UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON D.C., 20460

OFFICE OF CHEMICAL SAFETY
AND POLLUTION PREVENTION

Date: March 29, 2011

Chemical: Propanil
PC Code: 028201
Barcode: DP 382979

MEMORANDUM

SUBJECT: Review of Avian Reproduction Toxicity Study based on Effects from Propanil

FROM: Amy F. Rowland, Biologist 3/29/11
Sujatha Sankula, Lead Biologist 3/29/11
Nancy Andrews, Branch Chief 3/29/11
Environmental Risk Branch I
Environmental Fate and Effects Division (7507P)

TO: Cathryn OConnell, Risk Manager Reviewer
Tom Myers, Risk Manager
Pesticide Re-Evaluation Division (7508P)

The Environmental Fate and Effects Division (EFED) has completed its review of the avian reproduction toxicity study (MRID 48235101) submitted on effects of propanil. This study was classified as **acceptable**. Findings of the review are presented in Table 1 below.

Table 1: Study submitted on the toxic effects to bobwhite quail reproduction from propanil

MRID Number	Guideline	Study Description	Material Tested	Toxicity Endpoint	Study Classification
48235101	850.2300	Avian reproduction study, Bobwhite Quail (*Colinus virginianus*)	TEP[1]	NOAEC: 247 mg a.i./kg-diet LOAEC: 495 mg a.i./kg-diet Endpoint(s) Affected: Visually determined – adult mortality and adult gross necropsy Statistically determined – adult female weight gain, adult food consumption, eggs laid, and egg shell thickness Most sensitive endpoint(s): adult female weight gain, eggs laid, and egg shell thickness	Acceptable

[1]TEP = Typical End-Use Product

Data Evaluation Record on the Reproductive Effects of Propanil on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....} EPA MRID Number 48235101

Data Requirement:	PMRA Data Code	{.....}
	EPA DP Barcode	382979
	OECD Data Point	{.....}
	EPA MRID	48235101
	EPA Guideline	OPPTS 850.2300

Test material: Propanil (tech.) **Purity:** 99.6%
Common name Propanil
Chemical name:
IUPAC: 3′,4′-dichloropropionanilide
CAS: *N*-(3,4-dichlorophenyl)propanamide
CAS No.: 709-98-8
Synonyms: DCPA (Japan)

Primary Reviewer: Christie E. Padova **Signature:** Christie E. Padova
Staff Scientist, Dynamac Corporation **Date:** 01/12/11

Secondary Reviewer: Teri S. Myers **Signature:** Teri S Myers
Senior Scientist, Cambridge Environmental Inc. **Date:** 02/07/11

Primary Reviewer: **Date:** {.....}
{EPA/OECD/PMRA}

Secondary Reviewer(s): Amy F. Rowland **Date:** 03/29/2011
{EPA/OPP/EFED}

Reference/Submission No.: {.....}

Company Code	{.....}	[For PMRA]
Active Code	{.....}	[For PMRA]
Use Site Category	{.....}	[For PMRA]
EPA PC Code	028201	

Date Evaluation Completed: {dd-mm-yyyy}

CITATION: Stafford, J.M. 2009. Reproductive Toxicity Test with Propanil in the Diet of Northern Bobwhite (*Colinus virginianus*) Following FIFRA Guideline 71.4, OPPTS 850.2300 and OECD 206. Unpublished study performed by Springborn Smithers Laboratories, Snow Camp, NC and Wareham, MA. Laboratory Report No. 12177.4101. Study sponsored by Propanil Task Force II, c/o Edward M. Ruckert, MDermott, Will & Emery, Washington, DC. Study initiated May 31, 2007 and completed October 26, 2009.

DISCLAIMER: This document provides guidance for EPA and PMRA reviewers on how to complete a data evaluation record after reviewing a scientific study concerning the reproductive effects of a pesticide on avian species. It is not intended to prescribe conditions to any external party for conducting this study nor to establish absolute criteria regarding the assessment of whether the study is scientifically sound and whether the study satisfies any applicable data requirements. Reviewers are expected to review and to determine for each study, on a case-by-case basis, whether it is scientifically sound and provides sufficient information to satisfy applicable data requirements. Studies that fail to meet any of the conditions may be accepted, if appropriate; similarly, studies that meet all of the conditions may be rejected, if appropriate. In sum, the reviewer is to take into account the totality of factors related to the test methodology and results in determining the acceptability of the study.

EXECUTIVE SUMMARY

The one-generation reproductive toxicity of propanil to 18 pairs per level of 30-week old Northern bobwhite quail (*Colinus virginianus*) was assessed over *ca.* 25 weeks. Propanil was administered to the birds in the diet at nominal concentrations of 0 (negative control), 50, 250, and 500 mg ai/kg diet. Mean-measured concentrations were <10 (<LOQ, control), 47, 247, and 495 mg ai/kg diet, respectively.

Seven adult mortalities occurred during the study: one from the control group and six from the 495 mg ai/kg diet group. Three of the six deaths at the 495 mg ai/kg diet level were accompanied by friable livers noted at gross necropsy, which suggested that these birds were experiencing a (treatment-related) health challenge that lowered their physical stamina and increased their susceptibility to pen-mate aggression and the demands of reproduction. In addition, cage size was significantly smaller than recommended for this species, which may also have contributed to overall stress of the birds. During Weeks 18 through 21, diarrhea was observed in one cage at the 47 mg ai/kg diet level, five cages at the 247 mg ai/kg diet level, and eight cages at the 495 mg ai/kg diet level. The diarrhea ceased prior to the final week of egg collection. At scheduled necropsy, abnormalities of the liver included pale, discolored, or mottled coloration and a friable condition; this observation was noted in three birds from the 47 mg ai/kg diet level, two birds from the 247 mg ai/kg diet level, and three birds from the 495 mg ai/kg diet level. One male from the 247 mg ai/kg diet level had the abnormal liver condition as well as mild pericarditis, and three males from the 495 mg ai/kg diet level had enlarged spleens.

The reviewer's analysis detected a statistically significant reduction (p=0.021; 60%) in adult female weight gain at the 495 mg ai/kg diet level, while the study author's analysis detected an overall statistically-significant reduction in food consumption at the 495 mg ai/kg diet level compared to the control (16.0 versus 17.0 g/bird/day; p=0.0017). The calculated average daily intake averaged 0, 4.0, 19.6, and 36.7 mg ai/kg bw/day for the control, 47, 247, and 495 mg ai/kg diet levels, respectively.

No statistically-significant differences were indicated for any adult or offspring parameter at the 47 or 247 mg ai/kg diet levels. At the 495 mg ai/kg diet level there was a 19% (relative to control), statistically-significant reduction in the number of eggs laid per hen (p=0.017). Although there were no statistically-significant differences regarding the proportions of cracked eggs, average egg shell thickness was statistically-reduced at the 495 mg ai/kg diet level compared to the control (p=0.005; 6%).

This study is scientifically sound and does satisfy the guideline requirement for a Northern bobwhite quail (*Colinus virginianus*) reproductive toxicity study.

Results Synopsis

Test Organism Size/Age (mean Weight): 30 weeks old; 181 to 250 g (combined sexes)

NOAEC: 247 mg ai/kg diet (mean-measured)
LOAEC: 495 mg ai/kg diet (mean-measured)
Endpoint(s) Affected: visually determined: adult mortality and adult gross necropsy
Statistically determined: adult female weight gain, adult food consumption, eggs laid, and egg shell thickness

I. MATERIALS AND METHODS

GUIDELINE(S) FOLLOWED: U.S. EPA Pesticide Assessment Guidelines, §71-4 (1982), U.S. EPA Ecological Effects Test Guideline OPPTS 850.2300 (1996), and OECD Test Guideline 206 (1984)

Deviations from U.S. EPA OPPTS Guideline No. 850.2300 included:

1. Cage size (668 cm^2 per bird) was significantly smaller than recommended (≥5,000 cm^2 per bird).
2. The volume of acetone used in the preparation of test diets was not reported.

These deviations do not affect the scientific soundness of this study.

COMPLIANCE: Signed and dated GLP, Quality Assurance and Data Confidentiality statements were provided. This study was conducted in compliance with the U.S. EPA (40 CFR, Part 160) with the following exceptions: routine water and food contaminant screening analyses and preparation of the internal standard, hexanophenone.

A. MATERIALS:

1. Test Material Propanil (technical-grade)

Description: Solid

Lot No./Batch No. : 02 Code Blue

Purity: 99.6%

Stability of compound under test conditions: Stability in the treated feed was verified under frozen storage conditions for up to 42 days and under ambient test conditions for up to 7 days (see Reviewer's Comments section).

Storage conditions of test chemicals: In the original container at room temperature in a dark cabinet

Physicochemical properties of propanil.

Parameter	Values	Comments
Water solubility at 20°C	Not reported	
Vapor pressure	Not reported	
UV absorption	Not reported	
pKa	Not reported	
Kow	Not reported	

(OECD recommends water solubility, stability in water and light, pKa, Pow, and vapor pressure of test compound)

2. Test organism:

Table 1: Test organism.

