21	146	6	3	3.2	6400	8	512	4	256	62	3968	26	1664	0	0	4	2.385	147.85	10.9
21	147	7	3	2.8	5600	13	728	3	168	76	4256	8	448	0	0	2	9.500	722.00	0.8
22	148	1	3	4.2	8400	10	840	2	168	66	5544	22	1848	0	0	2	3.000	198.00	7.3

1st Post-Treatment Sampling

Pen	Bird	treat	sex	AVG	TWBC	Baso	Abs Bas	Eosin	Abs Eos	Hetero	ABS Het	Lym	ABS Lym	Mono	Abs Mono	*Haemo*	H:L Ratio	Trans H:L	Trans L:H
1	1	1	1	5.8	11600	6	696	4	464	12	1392	76	8816	2	232	1	0.158	1.89	481.3
1	2	2	1	7.2	14400	4	576	2	288	30	4320	60	8640	4	576	1	0.500	15.00	120.0
1	3	3	1	6.2	12400	0	0	0	0	12	1488	88	10912	0	0	1	0.136	1.64	645.3
1	4	4	1	13.8	27600	1	276	1	276	11	3036	86	23736	1	276	0	0.128	1.41	672.4
1	5	5	1	7.2	14400	0	0	0	0	24	3456	74	10656	2	288	1	0.324	7.78	228.2
1	6	6	1																
1	7	7	1																
2	8	1	1	11	22000	5	1100	4	880	20	4400	69	15180	2	440	1	0.290	5.80	238.1
2	9	2	1	14.4	28800	0	0	1	288	36	10368	60	17280	3	864	0	0.600	21.60	100.0
2	10	3	1	8.4	16800	2	336	2	336	10	1680	82	13776	4	672	1	0.122	1.22	672.4
2	11	4	1	3.6	7200	2	144	4	288	21	1512	73	5256	0	0	3	0.288	6.04	253.8
2	12	5	1	9.6	19200	0	0	10	1920	20	3840	68	13056	2	384	0	0.294	5.88	231.2
2	13	6	1	6	12000	10	1200	0	0	2	240	88	10560	0	0	1	0.023	0.05	3872.0
2	14	7	1	6.2	12400	3	372	3	372	18	2232	73	9052	3	372	0	0.247	4.44	296.1
3	15	1	1	7.6	15200	0	0	2	304	14	2128	82	12464	2	304	2	0.171	2.39	480.3
3	16	2	1	10.6	21200	2	424	4	848	10	2120	78	16536	6	1272	0	0.128	1.28	608.4
3	17	3	1	5.4	10800	4	432	2	216	20	2160	74	7992	0	0	2	0.270	5.41	273.8
3	18	4	1	9.6	19200	4	768	4	768	12	2304	74	14208	6	1152	3	0.162	1.95	456.3
3	19	5	1	4.4	8800	4	352	0	0	18	1584	78	6864	0	0	1	0.231	4.15	338.0
3	20	6	1	9.8	19600	1	196	2	392	6	1176	91	17836	0	0	0	0.066	0.40	1380.2
3	21	7	1	5.6	11200	2	224	30	3360	8	896	60	6720	0	0	3	0.133	1.07	450.0
4	22	1	1	8	16000	2	320	6	960	18	2880	71	11360	3	480	0	0.254	4.56	280.1
4	23	2	1	13.6	27200	3	816	6	1632	29	7888	58	15776	4	1088	1	0.500	14.50	116.0
4	24	3	1	9	18000	4	720	22	3960	18	3240	52	9360	4	720	0	0.346	6.23	150.2
4	25	4	1	9.8	19600	1	196	4	784	16	3136	76	14896	3	588	1	0.211	3.37	361.0
4	26	5	1	6.4	12800	0	0	10	1280	40	5120	45	5760	5	640	3	0.889	35.56	50.6
4	27	6	1	5.6	11200	0	0	6	672	31	3472	61	6832	2	224	1	0.508	15.75	120.0
4	28	7	1	9	18000	1	180	2	360	19	3420	75	13500	3	540	2	0.253	4.81	296.1
5	29	1	1																
5	30	2	1																

5	31	3	1																
5	32	4	1																
5	33	5	1																
5	34	6	1																
5	35	7	1																
6	36	1	1	8.6	17200	2	344	4	688	2	344	88	15136	4	688	2	0.023	0.05	3872.0
6	37	2	1	7	14000	1	140	7	980	4	560	85	11900	3	420	0	0.047	0.19	1806.3
6	38	3	1	6.2	12400	8	992	5	620	15	1860	72	8928	0	0	0	0.208	3.13	345.6
6	39	4	1	5.8	11600	0	0	10	1160	22	2552	63	7308	5	580	1	0.349	7.68	180.4
6	40	5	1	7.8	15600	8	1248	10	1560	28	4368	50	7800	4	624	1	0.560	15.68	89.3
6	41	6	1	14	28000	0	0	6	1680	45	12600	44	12320	5	1400	0	1.023	46.02	43.0
6	42	7	1	3.8	7600	0	0	2	152	20	1520	76	5776	2	152	3	0.263	5.26	288.8
7	43	1	1	3.8	7600	4	304	4	304	10	760	80	6080	2	152	3	0.125	1.25	640.0
7	44	2	1	7.4	14800	1	148	11	1628	21	3108	66	9768	1	148	1	0.318	6.68	207.4
7	45	3	1	11.2	22400	2	448	10	2240	43	9632	45	10080	0	0	1	0.956	41.09	47.1
7	46	4	1	5.8	11600	2	232	4	464	6	696	88	10208	0	0	0	0.068	0.41	1290.7
7	47	5	1	4.8	9600	0	0	8	768	9	864	83	7968	0	0	1	0.108	0.98	765.4
7	48	6	1	4.4	8800	2	176	8	704	22	1936	66	5808	2	176	0	0.333	7.33	198.0
7	49	7	1	4.4	8800	0	0	2	176	8	704	75	6600	15	1320	0	0.107	0.85	703.1
8	50	1	1	10.6	21200	1	212	10	2120	18	3816	60	12720	11	2332		0.300	5.40	200.0
8	51	2	1																
8	52	3	1																
8	53	4	1																
8	54	5	1																
8	55	6	1																
8	56	7	1																
9	57	1	1	8.2	16400	2	328	4	656	32	5248	60	9840	2	328	0	0.533	17.07	112.5
9	58	2	1	8	16000	2	320	8	1280	22	3520	68	10880	0	0	0	0.324	7.12	210.2
9	59	3	1	11.4	22800	2	456	5	1140	8	1824	84	19152	1	228	0	0.095	0.76	882.0
9	60	4	1	8	16000	2	320	8	1280	8	1280	78	12480	4	640	3	0.103	0.82	760.5
9	61	5	1	2.4	4800	0	0	2	96	20	960	76	3648	2	96	4	0.263	5.26	288.8

9	62	6	1	9	18000	0	0	8	1440	24	4320	62	11160	6	1080	2	0.387	9.29	160.2
9	63	7	1	5.8	11600	2	232	8	928	14	1624	76	8816	0	0	4	0.184	2.58	412.6
10	64	1	2	9.2	18400	0	0	2	368	14	2576	82	15088	2	368	0	0.171	2.39	480.3
10	65	2	2	11	22000	4	880	6	1320	30	6600	58	12760	2	440	3	0.517	15.52	112.1
10	66	3	2	10.8	21600	0	0	2	432	10	2160	82	17712	6	1296	2	0.122	1.22	672.4
10	67	4	2	10.4	20800	2	416	2	416	18	3744	72	14976	6	1248	1	0.250	4.50	288.0
10	68	5	2	10.6	21200	2	424	0	0	10	2120	86	18232	2	424	1	0.116	1.16	739.6
10	69	6	2	12.6	25200	2	504	4	1008	40	10080	44	11088	10	2520	1	0.909	36.36	48.4
10	70	7	2	13.6	27200	2	544	4	1088	10	2720	84	22848	0	0	2	0.119	1.19	705.6
11	71	1	2	19.2	38400	4	1536	5	1920	27	10368	60	23040	4	1536	1	0.450	12.15	133.3
11	72	2	2	9.2	18400	0	0	8	1472	34	6256	50	9200	8	1472	3	0.680	23.12	73.5
11	73	3	2	14.2	28400	0	0	6	1704	22	6248	62	17608	10	2840	2	0.355	7.81	174.7
11	74	4	2	8.4	16800	0	0	4	672	14	2352	78	13104	4	672	1	0.179	2.51	434.6
11	75	5	2	7.2	14400	2	288	12	1728	22	3168	60	8640	4	576	0	0.367	8.07	163.6
11	76	6	2	7.4	14800	0	0	0	0	28	4144	66	9768	6	888	1	0.424	11.88	155.6
11	77	7	2	20.6	41200	1	412	9	3708	39	16068	51	21012	0	0	3	0.765	29.82	66.7
12	78	1	2																
12	79	2	2																
12	80	3	2																
12	81	4	2																
12	82	5	2																
12	83	6	2																
12	84	7	2																
13	85	1	2																
13	86	2	2																
13	87	3	2																
13	88	4	2																
13	89	5	2																
13	90	6	2	9.6	19200	2	384	6	1152	14	2688	78	14976	0	0	3	0.179	2.51	434.6
13	91	7	2																
14	92	1	2	10.6	21200	0	0	2	424	12	2544	86	18232	0	0	1	0.140	1.67	616.3

14	93	2	2	13.8	27600	1	276	2	552	7	1932	86	23736	4	1104	1	0.081	0.57	1056.6
14	94	3	2																
14	95	4	2																
14	96	5	2																
14	97	6	2																
14	98	7	2																
15	99	1	2																
15	100	2	2																
15	101	3	2																
15	102	4	2																
15	103	5	2																
15	104	6	2																
15	105	7	2																
16	106	1	2	11	22000	4	880	5	1100	38	8360	70	15400	2	440	4	0.543	20.63	128.9
16	107	2	2	12.4	24800	1	248	2	496	12	2976	83	20584	2	496	3	0.145	1.73	574.1
16	108	3	2	9.2	18400	4	736	8	1472	16	2944	69	12696	3	552	1	0.232	3.71	297.6
16	109	4	2	9.6	19200	2	384	2	384	29	5568	60	11520	7	1344	3	0.483	14.02	124.1
16	110	5	2	7.2	14400	0	0	0	0	18	2592	82	11808	0	0	2	0.220	3.95	373.6
16	111	6	2	14.6	29200	1	292	5	1460	26	7592	63	18396	5	1460	1	0.413	10.73	152.7
16	112	7	2	6.4	12800	2	256	0	0	18	2304	80	10240	0	0	3	0.225	4.05	355.6
17	113	1	2	10.2	20400	4	816	2	408	16	3264	78	15912	0	0	2	0.205	3.28	380.3
17	114	2	2	9.2	18400	5	920	4	736	14	2576	75	13800	2	368	0	0.187	2.61	401.8
17	115	3	2	8.2	16400	14	2296	4	656	28	4592	50	8200	4	656	2	0.560	15.68	89.3
17	116	4	2	13.4	26800	2	536	2	536	15	4020	76	20368	5	1340	2	0.197	2.96	385.1
17	117	5	2	11	22000	6	1320	1	220	22	4840	68	14960	3	660	0	0.324	7.12	210.2
17	118	6	2	11	22000	2	440	6	1320	21	4620	65	14300	6	1320	1	0.323	6.78	201.2
17	119	7	2	21	42000	0	0	2	840	38	15960	56	23520	4	1680	2	0.679	25.79	82.5
18	120	1	2	19.6	39200	1	392	2	784	33	12936	61	23912	3	1176	3	0.541	17.85	112.8
18	121	2	2	10	20000	6	1200	0	0	8	1600	80	16000	6	1200	2	0.100	0.80	800.0
18	122	3	2	8.8	17600	4	704	2	352	14	2464	80	14080	0	0	2	0.175	2.45	457.1
18	123	4	2	21.8	43600	0	0	6	2616	52	22672	39	17004	3	1308	1	1.333	69.33	29.3