Parameter	Details	Remarks *Criteria*
Species (common and scientific names):	Northern bobwhite quail (*Colinus virginianus*)	The population was assigned SSL Colony No. 160. *Recommended species include a wild waterfowl species, preferably the mallard (Anas platyrhynchos) or an upland game species, preferably the northern bobwhite (Colinus virginianus)*
Age at Study Initiation:	30 weeks old	*Birds approaching their first breeding season should be used.*

Parameter	Details	Remarks *Criteria*
Body Weight: (mean and range)	Overall (combined sexes) range of 181 to 250 g at study initiation, with group means of 213.9 to 217.4 g for males and 208.7 to 216.0 g for females.	Body weights were recorded at Weeks 0 (study initiation), 2, 4, 6, 8, 10 (at photo-stimulation), and 25 (study termination). Following randomization, body weights were tested for normality and homogeneity followed by ANOVA to assure similar weights among treatment groups, by gender. *Body weights should be recorded at test initiation and at biweekly intervals up to week eight or up to the onset of egg laying and at termination.*
Source:	California Gamebirds Temecula, CA	Birds were from the same source and were phenotypically indistinguishable from wild stock. *All birds should be from the same source.*

B. STUDY DESIGN:

1. Experimental Conditions

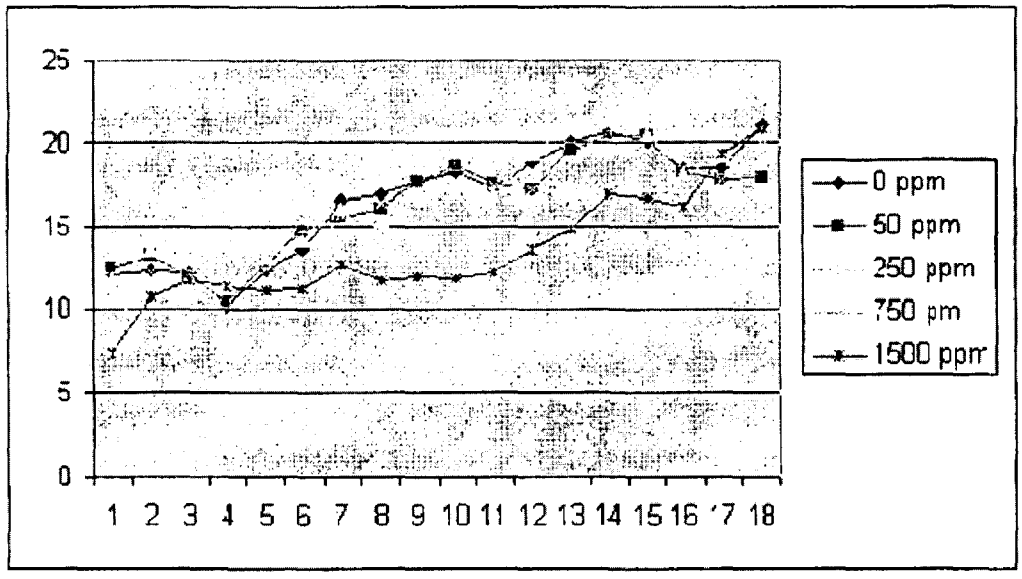
a. Range-finding study: A range-finding study was conducted with 5 male:female pairs per level of 34-week old Northern bobwhite quail (Buckeye Gamebirds, Defiance, OH) at nominal dietary concentrations of 0 (control), 50, 250, 750, and 1500 mg ai/kg diet. Birds were acclimated to test conditions for 4 weeks, and then offered treated diet for *ca.* 10 weeks prior to egg collection (last 6 weeks with photo-stimulation), and for an additional *ca.* 7 weeks during egg collection. Endpoints included adult mortality, clinical signs of toxicity, body weight (Weeks 0, 2, 4, and final), food consumption, and gross necropsy; egg production; embryo fertility and viability; and hatchling weights. Results obtained were visually assessed and used to select exposure levels for the definitive study.

Seven mortalities occurred during the range-finding study: two in the control group, two in the 50 mg ai/kg diet group, one in the 750 mg ai/kg diet group, and two in the 1500 mg ai/kg diet group. Based upon clinical signs of toxicity and effects observed upon necropsy, none of the mortalities were considered to be a direct result of treatment with the test substance. In addition, there were no definitive treatment-related abnormalities observed at scheduled necropsy.

From Weeks 0 to 4, the proportional change in male body weight was notably greater than the control level (-0.0230 g) at the 750 (-0.0506 g) and 1500 (-0.0725 g) mg ai/kg diet levels, slightly greater than the control at the 250 mg ai/kg diet level (-0.0382 g), and comparable to the control at the 50 mg ai./kg diet

level (-0.0159 g). In females from Weeks 0 to 4, the proportional change in body weight was greater than the control level (-0.0314 g) at the 750 (-0.0576 g) and 1500 (-0.1717 g) mg ai/kg diet levels, and comparable to the control at the 50 (-0.0316 g) and 250 (-0.0197 g) mg ai/kg diet levels.

Adult food consumption results were documented in the following figure (best copy available). Feed consumption decreased at the 1500 mg ai/kg diet level compared to the control and lower levels beginning at Week 5, and the 750 mg ai/kg diet level showed a lag in feed consumption between Weeks 13 and 16.



Mean reproductive results are summarized in the following table. Notable treatment-related effects were observed at the 750 and 1500 mg ai/kg diet levels, and included reductions in egg production (means of 3.2 and 2.0 eggs laid per hen, respectively) compared to the control level (mean of 18 eggs per hen), and in successful hatches (means of 64 and 50% hatched chicks of viable embryos, respectively) compared to the control level (96%).

Group, mg ai/kg diet	Eggs per Hen	% Cracked of Laid	% Set of Laid	% Fertile of Set	% Viable of Fertile	% Hatched of Viable	Hatchling Weight (g)
0	18	3	73	99	100	96	7.1
50	17.5	8	75	93	98	82	6.7
250	14.2	6	76	97	98	87	7.6
750	3.2	0	82	100	100	64	6.9
1500	2	0	83	80	100	50	6.2

b. Definitive Study

Table 2: Experimental Parameters.

Parameter	Details	Remarks *Criteria*
Acclimation period: Conditions (same as test or not): Feeding: Health (any mortality observed):	14 days Same as test Southern States Super Breeder (Lot Nos. N8210 and N8312) and on-site well water were available *ad libitum* No signs of illness, disease, or mortality were observed during the 72 hours immediately preceding the study.	The photoperiod during acclimation was 7 hrs light:17 hrs dark. *Recommended observation period includes a 2-3 week health observation period prior to selection of birds for treatment. Generally, birds should be healthy without excess mortality. Feeding should be ad libitum, and sickness, injuries or mortality should be noted.*
Test duration pre-laying exposure: egg-laying exposure: withdrawal period, if used:	*Ca.* 15 weeks 10 weeks N/A	***Recommended pre-laying exposure duration:*** *At least 10 weeks prior to the onset of egg-laying.* ***Recommended exposure duration with egg-laying:*** *At least 10 weeks.* ***Recommended withdrawal period:*** *If reduced reproduction is evident, a withdrawal period of up to 3 weeks should be added to the test phase.*

Parameter	Details	Remarks *Criteria*
Pen (for parental and offspring) size: construction materials: number:	Parents (one pair) were housed in cages measuring 53 cm deep x 25.2 cm wide x 20.5/25 cm high, with slanted floors for egg collection. Offspring cages measured 91 cm x 81 cm x 25 cm. Parental pens were constructed of polycarbonate-coated galvanized welded-wire mesh and solid galvanized sheet metal. Offspring cages were constructed of galvanized welded wire mesh. 18 parental pens/treatment level. Hatchlings were group-housed according to the appropriate parental pen of origin.	Cage size was significantly smaller than recommended. OPPTS recommends at least 5,000 cm^2 per bird. In this study, the floor space was only 668 cm^2 per bird. Cage sizes smaller than recommended should be shown to not adversely affect the health or reproduction of the quail. *Pens* *Pens should have adequate room and be arranged to prevent cross-contamination.* *Materials* *Recommended materials include nontoxic material and nonbinding material, such as galvanized steel.* *Number* *At least 5 replicate pens should be used for mallards housed in groups of 7. For other arrangements, at least 12 pens should be used, but considerably more may be used if birds are kept in pairs. Chicks should be housed according to parental grouping.*
Number of birds per pen (male:female)	2 birds/pen (1 male:1 female)	*One male and one female per pen should be used. For quail, one male and two females should be used. For ducks, two males and five females should be used.*
Number of pens per group/treatment negative control: solvent control: treated:	N/A 18 pens 18 pens/treatment	*At least 12-16 pens should be used, but considerably more if birds are kept in pairs.*

Parameter	Details	Remarks *Criteria*
Test concentrations (mg ai/kg diet) nominal: measured:	0 (control), 50, 250, and 500 mg ai/kg diet <10 (<LOQ, control), 47, 247, and 495 mg ai/kg diet	Mean-measured concentrations were reviewer-calculated (see Reviewer's Comments section). *Recommended test concentrations include at least two concentrations other than the control; three or more will provide a better statistical analysis. The highest test concentrations should show a significant effect or be at or above the actual or expected field residue level.*
Maximum labeled field residue anticipated and source of information:	Not specified	*The highest test concentrations should show a significant effect or be at or above the actual or expected field residue level. The source (i.e., maximum label rate in lb ai/A and ppm), label registration no., label date, and site should be cited*]
Solvent/vehicle, if used type: amount:	Acetone Not reported	It was reported that the acetone was allowed to completely evaporate during the preparation procedure. *Recommended solvents include corn oil or other appropriate vehicle not more than 2% of diet by weight*
Was detailed description and nutrient analysis of the basal diet provided? (Yes/No)	Yes. The basal diet contained a minimum of 21.0% crude protein and 4.0% crude fat, a maximum of 6.0% crude fiber, and a maximum of 3.5% calcium.	Offspring were fed Purina Gamebird Startena® (Lot No. 8AUG14STA) without the addition of test substance. *A commercial breeder feed or an equivalent that is appropriate for the test species is recommended.*

Parameter	Details	Remarks *Criteria*
Preparation of test diet	For each level, the appropriate quantity of pre-ground test substance was dissolved in 100 mL acetone and evenly sprayed/sprinkled over 2 kg of basal diet that had been evenly divided between two 9 x 13-inch glass pans. The acetone was allowed to evaporate for 1 hour. Each portion was separately stirred in a Kitchen Aid mixer for 5 minutes, and then layered with the remaining basal diet and mixed in a Turbula T50 mixer for 10 minutes.	Food was measured and replaced at least weekly throughout the study. *A premixed diet containing the test substance should be mechanically mixed with basal diet. If an evaporative vehicle is used, it should be completely evaporated prior to feeding.*
Indicate whether stability and homogeneity of test material in diet determined (Yes/No)	Yes	
Were concentrations in diet verified by chemical analysis?	Yes	See Reviewer's Comments section.
Did chemical analysis confirm that diet was stable? and homogeneous?	Yes Yes	See Reviewer's Comments section.
Feeding and husbandry	Feeding and husbandry conditions appeared to be adequate, given guideline recommendations.	

Parameter	Details	Remarks *Criteria*
Test conditions (pre-laying) temperature: relative humidity: photoperiod:	17 to 29°C 42 to 71% 7 hr light/day through Week 10; 17 hr light/day thereafter	Temperature and humidity were for the adult room during the entire study. Prior to photo-stimulation, light intensity averaged 19 foot-candles at pen level. At the beginning of Week 11, the average light intensity was increased to 44 foot candles. *Recommended temperature: about 21°C (70°F)* *Recommended relative humidity: about 55%* *Recommended lighting* *First 8 weeks: 7 h per day.* *Thereafter: 16-17 h per day.* *At least 6 foot-candles are recommended at bird level.*
Egg Collection and Incubation		
Egg collection and storage collection interval: storage temperature: storage humidity:	Daily 16°C 65%	*Eggs should be collected daily; recommended egg storage temperature is approximately 16°C (61°F); recommended humidity is approximately 65%.* *Recommended collection interval: daily*
Were eggs candled for cracks prior to setting for incubation?	Yes	*Eggs should be candled on day 0*
Were eggs set weekly?	Yes	
When candling was done for fertility?	Eggs were candled again on Days 11 (embryo viability) and 18 (embryo survival).	*Quail: approx. day 11* *Ducks: approx. day 14*
When the eggs were transferred to the hatcher?	Day 21	*Bobwhite: usually day 21* *Mallard: usually day 23*

Parameter	Details	Remarks *Criteria*
Hatching conditions temperature: humidity: photoperiod:	Mean of *ca.* 37°C 50 to 60% 14-hr light/day (hatchlings)	Post-hatching: radiant heaters maintained brooder temperatures at 30 to 39°C for chicks 0 to 7 days old, and at 29 to 38°C for chicks 8 to 14 days old. Brooder room temperature (away from direct heat) ranged from 22 to 33°C. *Recommended temperature is 39°C (102°F)* *Recommended humidity is 70%*
Day the hatched eggs were removed and counted	Days 23 and 24	*Eggs for bobwhite should be removed on day 24; for mallard on day 27*
Were egg shells washed and dried for at least 48 hrs before measuring?	Yes	
Egg shell thickness no. of eggs used: intervals: mode of measurement:	All eggs laid on one day Once every 2 weeks Five points around the girth of the shell using a digital micrometer graduated to 0.001 mm.	*Newly hatched eggs should be collected at least once every two weeks. Thickness of the shell plus membrane should be measured to the nearest 0.01 mm* with 3 - *4 measurements per shell.*
Reference chemical, if used	None used	

2. Observations:

Table 3: Observations.

Parameter	Details	Remarks
Parameters measured		
Parental (mortality, body weight, mean feed consumption) Egg collection and subsequent development (no. of eggs laid, no. of eggs cracked, shell thickness, no. of eggs set, no. of viable embryos, no. of live 3 week embryos, no. hatched, no. of 14-day survivors, average weight of 14-d old survivors, mortality, gross pathology, others)	- mortality - body weight - food consumption - signs of toxicity - necropsy - eggs laid - eggs cracked - egg shell thickness - eggs set - viable embryos - live 3-week embryos - hatchlings - hatchling body weight - 14-day-old survivors - 14-day-old survivor body weight - signs of toxicity of hatchlings	*Recommended endpoints measured include:* • *Eggs laid/pen* • *Eggs cracked/pen* • *Eggs set/pen* • *Viable embryos/pen* • *Live 3-week embryos/pen* • *Normal hatchlings/pen* • *14-day-old survivors/pen* • *14-day-old survivors/pen* • *Weights of 14-day-old* • *survivors (mean per pen)* • *Egg shell thickness* • *Food consumption (mean per pen)* • *Initial and final body weight (mean per pen)*
Indicate if the test material was regurgitated	No indications of dietary regurgitation.	
Observation intervals (for various parameters)	Parental and hatchling mortality and signs of toxicity were recorded daily. Parental body weights were recorded at Weeks 0, 2, 4, 6, 8, 10, and 25. Offspring were weighed at hatch and at 14 days. Parental food consumption was measured weekly or more often as food was added throughout the study.	*Body weights and food consumption should be measured at least biweekly*
Were raw data included?	Yes	

II. RESULTS AND DISCUSSION:

A. MORTALITY:

Seven adult mortalities occurred during the study: one from the control group and six from the 500 mg ai/kg diet group. Mortality observed in three of the six birds at the 500 mg ai/kg diet level was considered to be related to test substance administration (see discussion below).

The single control mortality was a male that was found dead at the end of Week 14, prior to the egg collection phase. The cause of death was attributed to a cage-related injury. Necropsy revealed sub-dermal hematomas on the top of the cranium and left side of the lower neck. No other abnormalities were noted, and gross examination of the pen-mate was unremarkable.

Six mortalities occurred at the 500 mg ai/kg diet level. Two birds died prior to the egg-collection phase of the study. The first death was a female that was found dead during Week 8 of the study. Necropsy revealed hemorrhaging in the ventral surface of the cervical muscles, which may have been the result of a cage injury. In addition, the liver was friable, particularly the dorsal surface of the right lobe, which was also very dark in coloration at the caudal end. No gross abnormalities were observed upon necropsy of the pen-mate. The second mortality was a male that died during Week 15; the bird was emaciated, with injuries apparently due to pen-mate aggression on the head, legs, and feet. No other abnormalities were found, although necropsy of the female pen-mate revealed that she was in a reproductively receptive mode (i.e., in egg production). It was reported that it is not uncommon for reproductively developed birds to be very aggressive toward cage mates that are not in full reproductive physiology. The remaining four birds died after egg production had begun, and three of the four deaths were in part attributed to pen-mate aggression: females from Cages 51, 23, and 7 that were found dead during Weeks 17, 19, and 23, respectively (weeks 2, 4, and 8 of egg-collection, respectively). The mates of all three birds were in full reproductive physiology, while one female was not reproductively developed, one was estimated to be at 50% development, and one was fully developed. All three females were emaciated, and had severe peck wounds, commonly on the neck and head, with additional wounds on the feet in one female (Cage 7). In addition, the intestines were in varying states of atrophy or bloated with gas, and friable livers were found in two of the three females (Cages 7 and 23). It was reported by the study author that the first female likely died from pen-mate aggression due to her late reproductive development, and that the liver condition for the other two birds likely affected their physical state enough to impair reproductive development, decreasing their response to reproductively mature mates, and attributing to their deaths from pen-mate aggression. The last mortality at the 500 mg ai/kg diet level was a female, and the death was attributed to cage injury/accidental trauma. Necropsy revealed that two of the bird's cervical vertebrae were twisted off their axis. In addition, hemorrhaging from the jugular vein was noted. No other abnormalities were noted, and necropsy of the pen-mate was unremarkable.

It was concluded by the study author that the finding of friable livers in three of the six fatalities at the 500 mg ai/kg diet level suggested that those birds were experiencing a (treatment-related) health challenge that lowered their physical stamina and increased their susceptibility to mate aggression and the demands of reproduction physiology.

Table 4: Effect of Propanil on Mortality of Northern Bobwhite Quail.

Treatment Mean-Measured (and Nominal) Concentrations	Observation Period					
	Week 8		Week 16		Week 25	
	No. Dead		No. Dead		No. Dead	
	Male	Female	Male	Female	Male	Female
Control	0	0	1	0	1	0
47 (50)	0	0	0	0	0	0
247 (250)	0	0	0	0	0	0
495 (500)	0	1	1	1	1	5

B. REPRODUCTIVE AND OTHER ENDPOINTS:

Abnormal Effects/Behavior: For *ca.* 1 month, during Weeks 18 through 21 (egg collection weeks 3 through 6), diarrhea was observed in one cage at the 50 mg ai/kg diet level, five cages at the 250 mg ai/kg diet level, and eight cages at the 500 mg ai/kg diet level. It was noted that although the incidence of observation was concentration-responsive, that it also correlated to the time during which most birds were undergoing their highest egg production. Furthermore, it was reported that if the birds were experiencing a treatment-related effect, manifested as diarrhea, it was likely exacerbated by the additional physical demands of reproduction during this period. The diarrhea ceased prior to the final week of egg collection. No other clinical signs of toxicity were reported.

Food Consumption: Statistically-significant reductions in food consumption were observed at the 500 mg ai/kg diet level compared to the control during Weeks 1 (12.7 versus 15.6 g/bird/day; p=0.0055), 13 (17.2 versus 19.3 g/bird/day; p=0.0204), 16 (17.1 versus 19.0 g/bird/day; p=0.0496), 17 (15.5 versus 20.6 g/bird/day; p=0.0001), 18 (17.7 versus 20.2 g/bird/day; p=0.0074), and overall (16.0 versus 17.0 g/bird/day; p=0.0017). Statistically-significant reductions were also observed at the 250 mg ai/kg diet level compared to the control during Weeks 17 (17.7 versus 20.6 g/bird/day; p=0.0001) and 21 (19.4 versus 21.1 g/bird/day; p=0.0289). The calculated average daily intake averaged 0, 4.0, 19.6, and 36.7 mg ai/kg bw/day for the control, 50, 250, and 500 mg ai/kg diet levels, respectively.

Body Weight: No treatment-related effects on adult body weight were observed by the study author during the study, with no statistically-significant differences indicated for any observation interval.

Necropsy: In birds that were sacrificed at study termination, one control female and one female from the 500 mg ai/kg diet level had regressed or regressing ovaries, which was not considered uncommon in this species after 10 weeks of egg production. Abnormalities of the liver varied slightly between birds, but generally included pale, discolored, or mottled coloration and a friable condition; this observation was noted in three birds from the 50 mg ai/kg diet level, two birds from the 250 mg ai/kg diet level, and three birds from the 500 mg ai/kg diet level. One male from the 250 mg ai/kg diet level had the abnormal liver condition as well as mild pericarditis, and three males from the 500 mg ai/kg diet level had enlarged spleens. No other abnormalities were noted among adult survivors.

Reproductive Effects: No statistically-significant differences were indicated for any reproductive or offspring parameter at the 50 or 250 mg ai/kg diet levels. At the 500 mg ai/kg diet level, there were statistically-significant reductions compared to the control in the number of eggs laid per hen per day (0.62 versus 0.77 eggs/hen/day; p=0.0430) and consequently in the number of eggs set per hen [p = 0.00096]. Although there were no statistically-significant differences regarding the proportions of cracked eggs, average egg shell thickness was statistically-reduced at the 500 mg ai/kg diet level compared to the control (0.192 versus 0.203 mm; p=0.0237). The study author reported, however, that the egg shell thickness measured in the 500 mg ai/kg diet level (0.192 mm) exceeded the minimum acceptable average (for study validity) for the control group (0.19 mm), and thus, the statistical difference between these two groups may not indicate a biological or ecological disadvantage at the 500 mg ai/kg diet level.