18	124	5	2	12	24000	6	1440	1	240	16	3840	73	17520	4	960	2	0.219	3.51	333.1
18	125	6	2	10	20000	3	600	4	800	22	4400	69	13800	2	400	0	0.319	7.01	216.4
18	126	7	2	17.6	35200	2	704	5	1760	36	12672	54	19008	3	1056	3	0.667	24.00	81.0
19	127	1	2	14.8	29600	5	1480	0	0	41	12136	50	14800	4	1184	4	0.820	33.62	61.0
19	128	2	2	9.6	19200	2	384	0	0	26	4992	66	12672	6	1152	1	0.394	10.24	167.5
19	129	3	2	17.6	35200	1	352	4	1408	6	2112	87	30624	2	704	3	0.069	0.41	1261.5
19	130	4	2	12.6	25200	2	504	2	504	26	6552	66	16632	4	1008	2	0.394	10.24	167.5
19	131	5	2	8.6	17200	1	172	5	860	14	2408	77	13244	3	516	3	0.182	2.55	423.5
19	132	6	2	11.2	22400	2	448	2	448	40	8960	52	11648	4	896	2	0.769	30.77	67.6
19	133	7	2	18	36000	1	360	5	1800	33	11880	59	21240	2	720	1	0.559	18.46	105.5
20	134	1	2	4.2	8400	6	504	8	672	18	1512	66	5544	2	168	2	0.273	4.91	242.0
20	135	2	2	7	14000	9	1260	4	560	10	1400	72	10080	5	700	0	0.139	1.39	518.4
20	136	3	2	8	16000	2	320	4	640	25	4000	68	10880	1	160	0	0.368	9.19	185.0
20	137	4	2	4.6	9200	7	644	4	368	29	2668	57	5244	3	276	0	0.509	14.75	112.0
20	138	5	2	5.6	11200	4	448	4	448	20	2240	69	7728	3	336	2	0.290	5.80	238.1
20	139	6	2	5.6	11200	3	336	13	1456	26	2912	55	6160	3	336	0	0.473	12.29	116.3
20	140	7	2	5.4	10800	4	432	4	432	10	1080	80	8640	2	216	1	0.125	1.25	640.0
21	141	1	3	6.4	12800	5	640	1	128	24	3072	68	8704	2	256	0	0.353	8.47	192.7
21	142	2	3	7.6	15200	2	304	0	0	15	2280	81	12312	2	304	0	0.185	2.78	437.4
21	143	3	3	6.2	12400	2	248	0	0	30	3720	65	8060	3	372	1	0.462	13.85	140.8
21	144	4	3	7	14000	3	420	0	0	27	3780	64	8960	6	840	1	0.422	11.39	151.7
21	145	5	3	9.4	18800	0	0	0	0	20	3760	76	14288	4	752	1	0.263	5.26	288.8
21	146	6	3	4.6	9200	13	1196	6	552	27	2484	51	4692	3	276	0	0.529	14.29	96.3
21	147	7	3	4	8000	0	0	4	320	14	1120	76	6080	6	480	2	0.184	2.58	412.6
22	148	1	3	6.6	13200	7	924	17	2244	27	3564	48	6336	1	132	0	0.563	15.19	85.3
22	149	2	3	6.8	13600	4	544	4	544	16	2176	72	9792	4	544	0	0.222	3.56	324.0
22	150	3	3	8.4	16800	3	504	5	840	49	8232	40	6720	3	504	0	1.225	60.03	32.7

2nd Post-treatment Sampling

Pen	Bird	treat	sex	AVG	TWBC	Baso	ABS Bas	Eosin	ABS Eos	Hetero	ABS Het	Lym	ABS Lym	Mono	ABS Mono	*Haemo*	H:L Ratio	Trans H:L	Trans L:H
1	1	1	1																
1	2	2	1																
1	3	3	1																
1	4	4	1																
1	5	5	1																
1	6	6	1																
1	7	7	1																
2	8	1	1																
2	9	2	1																
2	10	3	1	5.8	11600	4	464	2	232	16	1856	78	9048	0	0	4	0.205	3.28	380.3
2	11	4	1																
2	12	5	1																
2	13	6	1																
2	14	7	1																
3	15	1	1	9.6	19200	2	384	0	0	29	5568	67	12864	2	384	3	0.433	12.55	154.8
3	16	2	1	9.2	18400	2	368	4	736	10	1840	80	14720	4	736	2	0.125	1.25	640.0
3	17	3	1	8	16000	6	960	0	0	30	4800	62	9920	2	320	3	0.484	14.52	128.1
3	18	4	1	8	16000	4	640	12	1920	22	3520	62	9920	0	0	2	0.355	7.81	174.7
3	19	5	1	8.2	16400	2	328	4	656	24	3936	66	10824	4	656	1	0.364	8.73	181.5
3	20	6	1	10.6	21200	2	424	2	424	18	3816	74	15688	4	848	1	0.243	4.38	304.2
3	21	7	1	8.4	16800	2	336	0	0	14	2352	83	13944	1	168	0	0.169	2.36	492.1
4	22	1	1	4.2	8400	4	336	0	0	22	1848	70	5880	4	336	0	0.314	6.91	222.7
4	23	2	1	6	12000	4	480	0	0	20	2400	70	8400	6	720	2	0.286	5.71	245.0
4	24	3	1	8.2	16400	1	164	1	164	28	4592	64	10496	6	984	0	0.438	12.25	146.3
4	25	4	1	8.8	17600	6	1056	2	352	54	9504	38	6688	0	0	0	1.421	76.74	26.7
4	26	5	1	3.4	6800	4	272	0	0	40	2720	56	3808	0	0	1	0.714	28.57	78.4
4	27	6	1	12.4	24800	3	744	3	744	25	6200	67	16616	2	496	1	0.373	9.33	179.6
4	28	7	1	6.4	12800	2	256	8	1024	34	4352	56	7168	0	0	0	0.607	20.64	92.2
5	29	1	1	7	14000	2	280	0	0	38	5320	60	8400	0	0	3	0.633	24.07	94.7
5	30	2	1	14.2	28400	3	852	7	1988	15	4260	75	21300	0	0	0	0.200	3.00	375.0

2nd Post-treatment Sampling

5	31	3	1	11.6	23200	6	1392	4	928	40	9280	48	11136	2	464	2	0.833	33.33	57.6
5	32	4	1	7	14000	2	280	6	840	22	3080	68	9520	2	280	0	0.324	7.12	210.2
5	33	5	1	7.8	15600	0	0	1	156	29	4524	68	10608	2	312	0	0.426	12.37	159.4
5	34	6	1	9.6	19200	0	0	0	0	16	3072	81	15552	3	576	4	0.198	3.16	410.1
5	35	7	1	10	20000	3	600	1	200	24	4800	69	13800	3	600	0	0.348	8.35	198.4
6	36	1	1	9.2	18400	1	184	6	1104	19	3496	74	13616	0	0	0	0.257	4.88	288.2
6	37	2	1	7.8	15600	10	1560	5	780	20	3120	65	10140	0	0	0	0.308	6.15	211.3
6	38	3	1	11.6	23200	0	0	1	232	56	12992	38	8816	5	1160	1	1.474	82.53	25.8
6	39	4	1	9.8	19600	2	392	2	392	16	3136	78	15288	2	392	1	0.205	3.28	380.3
6	40	5	1	5.6	11200	4	448	0	0	32	3584	62	6944	2	224	0	0.516	16.52	120.1
6	41	6	1	8.4	16800	4	672	10	1680	46	7728	35	5880	5	840	2	1.314	60.46	26.6
6	42	7	1	6	12000	0	0	6	720	34	4080	58	6960	2	240	2	0.586	19.93	98.9
7	43	1	1	4.2	8400	2	168	10	840	16	1344	71	5964	1	84	0	0.225	3.61	315.1
7	44	2	1	6.8	13600	3	408	2	272	44	5984	51	6936	0	0	0	0.863	37.96	59.1
7	45	3	1	4.4	8800	6	528	6	528	24	2112	64	5632	0	0	1	0.375	9.00	170.7
7	46	4	1	4.4	8800	0	0	2	176	23	2024	74	6512	1	88	1	0.311	7.15	238.1
7	47	5	1	6	12000	2	240	2	240	50	6000	46	5520	0	0	1	1.087	54.35	42.3
7	48	6	1	12.4	24800	4	992	1	248	51	12648	42	10416	2	496	0	1.214	61.93	34.6
7	49	7	1	3.4	6800	2	136	0	0	38	2584	58	3944	2	136	1	0.655	24.90	88.5
8	50	1	1	10.8	21600	2	432	2	432	52	11232	43	9288	1	216	0	1.209	62.88	35.6
8	51	2	1	4.2	8400	0	0	0	0	30	2520	69	5796	1	84	2	0.435	13.04	158.7
8	52	3	1	7.2	14400	2	288	0	0	45	6480	51	7344	2	288	3	0.882	39.71	57.8
8	53	4	1	3.6	7200	4	288	0	0	42	3024	52	3744	2	144	1	0.808	33.92	64.4
8	54	5	1	6.2	12400	4	496	0	0	32	3968	63	7812	1	124	1	0.508	16.25	124.0
8	55	6	1	6.8	13600	1	136	0	0	48	6528	49	6664	2	272	0	0.980	47.02	50.0
8	56	7	1	5.8	11600	5	580	1	116	30	3480	64	7424	0	0	0	0.469	14.06	136.5
9	57	1	1	6.6	13200	2	264	4	528	40	5280	52	6864	2	264	3	0.769	30.77	67.6
9	58	2	1	1.8	3600	0	0	4	144	41	1476	52	1872	3	108	2	0.788	32.33	66.0
9	59	3	1	9.4	18800	4	752	1	188	58	10904	36	6768	1	188	0	1.611	93.44	22.3
9	60	4	1	15.2	30400	2	608	0	0	37	11248	60	18240	1	304	3	0.617	22.82	97.3
9	61	5	1	9.4	18800	4	752	3	564	24	4512	68	12784	1	188	0	0.353	8.47	192.7