Table 5: Reproductive and Other Parameters (nominal concentrations; study author-reported).

Parameter	Control	50 mg/kg	250 mg/kg	500 mg/kg	NOAEC/ LOAEC
No. laying pairs	17	18	18	16	N/A
Eggs laid	912	989	943	589	N/A

Parameter	Control	50 mg/kg	250 mg/kg	500 mg/kg	NOAEC/ LOAEC
Eggs laid/hen/day	0.77	0.79	0.76	0.62*	250 mg/kg 500 mg/kg
Eggs cracked	11	19	16	10	N/A
Eggs cracked/eggs laid	0.012	0.019	0.017	0.017	500 mg/kg >500 mg/kg
Eggs set	827	892	846	533	N/A
Eggs set/hen	48.6	49.6	47.0	33.3**	250 mg/kg 500 mg/kg
Eggs set/eggs laid	0.907	0.902	0.897	0.905	500 mg/kg >500 mg/kg
Shell thickness (mm ± SD)[(a)]	0.203	0.199	0.199	0.192*	250 mg/kg 500 mg/kg
Viable 11-day embryos	801	839	824	519	N/A
Viable 11-day embryos/eggs set	0.97	0.94	0.97	0.97	500 mg/kg >500 mg/kg
Live 18-day embryos	797	825	817	515	N/A
Live 18-day embryos/viable 11-day embryos	1.00	0.98	0.99	0.99	500 mg/kg >500 mg/kg
Hatchlings	735	782	787	452	N/A
Hatchlings/live 18-day embryos	0.92	0.95	0.96	0.88	500 mg/kg >5000 mg/kg
14-day old survivors	713	722	751	431	N/A
14-day old survivors/ hatchings	0.97	0.92	0.95	0.95	500 mg/kg >500 mg/kg
Hatchling weight (g ± SD)[(a)]	7.7	7.7	7.8	7.5	500 mg/kg >500 mg/kg
14-day old survivors weight (g ± SD)[(a)]	28.7	28.6	29.7	28.6	500 mg/kg >500 mg/kg
Mean food consumption (g/bird/day)	17.0	17.3	16.6	16.0**	250 mg/kg 500 mg/kg

Parameter	Control	50 mg/kg	250 mg/kg	500 mg/kg	NOAEC/ LOAEC
Weight (g) of parent females					
at test initiation:	208.7	216.0	209.8	214.3	500 mg/kg
at Week 10:	208.8	219.2	207.7	207.3	>500 mg/kg
at test termination:	235.4	245.2	231.8	226.2	
Weight (g) of parent males					
at test initiation:	214.0	213.9	214.8	217.4	500 mg/kg
at Week 10:	213.9	216.7	215.0	214.4	>500 mg/kg
at test termination:	211.8	213.7	212.2	209.0	
Gross pathology					
Unscheduled					
Abnormalities of the liver	0	0	0	3	250 mg/kg
Scheduled					500 mg/kg
Abnormalities of the liver	0	3	2	3	
Enlarged spleens	0	0	0	3	

N/A – Not statistically analyzed.
[a] Standard deviation not reported.
* Statistically-significant difference compared to the control at $p<0.05$.
** Statistically-significant difference compared to the control at $p<0.01$.

C. REPORTED STATISTICS:

The following variables were statistically analyzed: adult body weight (male and female separately; Weeks 0, 2, 4, 6, 8, 10, and 25), weekly and overall adult feed consumption, eggs laid per hen per day, eggs cracked of eggs laid per hen, total eggs set per hen, viable embryos of eggs set per hen, surviving embryos of viable embryos per hen, hatchlings of surviving embryos per hen, 14-day old survivors of hatchlings per hen, hatchling body weight, 14-day old survivor weight, and egg shell thickness.

Data sets were first tested for normality using a Chi-Square Test and for homogeneity of variance using Levene's Test. Proportional data were arcsine transformed if data were >0 and <1, and the transformation resulted in a normal distribution. Data that passed both assumptions were analyzed using ANOVA with an appropriate pair-wise mean comparison. Dunnett's Test and Williams' Test were used for data sets of equal replicates, and Bonferroni's t-Test was used for data set of unequal replicates. Data that failed the assumptions were analyzed using Steel's Many One-Rank (equal replicates) or Kruskal-Wallis' (unequal replicates) nonparametric tests. The unit of analysis was defined as the individual for adult body weights, and as the cage (adult pair) for all remaining endpoints. In cases where an adult pair did not produce values for a measurement interval, they were included in analysis for the last parameter that could be measured, but not subsequent analyses. All analyses were conducted at the $p\leq0.05$ level of significance using TOXSTAT® statistical software (v. 3.5) and nominal concentrations.

D. VERIFICATION OF STATISTICAL RESULTS:

Statistical Method: Analysis was conducted using "chicks.sas" (Ver. 3; March 2002), a SAS program provided by EFED/OPP/USEPA. Data for all endpoints were examined graphically using box plots to determine if they exhibited a dose-dependent response, which was ultimately used to select the multiple comparison test to detect LOAEC and NOAEC. Data for each endpoint were tested to determine if their distributions were normal and if

their variances were homogeneous using Shapiro-Wilk's and Levene's tests, respectively. Data that satisfied these assumptions were subjected to Dunnett's and William's tests and data that did not satisfy these assumptions were subjected to the non-parametric MannWhitney-U (with a Bonferroni adjustment) and Jonckheere's tests. Data for dead birds were excluded from the analyses. See Appendix I for output of reviewer's statistical verification and graphs for affected endpoints to support any reviewer-generated conclusions that may differ from those reported in the study.

NOAEC: 247 mg ai/kg diet (mean-measured)
LOAEC: 495 mg ai/kg diet (mean-measured)
Endpoint(s) Affected: adult mortality, adult gross necropsy, adult female weight gain, adult food consumption, eggs laid, eggs set, viable embryos, live embryos, number hatched, hatchling survivors, and egg shell thickness

Table 6: Reproductive and Other Parameters (mean-measured concentrations; reviewer-reported).

Parameter	Control	47 mg ai/kg	247 mg ai/kg	495 mg ai/kg	NOAEC/ LOAEC
Eggs laid/pen	53.6	54.9	52.4	43.6*	**247 mg ai/kg 495 mg ai/kg**
Eggs cracked/pen	0.65	1.1	0.89	0.75	495 mg ai/kg >495 mg ai/kg
Eggs not cracked/eggs laid (%)	98.7	98.1	98.4	97.9	495 mg ai/kg >495 mg ai/kg
Eggs set/pen	48.6	49.6	47.0	39.4*	**247 mg ai/kg 495 mg ai/kg**
Shell thickness	0.20	0.20	0.20	0.19**	**247 mg ai/kg 495 mg ai/kg**
Eggs set/eggs laid (%)	90.3	90.2	89.7	90.0	495 mg ai/kg >495 mg ai/kg
Viable embryos/pen	47.1	46.6	45.8	38.2*	**247 mg ai/kg 495 mg ai/kg**
Viable embryos/eggs set (%)	97.0	93.4	97.1	97.5	495 mg ai/kg >495 mg ai/kg
Live embryos/pen	46.9	45.8	45.4	37.9*	**247 mg ai/kg 495 mg ai/kg**
Live embryos/viable embryos (%)	99.5	98.1	99.1	99.0	495 mg ai/kg >495 mg ai/kg
No. of hatchlings/pen	23.9	23.4	24.1	17.2*	**247 mg ai/kg 495 mg ai/kg**
No. of hatchlings/eggs laid (%)	45.0	40.8	45.0	38.7	495 mg ai/kg >495 mg ai/kg

No. of hatchlings/eggs set (%)	49.8	45.2	50.2	43.3	495 mg ai/kg >495 mg ai/kg
No. of hatchlings/live embryos (%)	51.4	49.4	52.1	45.1	495 mg ai/kg >495 mg ai/kg
Hatchling survival/pen	23.3	21.4	23.1	16.5*	**247 mg ai/kg** **495 mg ai/kg**
Hatchling survival/eggs set (%)	48.5	41.2	48.2	41.9	495 mg ai/kg >495 mg ai/kg
Hatchling survival/no. of hatchlings (%)	97.2	91.6*	96.2	96.6	495 mg ai/kg >495 mg ai/kg
Hatchling weight (g)	7.7	7.8	7.8	7.5	495 mg ai/kg >495 mg ai/kg
Survivor weight (g)	28.7	28.6	29.5	28.3	495 mg ai/kg >495 mg ai/kg
Mean food consumption (g/bird/day)	17.0	17.3	16.6	16.2	495 mg ai/kg >495 mg ai/kg
Male weight gain (g)	-0.74	-0.41	-2.62	-9.13	495 mg ai/kg >495 mg ai/kg
Female weight gain (g)	26.4	29.2	22.0	10.6*	**247 mg ai/kg** **495 mg ai/kg**

* Statistically different from the control at $p<0.05$.
** Statistically different from the control at $p<0.01$.

E. STUDY DEFICIENCIES:

This study is scientifically sound. However, the following notable deviations from OPPTS 850.2300 guidance were observed: cage size (668 cm^2 per bird) was significantly smaller than recommended (≥5,000 cm^2 per bird), which may have contributed to the pen-mate aggression observed during the study; and the volume (thus concentration) of acetone solvent used to prepare the treated diets was not reported.

F. REVIEWER'S COMMENTS:

Results of the reviewer's statistical verification were similar to the study author's; statistically-significant reductions were detected at the highest level on several adult and reproductive endpoints. Mean-measured concentrations are reported in the Executive Summary and Conclusions sections of the DER.

All validity requirements were met. Specifically, controls produced an average of twenty-three (23) 14-day old survivors per hen during the 10-week production phase (minimum of 12 chicks per pen during a 10-week production phase), the egg shell thickness of control eggs was 0.203 mm (minimum of 0.19 mm for bobwhite), and adult control mortality was 3% (no more than 10% acceptable in controls).