2nd Post-treatment Sampling

9	62	6	1	12.8	25600	1	256	1	256	42	10752	55	14080	1	256	2	0.764	32.07	72.0
9	63	7	1																
10	64	1	2	17.6	35200	3	1056	1	352	16	5632	78	27456	2	704	3	0.205	3.28	380.3
10	65	2	2	9.2	18400	4	736	3	552	18	3312	72	13248	3	552	0	0.250	4.50	288.0
10	66	3	2	14.2	28400	0	0	8	2272	28	7952	62	17608	2	568	3	0.452	12.65	137.3
10	67	4	2	9.8	19600	4	784	1	196	34	6664	61	11956	0	0	0	0.557	18.95	109.4
10	68	5	2	20	40000	2	800	1	400	27	10800	65	26000	5	2000	2	0.415	11.22	156.5
10	69	6	2	14.4	28800	0	0	7	2016	24	6912	65	18720	4	1152	3	0.369	8.86	176.0
10	70	7	2	5.6	11200	0	0	2	224	25	2800	70	7840	3	336	3	0.357	8.93	196.0
11	71	1	2	7	14000	2	280	3	420	11	1540	82	11480	2	280	1	0.134	1.48	611.3
11	72	2	2	24.6	49200	0	0	2	984	36	17712	54	26568	8	3936	2	0.667	24.00	81.0
11	73	3	2	15.8	31600	2	632	0	0	40	12640	58	18328	0	0	2	0.690	27.59	84.1
11	74	4	2	13	26000	2	520	0	0	18	4680	80	20800	0	0	1	0.225	4.05	355.6
11	75	5	2	14.8	29600	2	592	0	0	44	13024	51	15096	3	888	0	0.863	37.96	59.1
11	76	6	2	7.2	14400	0	0	0	0	28	4032	72	10368	0	0	0	0.389	10.89	185.1
11	77	7	2	25.2	50400	0	0	3	1512	54	27216	39	19656	4	2016	2	1.385	74.77	28.2
12	78	1	2	9.4	18800	4	752	0	0	22	4136	70	13160	4	752	1	0.314	6.91	222.7
12	79	2	2	11.2	22400	1	224	0	0	26	5824	71	15904	2	448	1	0.366	9.52	193.9
12	80	3	2	16.2	32400	1	324	0	0	42	13608	51	16524	6	1944	1	0.824	34.59	61.9
12	81	4	2	13.6	27200	0	0	1	272	42	11424	55	14960	2	544	2	0.764	32.07	72.0
12	82	5	2	9.4	18800	7	1316	7	1316	19	3572	65	12220	2	376	3	0.292	5.55	222.4
12	83	6	2	7.8	15600	2	312	4	624	37	5772	57	8892	0	0	3	0.649	24.02	87.8
12	84	7	2	15.4	30800	0	0	2	616	17	5236	78	24024	3	924	3	0.218	3.71	357.9
13	85	1	2	7.6	15200	5	760	8	1216	31	4712	55	8360	1	152	2	0.564	17.47	97.6
13	86	2	2	14.2	28400	1	284	3	852	36	10224	58	16472	2	568	2	0.621	22.34	93.4
13	87	3	2	7.2	14400	2	288	2	288	22	3168	74	10656	0	0	2	0.297	6.54	248.9
13	88	4	2	14.6	29200	1	292	2	584	54	15768	40	11680	3	876	3	1.350	72.90	29.6
13	89	5	2	11	22000	2	440	4	880	42	9240	51	11220	1	220	3	0.824	34.59	61.9
13	90	6	2	11.4	22800	2	456	2	456	41	9348	53	12084	2	456	2	0.774	31.72	68.5
13	91	7	2	11	22000	0	0	2	440	21	4620	75	16500	2	440	3	0.280	5.88	267.9
14	92	1	2	16	32000	1	320	2	640	25	8000	67	21440	5	1600		0.373	9.33	179.6

2nd Post-treatment Sampling

14	93	2	2																
14	94	3	2																
14	95	4	2																
14	96	5	2																
14	97	6	2																
14	98	7	2																
15	99	1	2																
15	100	2	2																
15	101	3	2																
15	102	4	2	9.2	18400	2	368	2	368	30	5520	64	11776	2	368	3	0.469	14.06	136.5
15	103	5	2	7.6	15200	2	304	2	304	24	3648	70	10640	2	304	0	0.343	8.23	204.2
15	104	6	2																
15	105	7	2	11.4	22800	2	456	2	456	12	2736	82	18696	2	456	2	0.146	1.76	560.3
16	106	1	2	17.6	35200	1	352	3	1056	39	13728	54	19008	3	1056	2	0.722	28.17	74.8
16	107	2	2	10.8	21600	0	0	8	1728	16	3456	74	15984	2	432	2	0.216	3.46	342.3
16	108	3	2	6.8	13600	4	544	6	816	31	4216	59	8024	0	0	3	0.525	16.29	112.3
16	109	4	2	10.4	20800	2	416	0	0	32	6656	66	13728	0	0	2	0.485	15.52	136.1
16	110	5	2																
16	111	6	2																
16	112	7	2																
17	113	1	2	11	22000	0	0	0	0	29	6380	69	15180	2	440	1	0.420	12.19	164.2
17	114	2	2	16.2	32400	2	648	3	972	46	14904	48	15552	1	324	3	0.958	44.08	50.1
17	115	3	2	5.6	11200	2	224	2	224	32	3584	64	7168	0	0	0	0.500	16.00	128.0
17	116	4	2	7.4	14800	3	444	0	0	17	2516	80	11840	0	0	0	0.213	3.61	376.5
17	117	5	2	8.6	17200	2	344	0	0	36	6192	60	10320	2	344	4	0.600	21.60	100.0
17	118	6	2	12.4	24800	4	992	2	496	14	3472	78	19344	2	496	3	0.179	2.51	434.6
17	119	7	2	12.8	25600	2	512	4	1024	16	4096	76	19456	2	512	1	0.211	3.37	361.0
18	120	1	2	10.4	20800	2	416	6	1248	24	4992	66	13728	2	416	2	0.364	8.73	181.5
18	121	2	2	15.6	31200	1	312	7	2184	45	14040	44	13728	3	936	1	1.023	46.02	43.0
18	122	3	2	13.4	26800	2	536	2	536	12	3216	80	21440	4	1072	1	0.150	1.80	533.3
18	123	4	2	13.4	26800	4	1072	0	0	20	5360	76	20368	0	0	3	0.263	5.26	288.8

2nd Post-treatment Sampling

18	124	5	2	11.8	23600	4	944	2	472	36	8496	56	13216	2	472	2	0.643	23.14	87.1
18	125	6	2	10	20000	4	800	0	0	27	5400	68	13600	1	200	0	0.397	10.72	171.3
18	126	7	2	12.2	24400	3	732	0	0	27	6588	68	16592	2	488	1	0.397	10.72	171.3
19	127	1	2	16.6	33200	1	332	0	0	28	9296	68	22576	3	996	4	0.412	11.53	165.1
19	128	2	2	17.4	34800	1	348	2	696	17	5916	76	26448	4	1392	3	0.224	3.80	339.8
19	129	3	2	23.8	47600	1	476	1	476	53	25228	40	19040	5	2380	3	1.325	70.23	30.2
19	130	4	2	13.6	27200	0	0	4	1088	14	3808	79	21488	3	816	2	0.177	2.48	445.8
19	131	5	2	9.8	19600	2	392	2	392	14	2744	82	16072	0	0	3	0.171	2.39	480.3
19	132	6	2	12.6	25200	0	0	0	0	30	7560	68	17136	2	504	2	0.441	13.24	154.1
19	133	7	2	16.6	33200	1	332	9	2988	25	8300	60	19920	5	1660	2	0.417	10.42	144.0
20	134	1	2	6.2	12400	2	248	0	0	18	2232	78	9672	2	248	0	0.231	4.15	338.0
20	135	2	2	8.6	17200	2	344	5	860	33	5676	58	9976	2	344	1	0.569	18.78	101.9
20	136	3	2	10.8	21600	1	216	2	432	16	3456	79	17064	2	432	0	0.203	3.24	390.1
20	137	4	2	9.2	18400	4	736	0	0	13	2392	78	14352	5	920	0	0.167	2.17	468.0
20	138	5	2	8.2	16400	5	820	2	328	28	4592	65	10660	0	0	0	0.431	12.06	150.9
20	139	6	2	8.4	16800	6	1008	4	672	24	4032	64	10752	2	336	0	0.375	9.00	170.7
20	140	7	2	6.6	13200	0	0	4	528	35	4620	61	8052	0	0	2	0.574	20.08	106.3
21	141	1	3	6.2	12400	4	496	2	248	24	2976	66	8184	4	496	2	0.364	8.73	181.5
21	142	2	3	10.8	21600	2	432	1	216	36	7776	57	12312	4	864	1	0.632	22.74	90.3
21	143	3	3	15	30000	3	900	6	1800	27	8100	60	18000	4	1200	1	0.450	12.15	133.3
21	144	4	3	11.8	23600	8	1888	1	236	23	5428	64	15104	4	944	0	0.359	8.27	178.1
21	145	5	3	11.2	22400	2	448	2	448	26	5824	66	14784	4	896	2	0.394	10.24	167.5
21	146	6	3	12	24000	0	0	2	480	22	5280	74	17760	2	480	0	0.297	6.54	248.9
21	147	7	3	7	14000	5	700	7	980	33	4620	55	7700	0	0	0	0.600	19.80	91.7

3rd Post-Treatment Sampling

Pen	Bird	treat	sex	AVG	TWBC	Baso	Abs Bas	Eosin	Abs Eos	Hetero	Abs Het	Lym	Abs Lym	Mono	Abs Mon	*Haemo*	H:L Ratio	Trans H:L	Trans L:H
1	1	1	1	8.4	16800	1	168	10	1680	35	5880	52	8736	2	336	1	0.673	23.56	77.26
1	2	2	1	5.2	10400	2	208	8	832	32	3328	52	5408	6	624	0	0.615	19.69	84.50
1	3	3	1	7.6	15200	5	760	20	3040	35	5320	35	5320	5	760	1	1.000	35.00	35.00
1	4	4	1	7.8	15600	3	468	11	1716	33	5148	43	6708	10	1560	1	0.767	25.33	56.03
1	5	5	1	8.4	16800	4	672	14	2352	32	5376	44	7392	6	1008	1	0.727	23.27	60.50
1	6	6	1																
1	7	7	1																
2	8	1	1	7	14000	2	280	15	2100	35	4900	42	5880	6	840	4	0.833	29.17	50.40
2	9	2	1	10.8	21600	0	0	2	432	32	6912	60	12960	6	1296	1	0.533	17.07	112.50
2	10	3	1	9.2	18400	2	368	5	920	33	6072	52	9568	8	1472	0	0.635	20.94	81.94
2	11	4	1	5.4	10800	2	216	10	1080	32	3456	48	5184	8	864	3	0.667	21.33	72.00
2	12	5	1	5	10000	2	200	2	200	26	2600	68	6800	2	200	3	0.382	9.94	177.85
2	13	6	1	2.8	5600	0	0	11	616	20	1120	69	3864	0	0	0	0.290	5.80	238.05
2	14	7	1	5.2	10400	2	208	4	416	26	2704	62	6448	6	624	1	0.419	10.90	147.85
3	15	1	1	6	12000	3	360	2	240	16	1920	75	9000	4	480	1	0.213	3.41	351.56
3	16	2	1	5.6	11200	4	448	0	0	8	896	84	9408	4	448	2	0.095	0.76	882.00
3	17	3	1	10	20000	6	1200	22	4400	16	3200	54	10800	2	400	3	0.296	4.74	182.25
3	18	4	1	8.4	16800	2	336	0	0	11	1848	79	13272	8	1344	0	0.139	1.53	567.36
3	19	5	1	9.4	18800	2	376	4	752	8	1504	78	14664	8	1504	2	0.103	0.82	760.50
3	20	6	1	5.2	10400	0	0	2	208	20	2080	72	7488	6	624	2	0.278	5.56	259.20
3	21	7	1	5.4	10800	4	432	2	216	14	1512	72	7776	8	864	0	0.194	2.72	370.29
4	22	1	1	10.4	20800	0	0	4	832	26	5408	65	13520	5	1040	1	0.400	10.40	162.50
4	23	2	1	10.8	21600	1	216	2	432	12	2592	82	17712	3	648	0	0.146	1.76	560.33
4	24	3	1	6.8	13600	2	272	2	272	26	3536	66	8976	4	544	3	0.394	10.24	167.54
4	25	4	1	7.2	14400	2	288	6	864	22	3168	65	9360	5	720	2	0.338	7.45	192.05
4	26	5	1	6.4	12800	6	768	4	512	16	2048	71	9088	3	384	0	0.225	3.61	315.06
4	27	6	1	4.4	8800	2	176	5	440	33	2904	56	4928	4	352	1	0.589	19.45	95.03
4	28	7	1	6	12000	2	240	5	600	28	3360	63	7560	2	240	1	0.444	12.44	141.75
5	29	1	1	9.8	19600	0	0	8	1568	28	5488	61	11956	3	588	1	0.459	12.85	132.89
5	30	2	1	6.4	12800	2	256	0	0	18	2304	76	9728	4	512	1	0.237	4.26	320.89

3rd Post-Treatment Sampling

5	31	3	1	9.2	18400	2	368	0	0	14	2576	82	15088	2	368	0	0.171	2.39	480.29
5	32	4	1	5.6	11200	2	224	2	224	8	896	86	9632	2	224	0	0.093	0.74	924.50
5	33	5	1	11.2	22400	1	224	1	224	3	672	91	20384	4	896	1	0.033	0.10	2760.33
5	34	6	1	12.6	25200	3	756	3	756	20	5040	74	18648	0	0	1	0.270	5.41	273.80
5	35	7	1	8.6	17200	4	688	4	688	26	4472	62	10664	4	688	2	0.419	10.90	147.85
6	36	1	1	4.2	8400	0	0	0	0	34	2856	60	5040	6	504	0	0.567	19.27	105.88
6	37	2	1	6.6	13200	3	396	8	1056	20	2640	67	8844	2	264	0	0.299	5.97	224.45
6	38	3	1	4.6	9200	2	184	2	184	18	1656	72	6624	6	552	1	0.250	4.50	288.00
6	39	4	1	2.6	5200	5	260	4	208	18	936	69	3588	4	208	1	0.261	4.70	264.50
6	40	5	1	6.2	12400	0	0	10	1240	12	1488	78	9672	0	0	0	0.154	1.85	507.00
6	41	6	1	4.8	9600	2	192	10	960	24	2304	60	5760	4	384	2	0.400	9.60	150.00
6	42	7	1	11.2	22400	4	896	2	448	43	9632	46	10304	5	1120	2	0.935	40.20	49.21
7	43	1	1	10.2	20400	0	0	10	2040	24	4896	65	13260	1	204	1	0.369	8.86	176.04
7	44	2	1	6	12000	2	240	0	0	18	2160	78	9360	2	240	2	0.231	4.15	338.00
7	45	3	1	6	12000	0	0	2	240	14	1680	82	9840	2	240	2	0.171	2.39	480.29
7	46	4	1	5.8	11600	1	116	1	116	9	1044	86	9976	3	348	0	0.105	0.94	821.78
7	47	5	1	6.4	12800	2	256	4	512	16	2048	76	9728	2	256	2	0.211	3.37	361.00
7	48	6	1	20.6	41200	3	1236	6	2472	52	21424	36	14832	3	1236	0	1.444	75.11	24.92
7	49	7	1	10.4	20800	2	416	6	1248	22	4576	66	13728	4	832	1	0.333	7.33	198.00
8	50	1	1	7.4	14800	0	0	3	444	18	2664	74	10952	5	740	1	0.243	4.38	304.22
8	51	2	1	8.2	16400	2	328	3	492	16	2624	78	12792	1	164	0	0.205	3.28	380.25
8	52	3	1	5.8	11600	0	0	2	232	38	4408	58	6728	2	232	3	0.655	24.90	88.53
8	53	4	1	6.6	13200	0	0	2	264	24	3168	69	9108	5	660	3	0.348	8.35	198.38
8	54	5	1																
8	55	6	1	7.4	14800	2	296	2	296	16	2368	72	10656	8	1184	2	0.222	3.56	324.00
8	56	7	1	5.8	11600	2	232	0	0	35	4060	60	6960	3	348	1	0.583	20.42	102.86
9	57	1	1	6	12000	2	240	6	720	26	3120	66	7920	0	0	4	0.394	10.24	167.54
9	58	2	1	8.8	17600	0	0	2	352	22	3872	72	12672	4	704	1	0.306	6.72	235.64
9	59	3	1	5.2	10400	4	416	0	0	14	1456	78	8112	4	416	3	0.179	2.51	434.57
9	60	4	1	6.8	13600	4	544	6	816	38	5168	52	7072	0	0	1	0.731	27.77	71.16
9	61	5	1	15.4	30800	4	1232	2	616	32	9856	60	18480	2	616	1	0.533	17.07	112.50

3rd Post-Treatment Sampling

9	62	6	1	12.2	24400	2	488	2	488	8	1952	86	20984	2	488	3	0.093	0.74	924.50
9	63	7	1	11.4	22800	4	912	4	912	31	7068	61	13908	0	0	1	0.508	15.75	120.03
10	64	1	2	7.2	14400	2	288	2	288	26	3744	66	9504	4	576	1	0.394	10.24	167.54
10	65	2	2	19.6	39200	3	1176	0	0	38	14896	55	21560	4	1568	1	0.691	26.25	79.61
10	66	3	2	10.4	20800	2	416	0	0	42	8736	54	11232	2	416	1	0.778	32.67	69.43
10	67	4	2	10.6	21200	0	0	1	212	17	3604	79	16748	3	636	4	0.215	3.66	367.12
10	68	5	2	8.6	17200	2	344	0	0	15	2580	83	14276	0	0	2	0.181	2.71	459.27
10	69	6	2	8.4	16800	6	1008	2	336	28	4704	62	10416	2	336	1	0.452	12.65	137.29
10	70	7	2	8	16000	0	0	2	320	36	5760	62	9920	0	0	1	0.581	20.90	106.78
11	71	1	2	12	24000	2	480	2	480	62	14880	34	8160	0	0	3	1.824	113.06	18.65
11	72	2	2	12	24000	2	480	0	0	37	8880	61	14640	0	0	2	0.607	22.44	100.57
11	73	3	2	4.4	8800	1	88	0	0	14	1232	84	7392	1	88	1	0.167	2.33	504.00
11	74	4	2	19.2	38400	3	1152	6	2304	24	9216	63	24192	4	1536	3	0.381	9.14	165.38
11	75	5	2	14.6	29200	4	1168	2	584	31	9052	61	17812	2	584	2	0.508	15.75	120.03
11	76	6	2	8.6	17200	0	0	4	688	22	3784	74	12728	0	0	1	0.297	6.54	248.91
11	77	7	2	16.4	32800	3	984	0	0	30	9840	66	21648	1	328	4	0.455	13.64	145.20
12	78	1	2	15.6	31200	1	312	1	312	30	9360	67	20904	1	312	3	0.448	13.43	149.63
12	79	2	2	15.6	31200	2	624	2	624	34	10608	60	18720	2	624	4	0.567	19.27	105.88
12	80	3	2	10.2	20400	2	408	4	816	18	3672	74	15096	2	408	3	0.243	4.38	304.22
12	81	4	2	9.4	18800	4	752	4	752	26	4888	64	12032	2	376	4	0.406	10.56	157.54
12	82	5	2	8.8	17600	0	0	4	704	32	5632	62	10912	2	352	4	0.516	16.52	120.13
12	83	6	2	12.6	25200	4	1008	2	504	10	2520	80	20160	4	1008	2	0.125	1.25	640.00
12	84	7	2	7.4	14800	0	0	0	0	20	2960	78	11544	2	296	2	0.256	5.13	304.20
13	85	1	2	15.6	31200	3	936	1	312	30	9360	65	20280	1	312	3	0.462	13.85	140.83
13	86	2	2	20.4	40800	0	0	3	1224	14	5712	82	33456	1	408	2	0.171	2.39	480.29
13	87	3	2	17.4	34800	1	348	6	2088	17	5916	72	25056	4	1392	3	0.236	4.01	304.94
13	88	4	2	10.8	21600	3	648	1	216	19	4104	75	16200	2	432	3	0.253	4.81	296.05
13	89	5	2	11.6	23200	1	232	2	464	47	10904	47	10904	3	696	3	1.000	47.00	47.00
13	90	6	2	14	28000	1	280	0	0	10	2800	86	24080	3	840	0	0.116	1.16	739.60
13	91	7	2																
14	92	1	2	8.2	16400	0	0	6	984	28	4592	64	10496	2	328	3	0.438	12.25	146.29

3rd Post-Treatment Sampling

14	93	2	2	10.8	21600	4	864	0	0	28	6048	66	14256	2	432	2	0.424	11.88	155.57
14	94	3	2	12.6	25200	1	252	7	1764	14	3528	74	18648	4	1008	2	0.189	2.65	391.14
14	95	4	2	10.6	21200	0	0	8	1696	20	4240	70	14840	2	424	4	0.286	5.71	245.00
14	96	5	2	15.4	30800	0	0	4	1232	26	8008	63	19404	7	2156	3	0.413	10.73	152.65
14	97	6	2	7	14000	0	0	2	280	32	4480	66	9240	0	0	0	0.485	15.52	136.13
14	98	7	2	13	26000	2	520	3	780	16	4160	77	20020	2	520	0	0.208	3.32	370.56
15	99	1	2	10.8	21600	3	648	0	0	23	4968	73	15768	1	216	2	0.315	7.25	231.70
15	100	2	2	6.6	13200	0	0	2	264	27	3564	67	8844	4	528	2	0.403	10.88	166.26
15	101	3	2	14.4	28800	2	576	5	1440	8	2304	80	23040	5	1440	2	0.100	0.80	800.00
15	102	4	2	7.8	15600	2	312	4	624	24	3744	68	10608	2	312	3	0.353	8.47	192.67
15	103	5	2	9.8	19600	2	392	4	784	19	3724	71	13916	4	784	2	0.268	5.08	265.32
15	104	6	2	8.2	16400	0	0	2	328	26	4264	70	11480	2	328	3	0.371	9.66	188.46
15	105	7	2	15	30000	3	900	6	1800	21	6300	69	20700	1	300	3	0.304	6.39	226.71
16	106	1	2																
16	107	2	2	9.6	19200	12	2304	0	0	8	1536	78	14976	2	384	2	0.103	0.82	760.50
16	108	3	2																
16	109	4	2	8.4	16800	2	336	4	672	18	3024	74	12432	2	336	3	0.243	4.38	304.22
16	110	5	2																
16	111	6	2	9.2	18400	2	368	12	2208	12	2208	70	12880	4	736	3	0.171	2.06	408.33
16	112	7	2	13.6	27200	3	816	2	544	27	7344	67	18224	1	272	2	0.403	10.88	166.26
17	113	1	2	6.6	13200	1	132	3	396	12	1584	83	10956	1	132	0	0.145	1.73	574.08
17	114	2	2																
17	115	3	2																
17	116	4	2	9.6	19200	2	384	2	384	20	3840	72	13824	4	768	2	0.278	5.56	259.20
17	117	5	2	5.2	10400	8	832	2	208	32	3328	56	5824	2	208	4	0.571	18.29	98.00
17	118	6	2	10.4	20800	0	0	2	416	30	6240	66	13728	2	416	3	0.455	13.64	145.20
17	119	7	2	6	12000	4	480	0	0	14	1680	82	9840	0	0	2	0.171	2.39	480.29
18	120	1	2	12	24000	3	720	2	480	27	6480	67	16080	1	240	3	0.403	10.88	166.26
18	121	2	2	12.4	24800	2	496	3	744	15	3720	76	18848	4	992	1	0.197	2.96	385.07
18	122	3	2	11.6	23200	3	696	3	696	11	2552	80	18560	3	696	1	0.138	1.51	581.82
18	123	4	2	8	16000	4	640	1	160	20	3200	73	11680	2	320	3	0.274	5.48	266.45