All homogeneity, stability, and concentration verification samples were analyzed for propanil concentrations by EN-CAS Analytical Laboratories (Winston-Salem, NC). A comprehensive analytical report was provided as an appendix

(Appendix 6 of the study document). During the range-finding (or pilot) study, samples were hand-mixed and 10-g portions were extracted with 100 mL of acetonitrile by shaking for 15 minutes. Samples were centrifuged, and an aliquot (1 mL) of the filtered extract was mixed with 100 µL of a 500-µg/mL solution of hexanophenone in acetonitrile (internal standard) prior to analysis for propanil. The extraction procedure was slightly modified for the definitive study due to initial low recoveries. During the definitive study, samples were hand-mixed and 10-g portions were Soxhlet-extracted with 160 mL of acetonitrile for 6 hours. After *ca.* 1 hour of cooling, the solvent residue was brought to 200 mL volume with additional acetonitrile. An aliquot (1 mL) of the filtered extract was mixed with 100 µL of a 500-µg/mL solution of hexanophenone in acetonitrile (internal standard) prior to analysis for propnail. For both studies, analyses were performed using HPLC equipped with a UV detector (254 nm). The limit of quantification (LOQ) was 10 mg ai/kg diet.

The objectives of the analytical portion of the study were:

- **To verify a method for the analysis of avian feed samples.** The analytical method was validated at the start of both the range-finding and definitive tests at the nominal 50 and 500 mg ai/kg diet levels; mean recoveries were 88 and 92% for the range-finding and definitive studies, respectively.
- **To analyze feed samples from a range-finding study set up to determine the appropriate dosing levels for the definitive study.** For the range-finding study, propanil was mixed into the avian diet at nominal concentrations of 250 and 750 mg ai/kg diet for the dose verification samples and 50 and 1500 mg ai/kg diet for the homogeneity samples. Mean recoveries for dose verification samples were 82 and 98% for the nominal 250 and 750 mg ai/kg diet levels, respectively. Mean recoveries for homogeneity samples were 100 and 95% for the nominal 50 and 1500 mg ai/kg diet levels, respectively, with coefficients of variation (%RSD) of 7.5 and 11%, respectively. Procedural recovery assessments were performed concurrently with test sample analysis by fortifying basal diet with propanil at nominal concentrations of 50, 250, 750, or 1500 mg ai/kg diet; the overall mean recovery was 93%, with a RSD of 13%.
- **To analyze feed samples from the definitive study to verify the dose levels and homogeneity of various feed mixtures fed to the northern bobwhite.** For the definitive study, propanil was mixed into avian feed at nominal concentrations of 50, 250, and 500 mg ai/kg diet. Homogeneity was assessed at the 50 and 500 mg ai/kg diet levels (also used for concentration verification), and concentration verification was assessed at the nominal 250 mg ai/kg diet level. Diets were prepared and analyzed at the beginning (August 18, 2008), middle (November 10, 2008), and towards the end of the study (January 9, 2009). Analysis of the batch of samples collected towards the end of the study resulted in low values for the 250 and 500 mg ai/kg diet levels (data not reported); therefore, additional samples were collected (on January 20, 2009) and re-prepared and analyzed at these treatment levels. Mean recoveries for homogeneity samples ranged from 88 to 107% of nominal concentrations (50 and 500 mg ai/kg diet levels), with coefficients of variation (% RSD) ranging from 3.9 to 11.8%. Mean recoveries for concentration verification samples ranged from 87 to 106% of the nominal 250 mg ai/kg diet level. Procedural recovery assessments were performed concurrently with test sample analysis by fortifying basal diet with propanil at nominal concentrations of 50, 250, or 500 mg ai/kg diet; the overall mean recovery was 101%, with a RSD of 7.6%.
- **To determine storage stability of propanil in the treated diets.** During the range-finding study, basal diet was fortified at nominal concentrations of 50 or 1500 mg ai/kg diet and stored under frozen conditions for up to 42 days or under ambient conditions for up to 21 days. After 7 days of ambient storage, recoveries were 53-54% of nominal for the 50 mg ai/kg diet level and 69-76% of nominal for the 1500 mg ai/kg diet level. After 21 days of ambient storage, recoveries were 38-42% of nominal for the 50 mg ai/kg diet level and 65-84% of nominal for the 1500 mg ai/kg diet level. Under frozen storage conditions, recoveries ranged from 73 to 83% of nominal for both levels after 42 days. Due to the apparent instability of propanil in treated feed under ambient conditions, storage stability was further assessed during the definitive test; basal diet was fortified at 50, 250, or 500 mg ai/kg diet and stored under ambient conditions for 7 days. Recoveries ranged from 88 to 110% of nominal concentrations.

The basal diet used for fortification of untreated samples at the analytical laboratory (EN-CAS) was Purina Gamebird Flight Conditoner®, while the basal diet used throughout the definitive study was Southern States Super Breeder®.

Mean-measured concentrations in the treated feed were reviewer-calculated using data provided for homogeneity samples prepared at 50 and 500 mg ai/kg diet and for concentration verification samples prepared at 250 mg ai/kg diet level (see copy of associated Excel worksheet in Appendix II).

For homogeneity assessments, one sample was collected from the top left, top right, middle left, middle right, bottom left, and bottom right of the mixing bowl. For test concentration verification assessments, samples were composited from sampling the six locations within the mixing bowl (as described for homogeneity assessments).

Mean overall food consumption was reviewer-calculated (see copy of associated Excel worksheet in Appendix III).

Experimental test dates were September 1, 2008 to April 2, 2009.

G. CONCLUSIONS:

This study is **scientifically sound** and is thus **acceptable**. No notable treatment-related effects were observed upon any adult or offspring parameter at the 47 or 247 mg ai/kg diet levels. At the 495 mg ai/kg diet level, treatment-related effects included incidences of adult mortality in conjunction with gross abnormalities of the liver, a reduction in food consumption, a reduction in adult female weight gain, and reproductive effects including those on eggs laid, and egg shell thickness.

NOAEC: 247 mg ai/kg diet (mean-measured)
LOAEC: 495 mg ai/kg diet (mean-measured)
Endpoint(s) Affected: visually determined: adult mortality and adult gross necropsy
statistically determined: adult female weight gain, adult food consumption, eggs laid, and egg shell thickness

III. REFERENCES:

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APPENDIX I. OUTPUT OF REVIEWER'S STATISTICAL VERIFICATION:

Bobwhite repro, Propanil, MRID 48235101
PRINTOUT OF RAW DATA

Obs	TRT	EL	EC	ENC_EL	ES	ES_EL	VE	VE_ES	LE	LE_VE	NH	NH_EL	NH_ES
1	Ctrl	55	1	98.18	50	90.91	50	100.00	50	100.00	33	60.00	66.00
2	Ctrl	59	0	100.00	55	93.22	55	100.00	55	100.00	27	45.76	49.09
3	Ctrl	47	0	100.00	43	91.49	42	97.67	42	100.00	16	34.04	37.21
4	Ctrl	.	.	.	.	.	.	.	.	.	.	.	.
5	Ctrl	69	0	100.00	63	91.30	53	84.13	53	100.00	25	36.23	39.68
6	Ctrl	55	0	100.00	51	92.73	51	100.00	51	100.00	27	49.09	52.94
7	Ctrl	44	0	100.00	39	88.64	38	97.44	38	100.00	17	38.64	43.59
8	Ctrl	65	2	96.92	59	90.77	58	98.31	57	98.28	29	44.62	49.15
9	Ctrl	47	1	97.87	44	93.62	43	97.73	43	100.00	17	36.17	38.64
10	Ctrl	66	1	98.48	59	89.39	58	98.31	58	100.00	33	50.00	55.93
11	Ctrl	37	0	100.00	32	86.49	32	100.00	32	100.00	25	67.57	78.13
12	Ctrl	43	1	97.67	39	90.70	39	100.00	39	100.00	32	74.42	82.05
13	Ctrl	65	1	98.46	61	93.85	60	98.36	60	100.00	12	18.46	19.67
14	Ctrl	61	0	100.00	57	93.44	57	100.00	55	96.49	29	47.54	50.88
15	Ctrl	45	0	100.00	40	88.89	39	97.50	39	100.00	25	55.56	62.50
16	Ctrl	33	2	93.94	27	81.82	25	92.59	24	96.00	5	15.15	18.52
17	Ctrl	65	0	100.00	59	90.77	58	98.31	58	100.00	29	44.62	49.15
18	Ctrl	56	2	96.43	49	87.50	43	87.76	43	100.00	26	46.43	53.06
19	Dose1	61	0	100.00	56	91.80	49	87.50	48	97.96	32	52.46	57.14
20	Dose1	61	5	91.80	52	85.25	51	98.08	50	98.04	29	47.54	55.77
21	Dose1	26	0	100.00	23	88.46	21	91.30	21	100.00	4	15.38	17.39
22	Dose1	54	2	96.30	49	90.74	48	97.96	48	100.00	17	31.48	34.69
23	Dose1	54	0	100.00	49	90.74	49	100.00	48	97.96	26	48.15	53.06
24	Dose1	49	2	95.92	44	89.80	32	72.73	30	93.75	19	38.78	43.18
25	Dose1	62	2	96.77	55	88.71	50	90.91	49	98.00	23	37.10	41.82
26	Dose1	51	0	100.00	48	94.12	39	81.25	38	97.44	15	29.41	31.25
27	Dose1	35	0	100.00	32	91.43	29	90.63	27	93.10	14	40.00	43.75
28	Dose1	46	0	100.00	43	93.48	43	100.00	43	100.00	13	28.26	30.23
29	Dose1	64	2	96.88	59	92.19	59	100.00	59	100.00	34	53.13	57.63
30	Dose1	64	0	100.00	58	90.63	58	100.00	58	100.00	31	48.44	53.45
31	Dose1	61	0	100.00	57	93.44	52	91.23	51	98.08	25	40.98	43.86
32	Dose1	66	0	100.00	60	90.91	60	100.00	60	100.00	36	54.55	60.00
33	Dose1	37	2	94.59	33	89.19	30	90.91	29	96.67	10	27.03	30.30
34	Dose1	70	0	100.00	66	94.29	66	100.00	65	98.48	38	54.29	57.58
35	Dose1	62	3	95.16	47	75.81	42	89.36	42	100.00	23	37.10	48.94
36	Dose1	66	1	98.48	61	92.42	61	100.00	59	96.72	33	50.00	54.10
37	Dose2	63	4	93.65	54	85.71	53	98.15	53	100.00	29	46.03	53.70
38	Dose2	53	4	92.45	44	83.02	41	93.18	39	95.12	25	47.17	56.82
39	Dose2	61	2	96.72	55	90.16	55	100.00	55	100.00	31	50.82	56.36
40	Dose2	54	0	100.00	50	92.59	50	100.00	50	100.00	24	44.44	48.00
41	Dose2	41	1	97.56	36	87.80	34	94.44	34	100.00	17	41.46	47.22
42	Dose2	64	2	96.88	56	87.50	53	94.64	53	100.00	31	48.44	55.36
43	Dose2	62	0	100.00	56	90.32	56	100.00	55	98.21	31	50.00	55.36
44	Dose2	44	1	97.73	40	90.91	37	92.50	35	94.59	16	36.36	40.00
45	Dose2	50	0	100.00	48	96.00	48	100.00	47	97.92	25	50.00	52.08
46	Dose2	64	0	100.00	59	92.19	58	98.31	58	100.00	33	51.56	55.93
47	Dose2	55	0	100.00	50	90.91	49	98.00	49	100.00	27	49.09	54.00
48	Dose2	53	1	98.11	47	88.68	47	100.00	47	100.00	23	43.40	48.94
49	Dose2	53	0	100.00	47	88.68	46	97.87	46	100.00	23	43.40	48.94
50	Dose2	37	0	100.00	32	86.49	32	100.00	32	100.00	15	40.54	46.88
51	Dose2	65	0	100.00	60	92.31	59	98.33	58	98.31	32	49.23	53.33
52	Dose2	23	0	100.00	21	91.30	19	90.48	19	100.00	7	30.43	33.33
53	Dose2	50	0	100.00	45	90.00	44	97.78	44	100.00	22	44.00	48.89
54	Dose2	51	1	98.04	46	90.20	43	93.48	43	100.00	22	43.14	47.83
55	Dose3	48	0	100.00	45	93.75	43	95.56	42	97.67	21	43.75	46.67
56	Dose3	37	0	100.00	34	91.89	34	100.00	33	97.06	15	40.54	44.12
57	Dose3	.	.	.	.	.	.	.	.	.	.	.	.