3rd Post-Treatment Sampling

18	124	5	2	11.4	22800	0	0	2	456	47	10716	49	11172	2	456	3	0.959	45.08	51.09
18	125	6	2	9.4	18800	0	0	1	188	15	2820	81	15228	3	564	2	0.185	2.78	437.40
18	126	7	2	11.8	23600	2	472	4	944	15	3540	78	18408	1	236	2	0.192	2.88	405.60
19	127	1	2	12.2	24400	4	976	5	1220	27	6588	59	14396	5	1220	2	0.458	12.36	128.93
19	128	2	2	11.6	23200	0	0	2	464	18	4176	78	18096	2	464	3	0.231	4.15	338.00
19	129	3	2	13.6	27200	0	0	5	1360	26	7072	66	17952	3	816	3	0.394	10.24	167.54
19	130	4	2																
19	131	5	2																
19	132	6	2																
19	133	7	2																
20	134	1	2	9.8	19600	0	0	2	392	21	4116	70	13720	7	1372	0	0.300	6.30	233.33
20	135	2	2	8.4	16800	1	168	0	0	9	1512	85	14280	5	840	2	0.106	0.95	802.78
20	136	3	2	8.8	17600	1	176	0	0	25	4400	66	11616	8	1408	2	0.379	9.47	174.24
20	137	4	2	10	20000	1	200	1	200	28	5600	60	12000	10	2000	2	0.467	13.07	128.57
20	138	5	2	7	14000	0	0	9	1260	19	2660	66	9240	6	840	2	0.288	5.47	229.26
20	139	6	2	6.6	13200	2	264	10	1320	14	1848	64	8448	10	1320	0	0.219	3.06	292.57
20	140	7	2																
21	141	1	3																
21	142	2	3	4.8	9600	0	0	2	192	26	2496	70	6720	2	192	4	0.371	9.66	188.46
21	143	3	3	4.6	9200	4	368	4	368	19	1748	70	6440	3	276	0	0.271	5.16	257.89
21	144	4	3	7.8	15600	1	156	2	312	28	4368	67	10452	2	312	2	0.418	11.70	160.32
21	145	5	3	13.8	27600	2	552	2	552	19	5244	74	20424	3	828	2	0.257	4.88	288.21
21	146	6	3	4.4	8800	2	176	4	352	10	880	82	7216	2	176	2	0.122	1.22	672.40
21	147	7	3	3	6000	6	360	2	120	32	1920	58	3480	2	120	2	0.552	17.66	105.13
22	148	1	3	8.8	17600	2	352	6	1056	35	6160	56	9856	1	176	2	0.625	21.88	89.60

4th Post-Treatment Sampling

Pen	Bird	treat	sex	AVG	TWBC	Baso	Abs Bas	Eosin	Abs Eos	Hetero	Abs Het	Lym	Abs Lym	Mono	Abs Mon	*Haemo*	H:L Ratio	Trans H:L	Trans L:H
1	1	1	1	5	10000	2	200	2	200	36	3600	58	5800	2	200	1	0.621	22.34	93.44
1	2	2	1	3.2	6400	6	384	0	0	32	2048	60	3840	2	128	1	0.533	17.07	112.50
1	3	3	1	2.6	5200	0	0	2	104	24	1248	72	3744	2	104	1	0.333	8.00	216.00
1	4	4	1	3.4	6800	5	340	0	0	42	2856	49	3332	4	272	2	0.857	36.00	57.17
1	5	5	1	4	8000	4	320	0	0	36	2880	58	4640	2	160	1	0.621	22.34	93.44
1	6	6	1																
1	7	7	1																
2	8	1	1	2.6	5200	2	104	2	104	32	1664	62	3224	2	104	1	0.516	16.52	120.13
2	9	2	1	7.8	15600	1	156	3	468	42	6552	52	8112	2	312	0	0.808	33.92	64.38
2	10	3	1	3.4	6800	2	136	2	136	38	2584	56	3808	2	136	2	0.679	25.79	82.53
2	11	4	1	4.4	8800	6	528	0	0	36	3168	55	4840	3	264	1	0.655	23.56	84.03
2	12	5	1	3.8	7600	4	304	4	304	48	3648	40	3040	4	304	1	1.200	57.60	33.33
2	13	6	1	1.8	3600	0	0	4	144	50	1800	44	1584	2	72	0	1.136	56.82	38.72
2	14	7	1	5.4	10800	0	0	2	216	46	4968	50	5400	2	216	1	0.920	42.32	54.35
3	15	1	1	8.4	16800	2	336	0	0	18	3024	74	12432	6	1008	2	0.243	4.38	304.22
3	16	2	1	6.2	12400	1	124	0	0	19	2356	75	9300	5	620	2	0.253	4.81	296.05
3	17	3	1	5.8	11600	5	580	1	116	21	2436	68	7888	5	580	2	0.309	6.49	220.19
3	18	4	1	7.8	15600	0	0	1	156	18	2808	74	11544	7	1092	2	0.243	4.38	304.22
3	19	5	1	11	22000	2	440	0	0	19	4180	72	15840	7	1540	0	0.264	5.01	272.84
3	20	6	1	6.8	13600	3	408	2	272	16	2176	75	10200	4	544	2	0.213	3.41	351.56
3	21	7	1	9.2	18400	0	0	2	368	17	3128	72	13248	9	1656	2	0.236	4.01	304.94
4	22	1	1	3.6	7200	4	288	0	0	34	2448	58	4176	4	288	2	0.586	19.93	98.94
4	23	2	1	10	20000	2	400	5	1000	17	3400	71	14200	5	1000	2	0.239	4.07	296.53
4	24	3	1	10	20000	10	2000	2	400	21	4200	63	12600	4	800	2	0.333	7.00	189.00
4	25	4	1	10	20000	6	1200	4	800	27	5400	59	11800	4	800	2	0.458	12.36	128.93
4	26	5	1	1.2	2400	9	216	2	48	30	720	57	1368	2	48	1	0.526	15.79	108.30
4	27	6	1	3	6000	0	0	2	120	16	960	78	4680	4	240	1	0.205	3.28	380.25
4	28	7	1	5.4	10800	2	216	2	216	36	3888	60	6480	0	0	1	0.600	21.60	100.00
5	29	1	1	8.4	16800	0	0	1	168	26	4368	70	11760	3	504	2	0.371	9.66	188.46
5	30	2	1	9.2	18400	3	552	0	0	14	2576	77	14168	6	1104	0	0.182	2.55	423.50

4th Post-Treatment Sampling

5	31	3	1	12	24000	0	0	1	240	32	7680	64	15360	3	720	2	0.500	16.00	128.00
5	32	4	1	7.8	15600	2	312	1	156	35	5460	60	9360	2	312	2	0.583	20.42	102.86
5	33	5	1	9.4	18800	2	376	2	376	27	5076	67	12596	2	376	2	0.403	10.88	166.26
5	34	6	1	5.4	10800	1	108	0	0	30	3240	63	6804	6	648	2	0.476	14.29	132.30
5	35	7	1	15.2	30400	0	0	0	0	14	4256	79	24016	7	2128	2	0.177	2.48	445.79
6	36	1	1	5.4	10800	0	0	0	0	27	2916	71	7668	2	216	2	0.380	10.27	186.70
6	37	2	1	10.6	21200	2	424	1	212	13	2756	79	16748	5	1060	0	0.165	2.14	480.08
6	38	3	1	12.6	25200	0	0	5	1260	14	3528	77	19404	4	1008	3	0.182	2.55	423.50
6	39	4	1	11.8	23600	2	472	4	944	23	5428	70	16520	1	236	2	0.329	7.56	213.04
6	40	5	1																
6	41	6	1																
6	42	7	1																
7	43	1	1																
7	44	2	1																
7	45	3	1																
7	46	4	1																
7	47	5	1																
7	48	6	1																
7	49	7	1																
8	50	1	1	7.8	15600	0	0	0	0	11	1716	86	13416	3	468	0	0.128	1.41	672.36
8	51	2	1	2.2	4400	1	44	0	0	68	2992	30	1320	1	44	2	2.267	154.13	13.24
8	52	3	1	7	14000	2	280	1	140	39	5460	54	7560	4	560	2	0.722	28.17	74.77
8	53	4	1	5.2	10400	1	104	0	0	44	4576	50	5200	5	520	2	0.880	38.72	56.82
8	54	5	1	5	10000	1	100	4	400	25	2500	67	6700	3	300	2	0.373	9.33	179.56
8	55	6	1	3.8	7600	2	152	4	304	23	1748	66	5016	5	380	2	0.348	8.02	189.39
8	56	7	1	4.6	9200	0	0	4	368	22	2024	71	6532	3	276	2	0.310	6.82	229.14
9	57	1	1	17	34000	4	1360	1	340	26	8840	67	22780	2	680	3	0.388	10.09	172.65
9	58	2	1	5.4	10800	4	432	0	0	32	3456	60	6480	4	432	1	0.533	17.07	112.50
9	59	3	1	12.8	25600	1	256	1	256	6	1536	91	23296	1	256	3	0.066	0.40	1380.17
9	60	4	1	8.2	16400	0	0	2	328	48	7872	47	7708	3	492	1	1.021	49.02	46.02
9	61	5	1	3	6000	2	120	4	240	36	2160	56	3360	2	120	3	0.643	23.14	87.11

4th Post-Treatment Sampling

9	62	6	1	6.8	13600	6	816	2	272	46	6256	44	5984	2	272	4	1.045	48.09	42.09
9	63	7	1	4.2	8400	2	168	2	168	26	2184	68	5712	2	168	2	0.382	9.94	177.85
10	64	1	2	8.2	16400	2	328	0	0	20	3280	78	12792	0	0	1	0.256	5.13	304.20
10	65	2	2	15.8	31600	0	0	0	0	17	5372	81	25596	2	632	2	0.210	3.57	385.94
10	66	3	2	13.4	26800	1	268	1	268	12	3216	86	23048	0	0	2	0.140	1.67	616.33
10	67	4	2	11.4	22800	2	456	2	456	32	7296	62	14136	2	456	4	0.516	16.52	120.13
10	68	5	2	10	20000	0	0	8	1600	26	5200	56	11200	10	2000	2	0.464	12.07	120.62
10	69	6	2	11.4	22800	4	912	2	456	20	4560	72	16416	2	456	2	0.278	5.56	259.20
10	70	7	2	4.6	9200	4	368	4	368	30	2760	60	5520	2	184	3	0.500	15.00	120.00
11	71	1	2	7.6	15200	0	0	0	0	34	5168	60	9120	6	912	4	0.567	19.27	105.88
11	72	2	2	10.8	21600	7	1512	4	864	23	4968	61	13176	5	1080	4	0.377	8.67	161.78
11	73	3	2	18	36000	2	720	4	1440	21	7560	68	24480	5	1800	3	0.309	6.49	220.19
11	74	4	2	11.4	22800	2	456	0	0	40	9120	54	12312	4	912	3	0.741	29.63	72.90
11	75	5	2	4.8	9600	2	192	2	192	30	2880	59	5664	7	672	0	0.508	15.25	116.03
11	76	6	2	11.4	22800	4	912	2	456	24	5472	70	15960	0	0	2	0.343	8.23	204.17
11	77	7	2	13	26000	1	260	0	0	41	10660	52	13520	6	1560	2	0.788	32.33	65.95
12	78	1	2																
12	79	2	2																
12	80	3	2																
12	81	4	2																
12	82	5	2																
12	83	6	2																
12	84	7	2																
13	85	1	2																
13	86	2	2																
13	87	3	2																
13	88	4	2																
13	89	5	2																
13	90	6	2																
13	91	7	2	6.6	13200	2	264	2	264	32	4224	60	7920	4	528	4	0.533	17.07	112.50
14	92	1	2	10	20000	6	1200	4	800	24	4800	63	12600	3	600	3	0.381	9.14	165.38

4th Post-Treatment Sampling

14	93	2	2	17	34000	0	0	0	0	44	14960	50	17000	6	2040	3	0.880	38.72	56.82
14	94	3	2	13.8	27600	0	0	1	276	17	4692	81	22356	1	276	2	0.210	3.57	385.94
14	95	4	2	5.8	11600	2	232	0	0	22	2552	74	8584	2	232	2	0.297	6.54	248.91
14	96	5	2	9.8	19600	0	0	2	392	20	3920	74	14504	4	784	3	0.270	5.41	273.80
14	97	6	2	7.6	15200	2	304	0	0	21	3192	74	11248	3	456	2	0.284	5.96	260.76
14	98	7	2	9.8	19600	4	784	2	392	22	4312	72	14112	0	0	3	0.306	6.72	235.64
15	99	1	2	13.4	26800	3	804	2	536	20	5360	74	19832	1	268	2	0.270	5.41	273.80
15	100	2	2	9.2	18400	2	368	8	1472	14	2576	69	12696	7	1288	3	0.203	2.84	340.07
15	101	3	2	4.6	9200	2	184	6	552	26	2392	64	5888	2	184	3	0.406	10.56	157.54
15	102	4	2	11.4	22800	0	0	4	912	8	1824	88	20064	0	0	2	0.091	0.73	968.00
15	103	5	2	5	10000	4	400	0	0	42	4200	48	4800	6	600	3	0.875	36.75	54.86
15	104	6	2																
15	105	7	2																
16	106	1	2																
16	107	2	2																
16	108	3	2																
16	109	4	2																
16	110	5	2																
16	111	6	2																
16	112	7	2																
17	113	1	2																
17	114	2	2																
17	115	3	2																
17	116	4	2																
17	117	5	2	3.8	7600	4	304	8	608	28	2128	60	4560	0	0	4	0.467	13.07	128.57
17	118	6	2	11.4	22800	0	0	2	456	22	5016	74	16872	2	456	3	0.297	6.54	248.91
17	119	7	2	8.2	16400	4	656	0	0	42	6888	48	7872	6	984	3	0.875	36.75	54.86
18	120	1	2	7.2	14400	4	576	2	288	16	2304	78	11232	0	0	3	0.205	3.28	380.25
18	121	2	2	7.2	14400	4	576	2	288	34	4896	60	8640	0	0	2	0.567	19.27	105.88
18	122	3	2	39.6	79200	2	1584	0	0	73	57816	21	16632	4	3168	3	3.476	253.76	6.04
18	123	4	2	6.2	12400	0	0	0	0	18	2232	80	9920	2	248	3	0.225	4.05	355.56

18	124	5	2	9	18000	4	720	2	360	23	4140	69	12420	2	360	1	0.333	7.67	207.00
18	125	6	2	6.8	13600	0	0	2	272	16	2176	77	10472	5	680	2	0.208	3.32	370.56
18	126	7	2	8.2	16400	2	328	2	328	12	1968	80	13120	4	656	2	0.150	1.80	533.33
19	127	1	2	10.4	20800	1	208	9	1872	22	4576	64	13312	4	832	2	0.344	7.56	186.18
19	128	2	2	6.8	13600	2	272	4	544	34	4624	56	7616	4	544	3	0.607	20.64	92.24
19	129	3	2	5.2	10400	0	0	6	624	24	2496	70	7280	0	0	2	0.343	8.23	204.17
19	130	4	2	11.6	23200	2	464	7	1624	13	3016	75	17400	3	696	2	0.173	2.25	432.69
19	131	5	2	5.4	10800	2	216	0	0	34	3672	59	6372	5	540	4	0.576	19.59	102.38
19	132	6	2	13.4	26800	5	1340	1	268	21	5628	68	18224	5	1340	4	0.309	6.49	220.19
19	133	7	2	6.4	12800	2	256	6	768	26	3328	64	8192	2	256	3	0.406	10.56	157.54
20	134	1	2	5.2	10400	5	520	4	416	46	4784	42	4368	3	312	0	1.095	50.38	38.35
20	135	2	2	8.2	16400	2	328	4	656	36	5904	56	9184	2	328	0	0.643	23.14	87.11
20	136	3	2	8.6	17200	4	688	8	1376	47	8084	37	6364	4	688	1	1.270	59.70	29.13
20	137	4	2	6.4	12800	3	384	3	384	34	4352	59	7552	1	128	0	0.576	19.59	102.38
20	138	5	2	5.2	10400	1	104	0	0	30	3120	67	6968	2	208	0	0.448	13.43	149.63
20	139	6	2	4.6	9200	0	0	0	0	32	2944	64	5888	4	368	3	0.500	16.00	128.00
20	140	7	2																
21	141	1	3	2.6	5200	2	104	6	312	44	2288	48	2496	0	0	0	0.917	40.33	52.36
21	142	2	3	7	14000	8	1120	0	0	46	6440	44	6160	2	280	1	1.045	48.09	42.09
21	143	3	3	6.8	13600	3	408	0	0	35	4760	60	8160	2	272	0	0.583	20.42	102.86
21	144	4	3	4.4	8800	0	0	6	528	18	1584	73	6424	3	264	1	0.247	4.44	296.06
21	145	5	3	3.8	7600	4	304	0	0	26	1976	68	5168	2	152	3	0.382	9.94	177.85
21	146	6	3	7.6	15200	5	760	1	152	34	5168	52	7904	8	1216	0	0.654	22.23	79.53
21	147	7	3	5.2	10400	6	624	0	0	30	3120	60	6240	4	416	1	0.500	15.00	120.00
22	148	1	3	5.6	11200	2	224	8	896	36	4032	52	5824	2	224	1	0.692	24.92	75.11
22	149	2	3	6.4	12800	2	256	0	0	54	6912	40	5120	4	512	0	1.350	72.90	29.63
22	150	3	3	6.2	12400	2	248	8	992	42	5208	44	5456	4	496	1	0.955	40.09	46.10
22	151	4	3	4	8000	0	0	0	0	40	3200	58	4640	2	160	1	0.690	27.59	84.10
22	152	5	3	7.6	15200	0	0	1	152	37	5624	60	9120	2	304	1	0.617	22.82	97.30
22	153	6	3	4.2	8400	2	168	8	672	48	4032	36	3024	6	504	2	1.333	64.00	27.00
22	154	7	3	5	10000	0	0	1	100	32	3200	67	6700	0	0	0	0.478	15.28	140.28

5th Post-Treatment Sampling

Pen	Bird	treat	sex	AVG	TWBC	Baso	Abs Bas	Eosin	Abs Eos	Hetero	Abs Het	Lym	Abs Lym	Mono	Abs Mon	*Haemo*	H:L Ratio	Trans H:L	Trans L:H
1	1	1	1	5.2	10400	0	0	4	416	38	3952	56	5824	2	208	1	0.679	25.79	82.53
1	2	2	1	6.4	12800	2	256	0	0	30	3840	66	8448	2	256	1	0.455	13.64	145.20
1	3	3	1	9.4	18800	0	0	2	376	30	5640	68	12784	0	0	1	0.441	13.24	154.13
1	4	4	1	6	12000	0	0	2	240	31	3720	63	7560	4	480	1	0.492	15.25	128.03
1	5	5	1	8.2	16400	2	328	2	328	46	7544	50	8200	0	0	1	0.920	42.32	54.35
1	6	6	1																
1	7	7	1																
2	8	1	1	7.2	14400	0	0	6	864	18	2592	76	10944	0	0	1	0.237	4.26	320.89
2	9	2	1	5.4	10800	0	0	2	216	28	3024	70	7560	0	0	4	0.400	11.20	175.00
2	10	3	1	4	8000	2	160	32	2560	16	1280	50	4000	0	0	1	0.320	5.12	156.25
2	11	4	1	4.2	8400	0	0	6	504	32	2688	60	5040	2	168	1	0.533	17.07	112.50
2	12	5	1	4.6	9200	0	0	2	184	14	1288	82	7544	2	184	1	0.171	2.39	480.29
2	13	6	1	8.4	16800	0	0	10	1680	34	5712	54	9072	2	336	1	0.630	21.41	85.76
2	14	7	1	4.6	9200	2	184	10	920	18	1656	70	6440	0	0	0	0.257	4.63	272.22
3	15	1	1	5	10000	0	0	24	2400	10	1000	66	6600	0	0	0	0.152	1.52	435.60
3	16	2	1	6.6	13200	2	264	10	1320	28	3696	58	7656	2	264	1	0.483	13.52	120.14
3	17	3	1	4.6	9200	2	184	2	184	36	3312	60	5520	0	0	1	0.600	21.60	100.00
3	18	4	1	3.2	6400	2	128	2	128	38	2432	58	3712	0	0	0	0.655	24.90	88.53
3	19	5	1	4.4	8800	0	0	2	176	28	2464	66	5808	4	352	1	0.424	11.88	155.57
3	20	6	1	6	12000	6	720	0	0	24	2880	68	8160	2	240	0	0.353	8.47	192.67
3	21	7	1	3.8	7600	0	0	4	304	28	2128	66	5016	2	152	1	0.424	11.88	155.57
4	22	1	1	2	4000	0	0	2	80	58	2320	40	1600	0	0	1	1.450	84.10	27.59
4	23	2	1	5	10000	4	400	0	0	51	5100	45	4500	0	0	1	1.133	57.80	39.71
4	24	3	1	2	4000	4	160	2	80	36	1440	58	2320	0	0	1	0.621	22.34	93.44
4	25	4	1	3.6	7200	4	288	4	288	40	2880	52	3744	0	0	1	0.769	30.77	67.60
4	26	5	1	6.4	12800	2	256	4	512	52	6656	40	5120	2	256	1	1.300	67.60	30.77
4	27	6	1	3.2	6400	0	0	4	256	42	2688	52	3328	2	128	1	0.808	33.92	64.38
4	28	7	1	2.6	5200	2	104	6	312	42	2184	50	2600	0	0	0	0.840	35.28	59.52
5	29	1	1	7.8	15600	6	936	0	0	28	4368	66	10296	0	0	1	0.424	11.88	155.57
5	30	2	1	5.6	11200	2	224	2	224	20	2240	76	8512	0	0	1	0.263	5.26	288.80