58	Dose3	57	1	98.25	50	87.72	43	86.00	43	100.00	28	49.12	56.00
59	Dose3	59	0	100.00	54	91.53	53	98.15	53	100.00	25	42.37	46.30
60	Dose3	.	.	.	.	.	.	.	.	.	.	.	.
61	Dose3	46	3	93.48	41	89.13	40	97.56	40	100.00	19	41.30	46.34
62	Dose3	28	0	100.00	25	89.29	25	100.00	25	100.00	11	39.29	44.00
63	Dose3	.	.	.	.	.	.	.	.	.	.	.	.
64	Dose3	29	5	82.76	21	72.41	21	100.00	20	95.24	11	37.93	52.38
65	Dose3	67	0	100.00	62	92.54	62	100.00	62	100.00	21	31.34	33.87
66	Dose3	45	0	100.00	42	93.33	40	95.24	39	97.50	12	26.67	28.57
67	Dose3	.	.	.	.	.	.	.	.	.	.	.	.
68	Dose3	21	0	100.00	20	95.24	20	100.00	20	100.00	6	28.57	30.00
69	Dose3	.	.	.	.	.	.	.	.	.	.	.	.
70	Dose3	.	.	.	.	.	.	.	.	.	.	.	.
71	Dose3	37	0	100.00	34	91.89	33	97.06	33	100.00	12	32.43	35.29
72	Dose3	49	0	100.00	45	91.84	45	100.00	45	100.00	25	51.02	55.56

Bobwhite repro, Propanil, MRID 48235101
PRINTOUT OF RAW DATA (continued)

Obs	TRT	NH_LE	HS	HS_ES	HS_NH	THICK	HATWT	SURVWT	FOOD	WTGAINM	WTGAINF
1	Ctrl	66.00	32	64.00	96.97	0.21	7	29	18	-1	57
2	Ctrl	49.09	26	47.27	96.30	0.21	7	30	18	-12	20
3	Ctrl	38.10	16	37.21	100.00	0.20	8	29	19	10	30
4	Ctrl	.	.	.	.	.	.	.	.	.	.
5	Ctrl	47.17	24	38.10	96.00	0.20	7	26	19	-4	49
6	Ctrl	52.94	25	49.02	92.59	0.20	8	29	16	-16	22
7	Ctrl	44.74	17	43.59	100.00	0.20	7	27	16	17	28
8	Ctrl	50.88	29	49.15	100.00	0.21	8	26	16	4	36
9	Ctrl	39.53	16	36.36	94.12	0.20	8	32	19	7	9
10	Ctrl	56.90	33	55.93	100.00	0.21	8	28	18	-23	27
11	Ctrl	78.13	24	75.00	96.00	0.20	8	30	16	2	-44
12	Ctrl	82.05	32	82.05	100.00	0.21	8	27	14	18	-13
13	Ctrl	20.00	11	18.03	91.67	0.21	7	28	17	-2	45
14	Ctrl	52.73	29	50.88	100.00	0.19	8	29	18	-4	42
15	Ctrl	64.10	25	62.50	100.00	0.20	8	30	14	-12	21
16	Ctrl	20.83	5	18.52	100.00	0.19	8	26	16	-3	33
17	Ctrl	50.00	26	44.07	89.66	0.20	8	31	16	-16	34
18	Ctrl	60.47	26	53.06	100.00	0.22	8	31	19	23	53
19	Dose1	66.67	30	53.57	93.75	0.20	9	31	18	-37	24
20	Dose1	58.00	25	48.08	86.21	0.18	7	29	16	6	15
21	Dose1	19.05	4	17.39	100.00	0.20	8	29	15	2	24
22	Dose1	35.42	16	32.65	94.12	0.19	8	31	16	13	36
23	Dose1	54.17	21	42.86	80.77	0.21	7	29	18	20	18
24	Dose1	63.33	19	43.18	100.00	0.20	8	30	19	-2	41
25	Dose1	46.94	18	32.73	78.26	0.21	8	32	19	7	31
26	Dose1	39.47	13	27.08	86.67	0.20	8	27	18	6	29
27	Dose1	51.85	11	34.38	78.57	0.20	7	21	18	-15	15
28	Dose1	30.23	13	30.23	100.00	0.20	8	29	16	-1	22
29	Dose1	57.63	32	54.24	94.12	0.19	8	28	18	-24	40
30	Dose1	53.45	29	50.00	93.55	0.20	8	33	17	-11	48
31	Dose1	49.02	23	40.35	92.00	0.21	8	27	19	22	32
32	Dose1	60.00	34	56.67	94.44	0.20	8	27	20	13	47
33	Dose1	34.48	10	30.30	100.00	0.20	8	30	17	6	22
34	Dose1	58.46	38	57.58	100.00	0.22	8	27	16	1	49
35	Dose1	54.76	21	44.68	91.30	0.18	8	28	17	-16	12
36	Dose1	55.93	28	45.90	84.85	0.20	8	28	17	2	23
37	Dose2	54.72	25	46.30	86.21	0.20	7	26	17	15	10
38	Dose2	64.10	25	56.82	100.00	0.19	9	30	16	4	52
39	Dose2	56.36	31	56.36	100.00	0.21	8	30	18	-8	18
40	Dose2	48.00	22	44.00	91.67	0.20	8	31	17	-7	26
41	Dose2	50.00	17	47.22	100.00	0.19	8	32	18	-1	14
42	Dose2	58.49	31	55.36	100.00	0.18	8	34	17	4	-15
43	Dose2	56.36	31	55.36	100.00	0.20	8	32	18	4	35

44	Dose2	45.71	16	40.00	100.00	0.18	9	33	16	-29	5
45	Dose2	53.19	25	52.08	100.00	0.22	7	27	17	-7	7
46	Dose2	56.90	31	52.54	93.94	0.20	9	31	18	-3	44
47	Dose2	55.10	27	54.00	100.00	0.21	7	29	16	-24	31
48	Dose2	48.94	23	48.94	100.00	0.22	8	31	18	0	26
49	Dose2	50.00	21	44.68	91.30	0.22	7	29	16	5	22
50	Dose2	46.88	15	46.88	100.00	0.21	8	30	17	-19	48
51	Dose2	55.17	29	48.33	90.63	0.20	7	26	17	-3	25
52	Dose2	36.84	7	33.33	100.00	0.17	8	25	14	6	2
53	Dose2	50.00	18	40.00	81.82	0.19	7	31	16	10	23
54	Dose2	51.16	21	45.65	95.45	0.19	7	25	15	6	25
55	Dose3	50.00	21	46.67	100.00	0.20	7	29	15	-16	7
56	Dose3	45.45	14	41.18	93.33	0.19	8	33	17	-13	-15
57	Dose3	.	.	.	.	.	.	.	.	.	.
58	Dose3	65.12	28	56.00	100.00	0.19	7	25	18	-5	-30
59	Dose3	47.17	23	42.59	92.00	0.21	8	29	17	-10	46
60	Dose3	.	.	.	.	.	.	.	.	.	.
61	Dose3	47.50	19	46.34	100.00	0.20	8	28	15	-3	17
62	Dose3	44.00	11	44.00	100.00	0.18	9	29	15	-28	-3
63	Dose3	.	.	.	.	.	.	.	.	.	.
64	Dose3	55.00	11	52.38	100.00	0.15	7	28	16	-16	-3
65	Dose3	33.87	19	30.65	90.48	0.19	7	27	17	3	25
66	Dose3	30.77	11	26.19	91.67	0.19	7	24	16	-10	26
67	Dose3	.	.	.	.	.	.	.	.	.	.
68	Dose3	30.00	6	30.00	100.00	0.20	8	30	16	-26	20
69	Dose3	.	.	.	.	.	.	.	.	.	.
70	Dose3	.	.	.	.	.	.	.	.	.	.
71	Dose3	36.36	12	35.29	100.00	0.19	7	29	17	-1	41
72	Dose3	55.56	23	51.11	92.00	0.20	8	29	17	16	-5

Bobwhite repro, Propanil, MRID 48235101
ANALYSIS RESULTS FOR VARIABLE EL (Eggs Laid)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.959	0.029	0.537	0.659	USE PARAMETRIC TESTS

****
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf. Interval
Ctrl	17	53.65	11.01	2.67	20.52	47.99, 59.31
Dose1	18	54.94	12.21	2.88	22.22	48.87, 61.02
Dose2	18	52.39	10.93	2.58	20.87	46.95, 57.83
Dose3	12	43.58	13.73	3.96	31.51	34.86, 52.31

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	55.00	33.00	69.00	.	.
Dose1	61.00	26.00	70.00	102.42	-2.42
Dose2	53.00	23.00	65.00	97.65	2.35
Dose3	45.50	21.00	67.00	81.24	18.76

****
PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Analysis of Variance (ANOVA) - overall F-test

Numerator df	Denominator df	F-stat	P-value
3	61	2.49	0.068

Dunnett - testing each trt mean signif. less than control
Williams - test assumes dose-response relationship, testing negative trend
Tukey - two-sided tests, all possible comparisons, not used for NOEC or LOEC

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	53.65	.	54.31	.	0.988	0.989	0.121	.	.
Dose1	54.94	0.856	54.31	0.653	.	0.916	0.059	.	.
Dose2	52.39	0.630	52.39	0.477	.	.	0.202	.	.
Dose3	43.58	0.036	43.58	0.017	.	.	.	.	.