5	31	3	1	4.4	8800	8	704	2	176	16	1408	74	6512	0	0	1	0.216	3.46	342.25
5	32	4	1	9	18000	0	0	0	0	16	2880	84	15120	0	0	1	0.190	3.05	441.00
5	33	5	1	4.8	9600	6	576	4	384	50	4800	40	3840	0	0	1	1.250	62.50	32.00
5	34	6	1	5.2	10400	0	0	0	0	36	3744	64	6656	0	0	1	0.563	20.25	113.78
5	35	7	1	3.8	7600	2	152	2	152	28	2128	68	5168	0	0	1	0.412	11.53	165.14
6	36	1	1	5.2	10400	6	624	4	416	16	1664	74	7696	0	0	1	0.216	3.46	342.25
6	37	2	1	6.6	13200	4	528	4	528	22	2904	70	9240	0	0	1	0.314	6.91	222.73
6	38	3	1	9.8	19600	2	392	4	784	46	9016	48	9408	0	0	1	0.958	44.08	50.09
6	39	4	1	2	4000	4	160	2	80	42	1680	48	1920	4	160	0	0.875	36.75	54.86
6	40	5	1	4.4	8800	2	176	2	176	28	2464	68	5984	0	0	0	0.412	11.53	165.14
6	41	6	1	4.2	8400	2	168	4	336	40	3360	54	4536	0	0	1	0.741	29.63	72.90
6	42	7	1	2.8	5600	0	0	4	224	60	3360	36	2016	0	0	1	1.667	100.00	21.60
7	43	1	1	9.4	18800	4	752	0	0	18	3384	78	14664	0	0	1	0.231	4.15	338.00
7	44	2	1	4	8000	4	320	12	960	42	3360	42	3360	0	0	1	1.000	42.00	42.00
7	45	3	1	2.8	5600	2	112	6	336	30	1680	62	3472	0	0	1	0.484	14.52	128.13
7	46	4	1	16.8	33600	5	1680	4	1344	55	18480	36	12096	0	0	0	1.528	84.03	23.56
7	47	5	1	5	10000	10	1000	8	800	30	3000	50	5000	2	200	0	0.600	18.00	83.33
7	48	6	1	3	6000	4	240	0	0	26	1560	68	4080	2	120	1	0.382	9.94	177.85
7	49	7	1	4.8	9600	4	384	4	384	28	2688	64	6144	0	0	0	0.438	12.25	146.29
8	50	1	1	6.2	12400	0	0	0	0	46	5704	52	6448	2	248	1	0.885	40.69	58.78
8	51	2	1	3	6000	5	300	3	180	50	3000	42	2520	0	0	1	1.190	59.52	35.28
8	52	3	1	1.6	3200	6	192	4	128	68	2176	22	704	0	0	1	3.091	210.18	7.12
8	53	4	1	2.8	5600	10	560	6	336	48	2688	36	2016	0	0	1	1.333	64.00	27.00
8	54	5	1	2.6	5200	0	0	0	0	68	3536	32	1664	0	0	1	2.125	144.50	15.06
8	55	6	1	2.8	5600	4	224	0	0	63	3528	33	1848	0	0	4	1.909	120.27	17.29
8	56	7	1	0.8	1600	4	64	0	0	72	1152	24	384	0	0	1	3.000	216.00	8.00
9	57	1	1	5.6	11200	2	224	0	0	38	4256	60	6720	0	0	1	0.633	24.07	94.74
9	58	2	1	2.4	4800	4	192	4	192	54	2592	38	1824	0	0	1	1.421	76.74	26.74
9	59	3	1	6.4	12800	4	512	4	512	52	6656	40	5120	0	0	0	1.300	67.60	30.77
9	60	4	1	11.2	22400	2	448	2	448	40	8960	56	12544	0	0	1	0.714	28.57	78.40
9	61	5	1	5.2	10400	4	416	0	0	18	1872	78	8112	0	0	1	0.231	4.15	338.00

9	62	6	1	7.2	14400	6	864	2	288	34	4896	58	8352	0	0	1	0.586	19.93	98.94
9	63	7	1	10.8	21600	2	432	0	0	13	2808	85	18360	0	0	1	0.153	1.99	555.77
10	64	1	2	4.6	9200	4	368	6	552	28	2576	62	5704	0	0	1	0.452	12.65	137.29
10	65	2	2	2.8	5600	4	224	4	224	28	1568	64	3584	0	0	1	0.438	12.25	146.29
10	66	3	2	10.2	20400	0	0	4	816	31	6324	65	13260	0	0	1	0.477	14.78	136.29
10	67	4	2	15.8	31600	0	0	1	316	41	12956	58	18328	0	0	1	0.707	28.98	82.05
10	68	5	2	7.2	14400	4	576	4	576	18	2592	74	10656	0	0	1	0.243	4.38	304.22
10	69	6	2	11	22000	4	880	0	0	32	7040	64	14080	0	0	1	0.500	16.00	128.00
10	70	7	2	13.6	27200	0	0	2	544	27	7344	71	19312	0	0	1	0.380	10.27	186.70
11	71	1	2	10.6	21200	4	848	4	848	12	2544	80	16960	0	0	1	0.150	1.80	533.33
11	72	2	2	13.4	26800	1	268	2	536	22	5896	75	20100	0	0	1	0.293	6.45	255.68
11	73	3	2	8.6	17200	0	0	2	344	27	4644	71	12212	0	0	1	0.380	10.27	186.70
11	74	4	2	17.2	34400	0	0	6	2064	14	4816	80	27520	0	0	1	0.175	2.45	457.14
11	75	5	2	8	16000	0	0	3	480	45	7200	52	8320	0	0	1	0.865	38.94	60.09
11	76	6	2	13.4	26800	2	536	4	1072	24	6432	68	18224	2	536	1	0.353	8.47	192.67
11	77	7	2	5.8	11600	0	0	0	0	31	3596	69	8004	0	0	1	0.449	13.93	153.58
12	78	1	2	6.4	12800	4	512	2	256	40	5120	53	6784	1	128	1	0.755	30.19	70.23
12	79	2	2	5.4	10800	4	432	2	216	20	2160	74	7992	0	0	1	0.270	5.41	273.80
12	80	3	2	4.4	8800	2	176	2	176	36	3168	60	5280	0	0	1	0.600	21.60	100.00
12	81	4	2	6.6	13200	2	264	6	792	16	2112	76	10032	0	0	1	0.211	3.37	361.00
12	82	5	2	5.4	10800	0	0	4	432	22	2376	73	7884	1	108	1	0.301	6.63	242.23
12	83	6	2	6.6	13200	0	0	6	792	24	3168	70	9240	0	0	1	0.343	8.23	204.17
12	84	7	2																
13	85	1	2	10.2	20400	0	0	4	816	23	4692	73	14892	0	0	1	0.315	7.25	231.70
13	86	2	2	6.6	13200	4	528	2	264	46	6072	48	6336	0	0	1	0.958	44.08	50.09
13	87	3	2	7.6	15200	4	608	4	608	26	3952	66	10032	0	0	1	0.394	10.24	167.54
13	88	4	2	5.6	11200	4	448	4	448	36	4032	56	6272	0	0	1	0.643	23.14	87.11
13	89	5	2	9.6	19200	2	384	4	768	26	4992	68	13056	0	0	1	0.382	9.94	177.85
13	90	6	2	6.6	13200	4	528	6	792	46	6072	44	5808	0	0	1	1.045	48.09	42.09
13	91	7	2	9.2	18400	0	0	2	368	20	3680	76	13984	2	368	1	0.263	5.26	288.80
14	92	1	2	9	18000	0	0	2	360	26	4680	72	12960	0	0	1	0.361	9.39	199.38

14	93	2	2	11.2	22400	4	896	1	224	20	4480	75	16800	0	0	1	0.267	5.33	281.25
14	94	3	2	2.8	5600	0	0	2	112	18	1008	80	4480	0	0	1	0.225	4.05	355.56
14	95	4	2	18.8	37600	2	752	1	376	43	16168	54	20304	0	0	1	0.796	34.24	67.81
14	96	5	2	7.6	15200	2	304	6	912	16	2432	76	11552	0	0	1	0.211	3.37	361.00
14	97	6	2	11.2	22400	0	0	6	1344	16	3584	78	17472	0	0	1	0.205	3.28	380.25
14	98	7	2	8.6	17200	0	0	6	1032	32	5504	62	10664	0	0	1	0.516	16.52	120.13
15	99	1	2	6.8	13600	2	272	2	272	18	2448	78	10608	0	0	4	0.231	4.15	338.00
15	100	2	2	8.2	16400	0	0	2	328	15	2460	83	13612	0	0	1	0.181	2.71	459.27
15	101	3	2	15.2	30400	3	912	11	3344	27	8208	59	17936	0	0	1	0.458	12.36	128.93
15	102	4	2	5	10000	0	0	4	400	26	2600	69	6900	1	100	1	0.377	9.80	183.12
15	103	5	2	16.8	33600	3	1008	7	2352	14	4704	75	25200	1	336	1	0.187	2.61	401.79
15	104	6	2	12.2	24400	1	244	5	1220	15	3660	77	18788	2	488	1	0.195	2.92	395.27
15	105	7	2	11.6	23200	0	0	2	464	18	4176	76	17632	4	928	1	0.237	4.26	320.89
16	106	1	2	9.4	18800	0	0	8	1504	8	1504	80	15040	4	752	1	0.100	0.80	800.00
16	107	2	2	8	16000	4	640	8	1280	10	1600	78	12480	0	0	1	0.128	1.28	608.40
16	108	3	2	8.4	16800	0	0	0	0	14	2352	82	13776	4	672	1	0.171	2.39	480.29
16	109	4	2	6	12000	0	0	4	480	28	3360	68	8160	0	0	1	0.412	11.53	165.14
16	110	5	2	7.6	15200	0	0	6	912	18	2736	72	10944	4	608	1	0.250	4.50	288.00
16	111	6	2	8.2	16400	0	0	2	328	28	4592	68	11152	2	328	1	0.412	11.53	165.14
16	112	7	2																
17	113	1	2	4.6	9200	0	0	2	184	20	1840	74	6808	4	368	1	0.270	5.41	273.80
17	114	2	2	7.4	14800	0	0	4	592	18	2664	78	11544	0	0	1	0.231	4.15	338.00
17	115	3	2	7.4	14800	2	296	2	296	8	1184	84	12432	4	592	1	0.095	0.76	882.00
17	116	4	2	4.4	8800	0	0	4	352	24	2112	69	6072	3	264	1	0.348	8.35	198.38
17	117	5	2	3.2	6400	0	0	6	384	13	832	79	5056	2	128	1	0.165	2.14	480.08
17	118	6	2	3.6	7200	4	288	8	576	24	1728	58	4176	6	432	1	0.414	9.93	140.17
17	119	7	2	9.2	18400	0	0	0	0	14	2576	84	15456	2	368	1	0.167	2.33	504.00
18	120	1	2	4.8	9600	6	576	2	192	24	2304	68	6528	0	0	1	0.353	8.47	192.67
18	121	2	2	8.2	16400	4	656	18	2952	76	12464	2	328	0	0	1	38.000	2888.00	0.05
18	122	3	2	3.4	6800	4	272	4	272	28	1904	64	4352	0	0	1	0.438	12.25	146.29
18	123	4	2	7.6	15200	4	608	2	304	16	2432	78	11856	0	0	1	0.205	3.28	380.25