SUMMARY	NOEC	LOEC
Dunnett	Dose2	Dose3
Williams	**Dose2**	**Dose3**

Bobwhite repro, Propanil, MRID 48235101
ANALYSIS RESULTS FOR VARIABLE NEG_EC (Eggs Cracked)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.781	<.001	1.338	0.270	USE NON-PARAMETRIC TESTS

****
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.	Interval
Ctrl	17	0.65	0.79	0.19	121.46	0.24,	1.05
Dose1	18	1.06	1.43	0.34	135.83	0.34,	1.77
Dose2	18	0.89	1.32	0.31	148.89	0.23,	1.55
Dose3	12	0.75	1.60	0.46	213.67	0.00,	1.77

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	0.00	0.00	2.00	.	.
Dose1	0.00	0.00	5.00	163.13	-63.13
Dose2	0.00	0.00	4.00	137.37	-37.37
Dose3	0.00	0.00	5.00	115.91	-15.91

****
NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	1.16	0.763

MannWhit(Bon) - testing each trt median signif. greater than control
Jonckheere - test assumes dose-response relationship, testing positive trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	0.00	.	.
Dose1	0.00	1.000	0.293
Dose2	0.00	1.000	0.436
Dose3	0.00	1.000	0.713

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Bobwhite repro, Propanil, MRID 48235101
ANALYSIS RESULTS FOR VARIABLE ENC_EL ((EL-EC)/EL (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.705	<.001	2.291	0.087	USE NON-PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.	Interval
Ctrl	17	98.70	1.74	0.42	1.76	97.81,	99.60
Dose1	18	98.11	2.52	0.59	2.57	96.85,	99.36
Dose2	18	98.40	2.30	0.54	2.34	97.25,	99.54
Dose3	12	97.87	5.12	1.48	5.23	94.62,	100.00

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	100.00	93.94	100.00	.	.
Dose1	100.00	91.80	100.00	99.39	0.61
Dose2	100.00	92.45	100.00	99.69	0.31
Dose3	100.00	82.76	100.00	99.16	0.84

****

NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	1.12	0.773

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	100.00	.	.
Dose1	100.00	1.000	0.326
Dose2	100.00	1.000	0.429
Dose3	100.00	1.000	0.707

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Bobwhite repro, Propanil, MRID 48235101
ANALYSIS RESULTS FOR VARIABLE ES (Eggs Set)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.964	0.055	0.624	0.602	USE PARAMETRIC TESTS

****
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	17	48.65	10.78	2.61	22.15	43.11, 54.19
Dose1	18	49.56	11.31	2.67	22.82	43.93, 55.18
Dose2	18	47.00	9.98	2.35	21.23	42.04, 51.96
Dose3	12	39.42	13.10	3.78	33.25	31.09, 47.74

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	50.00	27.00	63.00	.	.
Dose1	50.50	23.00	66.00	101.87	-1.87
Dose2	47.50	21.00	60.00	96.61	3.39
Dose3	41.50	20.00	62.00	81.03	18.97

****
PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Analysis of Variance (ANOVA) - overall F-test

Numerator df	Denominator df	F-stat	P-value
3	61	2.27	0.090

Dunnett - testing each trt mean signif. less than control
Williams - test assumes dose-response relationship, testing negative trend
Tukey - two-sided tests, all possible comparisons, not used for NOEC or LOEC

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	48.65	.	49.11	.	0.995	0.972	0.137	.	.
Dose1	49.56	0.834	49.11	0.635	.	0.902	0.081	.	.
Dose2	47.00	0.577	47.00	0.422	.	.	0.273	.	.
Dose3	39.42	0.042	39.42	0.019	.	.	.	.	.

SUMMARY	NOEC	LOEC
Dunnett	Dose2	Dose3
Williams	**Dose2**	**Dose3**

Bobwhite repro, Propanil, MRID 48235101
ANALYSIS RESULTS FOR VARIABLE ES_EL (EggsSet/EggsLaid (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.803	<.001	0.632	0.597	USE NON-PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.	Interval
Ctrl	17	90.32	3.07	0.75	3.40	88.74,	91.90
Dose1	18	90.19	4.24	1.00	4.70	88.08,	92.30
Dose2	18	89.71	2.96	0.70	3.30	88.24,	91.18
Dose3	12	90.05	5.94	1.71	6.59	86.27,	93.82

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	90.77	81.82	93.85	.	.
Dose1	90.82	75.81	94.29	99.85	0.15
Dose2	90.18	83.02	96.00	99.32	0.68
Dose3	91.86	72.41	95.24	99.69	0.31

****

NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	2.60	0.458

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	90.77	.	.
Dose1	90.82	1.000	0.579
Dose2	90.18	0.517	0.164
Dose3	91.86	1.000	0.514

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Bobwhite repro, Propanil, MRID 48235101
ANALYSIS RESULTS FOR VARIABLE VE (Viable Embryo(d14))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.974	0.193	0.398	0.755	USE PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.	Interval
Ctrl	17	47.12	10.40	2.52	22.08	41.77,	52.47
Dose1	18	46.61	12.52	2.95	26.87	40.38,	52.84
Dose2	18	45.78	10.32	2.43	22.53	40.65,	50.91
Dose3	12	38.25	12.54	3.62	32.79	30.28,	46.22

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	50.00	25.00	60.00	.	.
Dose1	49.00	21.00	66.00	98.92	1.08
Dose2	47.50	19.00	59.00	97.16	2.84
Dose3	40.00	20.00	62.00	81.18	18.82

****

PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Analysis of Variance (ANOVA) - overall F-test

Numerator df	Denominator df	F-stat	P-value
3	61	1.74	0.168

Dunnett - testing each trt mean signif. less than control
Williams - test assumes dose-response relationship, testing negative trend
Tukey - two-sided tests, all possible comparisons, not used for NOEC or LOEC

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	47.12	.	47.12	.	0.999	0.985	0.177	.	.
Dose1	46.61	0.706	46.61	0.527	.	0.996	0.212	.	.
Dose2	45.78	0.616	45.78	0.462	.	.	0.297	.	.
Dose3	38.25	0.055	38.25	0.026	.	.	.	.	.

SUMMARY	NOEC	LOEC
Dunnett	Dose3	>highest dose
Williams	**Dose2**	**Dose3**

Bobwhite repro, Propanil, MRID 48235101
ANALYSIS RESULTS FOR VARIABLE VE_ES (ViableEmbryo/EggsSet (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.862	<.001	4.688	0.005	USE NON-PARAMETRIC TESTS

****
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf. Interval
Ctrl	17	96.95	4.56	1.11	4.71	94.60, 99.29
Dose1	18	93.44	7.68	1.81	8.22	89.62, 97.26
Dose2	18	97.06	3.10	0.73	3.19	95.52, 98.60
Dose3	12	97.46	4.04	1.17	4.14	94.90, 100.00

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	98.31	84.13	100.00	.	.
Dose1	94.63	72.73	100.00	96.38	3.62
Dose2	98.07	90.48	100.00	100.12	-0.12
Dose3	99.07	86.00	100.00	100.53	-0.53

****
NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	2.11	0.549

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	98.31	.	.
Dose1	94.63	0.537	0.171
Dose2	98.07	1.000	0.503
Dose3	99.07	1.000	0.719

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Bobwhite repro, Propanil, MRID 48235101
ANALYSIS RESULTS FOR VARIABLE LE (Live Embryo(d21))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.974	0.177	0.373	0.773	USE PARAMETRIC TESTS

****
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	17	46.88	10.37	2.51	22.11	41.55, 52.21
Dose1	18	45.83	12.65	2.98	27.60	39.54, 52.12
Dose2	18	45.39	10.35	2.44	22.80	40.24, 50.53
Dose3	12	37.92	12.66	3.65	33.39	29.87, 45.96

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	50.00	24.00	60.00	.	.
Dose1	48.00	21.00	65.00	97.76	2.24
Dose2	47.00	19.00	58.00	96.81	3.19
Dose3	39.50	20.00	62.00	80.88	19.12

****
PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Analysis of Variance (ANOVA) - overall F-test

Numerator df	Denominator df	F-stat	P-value
3	61	1.68	0.181

Dunnett - testing each trt mean signif. less than control
Williams - test assumes dose-response relationship, testing negative trend
Tukey - two-sided tests, all possible comparisons, not used for NOEC or LOEC

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	46.88	.	46.88	.	0.993	0.980	0.173	.	.
Dose1	45.83	0.649	45.83	0.466	.	0.999	0.259	.	.
Dose2	45.39	0.599	45.39	0.445	.	.	0.308	.	.
Dose3	37.92	0.054	37.92	0.026	.	.	.	.	.