18	124	5	2	5.4	10800	0	0	12	1296	28	3024	60	6480	0	0	1	0.467	13.07	128.57
18	125	6	2	4.6	9200	0	0	6	552	14	1288	80	7360	0	0	1	0.175	2.45	457.14
18	126	7	2																
19	127	1	2	6.2	12400	0	0	6	744	22	2728	72	8928	0	0	1	0.306	6.72	235.64
19	128	2	2	6.8	13600	2	272	4	544	36	4896	58	7888	0	0	1	0.621	22.34	93.44
19	129	3	2	6.2	12400	0	0	10	1240	38	4712	50	6200	2	248	1	0.760	28.88	65.79
19	130	4	2	7.4	14800	6	888	2	296	30	4440	58	8584	4	592	1	0.517	15.52	112.13
19	131	5	2	4.2	8400	2	168	4	336	30	2520	62	5208	2	168	1	0.484	14.52	128.13
19	132	6	2	15.4	30800	2	616	0	0	6	1848	92	28336	0	0	1	0.065	0.39	1410.67
19	133	7	2	7.8	15600	3	468	8	1248	22	3432	67	10452	0	0	1	0.328	7.22	204.05
20	134	1	2	5	10000	2	200	0	0	26	2600	72	7200	0	0	1	0.361	9.39	199.38
20	135	2	2	3.2	6400	2	128	2	128	23	1472	73	4672	0	0	1	0.315	7.25	231.70
20	136	3	2	6	12000	4	480	6	720	22	2640	68	8160	0	0	1	0.324	7.12	210.18
20	137	4	2	3	6000	4	240	2	120	26	1560	66	3960	2	120	0	0.394	10.24	167.54
20	138	5	2	2.8	5600	0	0	2	112	38	2128	60	3360	0	0	1	0.633	24.07	94.74
20	139	6	2	6.4	12800	2	256	2	256	32	4096	64	8192	0	0	1	0.500	16.00	128.00
20	140	7	2																
21	141	1	3	4.4	8800	14	1232	6	528	32	2816	48	4224	0	0	1	0.667	21.33	72.00
21	142	2	3	3.4	6800	2	136	4	272	16	1088	76	5168	2	136	1	0.211	3.37	361.00
21	143	3	3	3.2	6400	4	256	0	0	34	2176	62	3968	0	0	1	0.548	18.65	113.06
21	144	4	3	3.4	6800	4	272	0	0	38	2584	58	3944	0	0	1	0.655	24.90	88.53
21	145	5	3	4.2	8400	9	756	3	252	17	1428	69	5796	2	168	1	0.246	4.19	280.06
21	146	6	3	6.4	12800	5	640	3	384	40	5120	52	6656	0	0	0	0.769	30.77	67.60
21	147	7	3	4	8000	4	320	2	160	22	1760	72	5760	0	0	1	0.306	6.72	235.64
22	148	1	3	3.6	7200	0	0	4	288	32	2304	62	4464	2	144	1	0.516	16.52	120.13
22	149	2	3	4.8	9600	2	192	0	0	34	3264	64	6144	0	0	0	0.531	18.06	120.47
22	150	3	3	3.8	7600	2	152	2	152	30	2280	66	5016	0	0	1	0.455	13.64	145.20
22	151	4	3	8.4	16800	0	0	2	336	18	3024	80	13440	0	0	1	0.225	4.05	355.56
22	152	5	3	12.8	25600	0	0	6	1536	26	6656	68	17408	0	0	1	0.382	9.94	177.85
22	153	6	3	5	10000	2	200	2	200	33	3300	62	6200	1	100	0	0.532	17.56	116.48
22	154	7	3	7.6	15200	0	0	2	304	34	5168	64	9728	0	0	1	0.531	18.06	120.47

23	155	1	3	6	12000	0	0	0	0	52	6240	48	5760	0	0	1	1.083	56.33	44.31
23	156	2	3	5	10000	2	200	6	600	33	3300	58	5800	1	100	1	0.569	18.78	101.94
23	157	3	3	4.4	8800	0	0	6	528	42	3696	52	4576	0	0	1	0.808	33.92	64.38
23	158	4	3	3.4	6800	0	0	6	408	32	2176	62	4216	0	0	0	0.516	16.52	120.13
23	159	5	3	4.2	8400	0	0	14	1176	40	3360	46	3864	0	0	0	0.870	34.78	52.90
23	160	6	3	4.8	9600	0	0	6	576	36	3456	58	5568	0	0	0	0.621	22.34	93.44
23	161	7	3	6.4	12800	2	256	10	1280	34	4352	54	6912	0	0	1	0.630	21.41	85.76
24	162	1	3	4.6	9200	2	184	2	184	20	1840	76	6992	0	0	1	0.263	5.26	288.80
24	163	2	3	5.8	11600	2	232	4	464	16	1856	78	9048	0	0	0	0.205	3.28	380.25
24	164	3	3	5.4	10800	0	0	14	1512	42	4536	44	4752	0	0	1	0.955	40.09	46.10
24	165	4	3	8.4	16800	0	0	4	672	24	4032	70	11760	2	336	1	0.343	8.23	204.17
24	166	5	3	6.6	13200	0	0	6	792	18	2376	76	10032	0	0	0	0.237	4.26	320.89
24	167	6	3	6.2	12400	0	0	4	496	34	4216	62	7688	0	0	1	0.548	18.65	113.06
24	168	7	3	3.8	7600	0	0	4	304	16	1216	80	6080	0	0	1	0.200	3.20	400.00
25	169	1	3	3.6	7200	6	432	2	144	18	1296	72	5184	2	144	1	0.250	4.50	288.00
25	170	2	3	6.2	12400	0	0	2	248	26	3224	72	8928	0	0	1	0.361	9.39	199.38
25	171	3	3	6.8	13600	4	544	6	816	16	2176	74	10064	0	0	1	0.216	3.46	342.25
25	172	4	3	11.4	22800	1	228	4	912	33	7524	62	14136	0	0	1	0.532	17.56	116.48
25	173	5	3	2.8	5600	2	112	14	784	24	1344	60	3360	0	0	1	0.400	9.60	150.00
25	174	6	3	4.6	9200	4	368	0	0	40	3680	56	5152	0	0	1	0.714	28.57	78.40
25	175	7	3	5	10000	4	400	6	600	32	3200	58	5800	0	0	1	0.552	17.66	105.13
26	176	1	3	6.8	13600	0	0	0	0	36	4896	64	8704	0	0	1	0.563	20.25	113.78
26	177	2	3	5.8	11600	2	232	2	232	38	4408	58	6728	0	0	1	0.655	24.90	88.53
26	178	3	3	5.6	11200	2	224	0	0	32	3584	62	6944	4	448	0	0.516	16.52	120.13
26	179	4	3	7.2	14400	1	144	0	0	20	2880	77	11088	2	288	0	0.260	5.19	296.45
26	180	5	3	3	6000	4	240	2	120	36	2160	58	3480	0	0	1	0.621	22.34	93.44
26	181	6	3	3.2	6400	6	384	4	256	56	3584	34	2176	0	0	1	1.647	92.24	20.64
26	182	7	3	4.2	8400	4	336	0	0	24	2016	72	6048	0	0	1	0.333	8.00	216.00
27	183	1	3	4.2	8400	4	336	2	168	32	2688	62	5208	0	0	0	0.516	16.52	120.13
27	184	2	3	5.4	10800	2	216	10	1080	35	3780	53	5724	0	0	1	0.660	23.11	80.26
27	185	3	3	8.4	16800	2	336	2	336	47	7896	49	8232	0	0	0	0.959	45.08	51.09

27	186	4	3	5.6	11200	4	448	4	448	26	2912	66	7392	0	0	1	0.394	10.24	167.54
27	187	5	3	6.2	12400	0	0	0	0	24	2976	76	9424	0	0	1	0.316	7.58	240.67
27	188	6	3	5.2	10400	0	0	0	0	48	4992	50	5200	2	208	1	0.960	46.08	52.08
27	189	7	3	3.2	6400	10	640	0	0	24	1536	66	4224	0	0	1	0.364	8.73	181.50
28	190	1	3	8.4	16800	4	672	0	0	16	2688	80	13440	0	0	0	0.200	3.20	400.00
28	191	2	3	6.2	12400	0	0	6	744	20	2480	74	9176	0	0	1	0.270	5.41	273.80
28	192	3	3	6.2	12400	0	0	5	620	38	4712	57	7068	0	0	1	0.667	25.33	85.50
28	193	4	3	4.6	9200	0	0	0	0	18	1656	82	7544	0	0	1	0.220	3.95	373.56
28	194	5	3	4.2	8400	4	336	0	0	42	3528	54	4536	0	0	1	0.778	32.67	69.43
28	195	6	3	10.2	20400	0	0	8	1632	42	8568	50	10200	0	0	1	0.840	35.28	59.52
28	196	7	3	5.8	11600	2	232	12	1392	33	3828	52	6032	1	116	1	0.635	20.94	81.94
29	197	1	3	7.8	15600	7	1092	3	468	37	5772	53	8268	0	0	0	0.698	25.83	75.92
29	198	2	3	6	12000	1	120	0	0	25	3000	73	8760	1	120	1	0.342	8.56	213.16
29	199	3	3	4.6	9200	6	552	6	552	26	2392	62	5704	0	0	1	0.419	10.90	147.85
29	200	4	3	5.2	10400	4	416	2	208	24	2496	70	7280	0	0	1	0.343	8.23	204.17
29	201	5	3	5.6	11200	2	224	0	0	29	3248	69	7728	0	0	1	0.420	12.19	164.17
29	202	6	3	3.4	6800	0	0	3	204	17	1156	80	5440	0	0	1	0.213	3.61	376.47
29	203	7	3	4.2	8400	4	336	6	504	49	4116	40	3360	1	84	0	1.225	60.03	32.65
30	204	1	3	4	8000	6	480	26	2080	22	1760	46	3680	0	0	1	0.478	10.52	96.18
30	205	2	3	5.2	10400	2	208	0	0	33	3432	65	6760	0	0	1	0.508	16.75	128.03
30	206	3	3	6.8	13600	0	0	0	0	38	5168	62	8432	0	0	1	0.613	23.29	101.16
30	207	4	3	6.4	12800	0	0	12	1536	54	6912	34	4352	0	0	1	1.588	85.76	21.41
30	208	5	3	7.2	14400	0	0	4	576	22	3168	74	10656	0	0	1	0.297	6.54	248.91
30	209	6	3	6.2	12400	7	868	9	1116	30	3720	54	6696	0	0	1	0.556	16.67	97.20
30	210	7	3	5.8	11600	4	464	4	464	30	3480	62	7192	0	0	1	0.484	14.52	128.13