SUMMARY	NOEC	LOEC
Dunnett	Dose3	>highest dose
Williams	**Dose2**	**Dose3**

Bobwhite repro, Propanil, MRID 48235101
ANALYSIS RESULTS FOR VARIABLE LE_VE (LiveEmbryo/ViableEmbryo (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.806	<.001	0.984	0.406	USE NON-PARAMETRIC TESTS

****
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.	Interval
Ctrl	17	99.46	1.28	0.31	1.29	98.80,	100.00
Dose1	18	98.12	2.08	0.49	2.12	97.09,	99.16
Dose2	18	99.12	1.71	0.40	1.72	98.27,	99.97
Dose3	12	98.96	1.65	0.48	1.67	97.91,	100.00

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	100.00	96.00	100.00	.	.
Dose1	98.06	93.10	100.00	98.66	1.34
Dose2	100.00	94.59	100.00	99.66	0.34
Dose3	100.00	95.24	100.00	99.50	0.50

****
NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	6.94	0.074

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	100.00	.	.
Dose1	98.06	0.036	0.009
Dose2	100.00	1.000	0.320
Dose3	100.00	1.000	0.368

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	<lowest dose	Dose1
Jonckheere	Dose3	>highest dose

Bobwhite repro, Propanil, MRID 48235101
ANALYSIS RESULTS FOR VARIABLE NH (Number Hatched)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.966	0.074	1.312	0.279	USE PARAMETRIC TESTS

****
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf. Interval
Ctrl	17	23.94	7.88	1.91	32.90	19.89, 27.99
Dose1	18	23.44	9.80	2.31	41.80	18.57, 28.32
Dose2	18	24.06	6.95	1.64	28.89	20.60, 27.51
Dose3	12	17.17	6.95	2.01	40.50	12.75, 21.58

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	26.00	5.00	33.00	.	.
Dose1	24.00	4.00	38.00	97.93	2.07
Dose2	24.50	7.00	33.00	100.48	-0.48
Dose3	17.00	6.00	28.00	71.70	28.30

****
PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Analysis of Variance (ANOVA) - overall F-test

Numerator df	Denominator df	F-stat	P-value
3	61	2.23	0.094

Dunnett - testing each trt mean signif. less than control
Williams - test assumes dose-response relationship, testing negative trend
Tukey - two-sided tests, all possible comparisons, not used for NOEC or LOEC

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	23.94	.	23.94	.	0.998	1.000	0.128	.	.
Dose1	23.44	0.686	23.75	0.553	.	0.996	0.169	.	.
Dose2	24.06	0.771	23.75	0.587	.	.	0.112	.	.
Dose3	17.17	0.039	17.17	0.018	.	.	.	.	.

SUMMARY	NOEC	LOEC
Dunnett	**Dose2**	**Dose3**
Williams	Dose2	Dose3

Bobwhite repro, Propanil, MRID 48235101
ANALYSIS RESULTS FOR VARIABLE NH_EL (NumberHatched/EggsLaid (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.969	0.109	3.403	0.023	USE NON-PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf. Interval	
Ctrl	17	44.96	15.15	3.67	33.70	37.17,	52.75
Dose1	18	40.78	11.23	2.65	27.53	35.20,	46.36
Dose2	18	44.97	5.47	1.29	12.16	42.25,	47.69
Dose3	12	38.70	7.69	2.22	19.89	33.81,	43.58

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	45.76	15.15	74.42	.	.
Dose1	40.49	15.38	54.55	90.71	9.29
Dose2	45.24	30.43	51.56	100.03	-0.03
Dose3	39.91	26.67	51.02	86.07	13.93

****

NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	4.27	0.233

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	45.76	.	.
Dose1	40.49	0.818	0.265
Dose2	45.24	1.000	0.571
Dose3	39.91	0.224	0.139

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Bobwhite repro, Propanil, MRID 48235101
ANALYSIS RESULTS FOR VARIABLE NH_ES (NumberHatched/EggsSet (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.963	0.049	3.319	0.026	USE NON-PARAMETRIC TESTS

****
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	17	49.78	17.02	4.13	34.20	41.02, 58.53
Dose1	18	45.23	12.24	2.89	27.07	39.14, 51.32
Dose2	18	50.16	6.10	1.44	12.15	47.13, 53.20
Dose3	12	43.26	9.40	2.71	21.72	37.29, 49.23

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	49.15	18.52	82.05	.	.
Dose1	46.40	17.39	60.00	90.87	9.13
Dose2	50.51	33.33	56.82	100.78	-0.78
Dose3	45.21	28.57	56.00	86.91	13.09

****
NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	3.77	0.288

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	49.15	.	.
Dose1	46.40	0.868	0.282
Dose2	50.51	1.000	0.571
Dose3	45.21	0.326	0.151

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Bobwhite repro, Propanil, MRID 48235101
ANALYSIS RESULTS FOR VARIABLE NH_LE (NumberHatched/LiveEmbryo (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.966	0.069	2.994	0.038	USE NON-PARAMETRIC TESTS

****
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf. Interval
Ctrl	17	51.39	16.68	4.05	32.46	42.81, 59.97
Dose1	18	49.38	12.73	3.00	25.79	43.05, 55.71
Dose2	18	52.11	6.00	1.41	11.52	49.12, 55.09
Dose3	12	45.07	10.78	3.11	23.93	38.22, 51.92

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	50.88	20.00	82.05	.	.
Dose1	53.81	19.05	66.67	96.09	3.91
Dose2	52.18	36.84	64.10	101.39	-1.39
Dose3	46.31	30.00	65.12	87.69	12.31

****
NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	3.70	0.295

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	50.88	.	.
Dose1	53.81	1.000	0.447
Dose2	52.18	1.000	0.510
Dose3	46.31	0.303	0.096

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Bobwhite repro, Propanil, MRID 48235101
ANALYSIS RESULTS FOR VARIABLE HS (Hatching Survival(d14))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.981	0.432	0.919	0.437	USE PARAMETRIC TESTS

****
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	17	23.29	7.79	1.89	33.45	19.29, 27.30
Dose1	18	21.39	9.29	2.19	43.42	16.77, 26.01
Dose2	18	23.06	6.68	1.57	28.98	19.73, 26.38
Dose3	12	16.50	6.59	1.90	39.91	12.32, 20.68

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	25.00	5.00	33.00	.	.
Dose1	21.00	4.00	38.00	91.82	8.18
Dose2	24.00	7.00	31.00	98.98	1.02
Dose3	16.50	6.00	28.00	70.83	29.17

****
PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Analysis of Variance (ANOVA) - overall F-test

Numerator df	Denominator df	F-stat	P-value
3	61	2.20	0.097

Dunnett - testing each trt mean signif. less than control
Williams - test assumes dose-response relationship, testing negative trend
Tukey - two-sided tests, all possible comparisons, not used for NOEC or LOEC

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	23.29	.	23.29	.	0.886	1.000	0.104	.	.
Dose1	21.39	0.446	22.22	0.407	.	0.917	0.338	.	.
Dose2	23.06	0.722	22.22	0.434	.	.	0.117	.	.
Dose3	16.50	0.031	16.50	0.014	.	.	.	.	.

SUMMARY	NOEC	LOEC
Dunnett	**Dose2**	**Dose3**
Williams	Dose2	Dose3

Bobwhite repro, Propanil, MRID 48235101
ANALYSIS RESULTS FOR VARIABLE HS_ES (HatchingSurvival/EggsSet (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.978	0.297	3.110	0.033	USE NON-PARAMETRIC TESTS

****
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.	Interval
Ctrl	17	48.51	16.96	4.11	34.96	39.79,	57.23
Dose1	18	41.21	11.36	2.68	27.56	35.57,	46.86
Dose2	18	48.21	6.46	1.52	13.40	45.00,	51.43
Dose3	12	41.87	9.53	2.75	22.77	35.81,	47.92

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	49.02	18.03	82.05	.	.
Dose1	43.02	17.39	57.58	84.95	15.05
Dose2	47.78	33.33	56.82	99.38	0.62
Dose3	43.30	26.19	56.00	86.30	13.70

****
NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	5.48	0.140

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	49.02	.	.
Dose1	43.02	0.240	0.073
Dose2	47.78	1.000	0.600
Dose3	43.30	0.326	0.248

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Bobwhite repro, Propanil, MRID 48235101
ANALYSIS RESULTS FOR VARIABLE HS_NH (HatchingSurvival/NumberHatched (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.901	<.001	3.723	0.016	USE NON-PARAMETRIC TESTS

****
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	17	97.25	3.47	0.84	3.57	95.47, 99.04
Dose1	18	91.59	7.46	1.76	8.15	87.88, 95.30
Dose2	18	96.17	5.67	1.34	5.90	93.35, 98.99
Dose3	12	96.62	4.22	1.22	4.37	93.94, 99.30

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	100.00	89.66	100.00	.	.
Dose1	93.65	78.26	100.00	94.18	5.82
Dose2	100.00	81.82	100.00	98.88	1.12
Dose3	100.00	90.48	100.00	99.35	0.65

****
NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	6.81	0.078

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	100.00	.	.
Dose1	93.65	0.034	0.008
Dose2	100.00	1.000	0.385
Dose3	100.00	1.000	0.577

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	<lowest dose	Dose1
Jonckheere	Dose3	>highest dose

Bobwhite repro, Propanil, MRID 48235101
ANALYSIS RESULTS FOR VARIABLE THICK (Eggshell thickness)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.961	0.038	1.414	0.247	USE PARAMETRIC TESTS

****
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf. Interval
Ctrl	17	0.20	0.01	0.00	4.44	0.20, 0.21
Dose1	18	0.20	0.01	0.00	4.59	0.19, 0.20
Dose2	18	0.20	0.01	0.00	7.13	0.19, 0.20
Dose3	12	0.19	0.01	0.00	7.80	0.18, 0.20

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	0.20	0.19	0.22	.	.
Dose1	0.20	0.18	0.22	97.75	2.25
Dose2	0.20	0.17	0.22	97.37	2.63
Dose3	0.19	0.15	0.21	94.12	5.88

****
PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Analysis of Variance (ANOVA) - overall F-test

Numerator df	Denominator df	F-stat	P-value
3	61	2.40	0.076

Dunnett - testing each trt mean signif. less than control
Williams - test assumes dose-response relationship, testing negative trend
Tukey - two-sided tests, all possible comparisons, not used for NOEC or LOEC

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	0.20	.	0.20	.	0.667	0.545	0.046	.	.
Dose1	0.20	0.274	0.20	0.154	.	0.997	0.345	.	.
Dose2	0.20	0.208	0.20	0.118	.	.	0.444	.	.
Dose3	0.19	0.013	0.19	0.005	.	.	.	.	.

SUMMARY	NOEC	LOEC
Dunnett	Dose2	Dose3
Williams	**Dose2**	**Dose3**

Bobwhite repro, Propanil, MRID 48235101
ANALYSIS RESULTS FOR VARIABLE HATWT (Hatchling Weight)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.988	0.777	3.949	0.012	USE NON-PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf. Interval
Ctrl	17	7.68	0.27	0.07	3.49	7.54, 7.81
Dose1	18	7.76	0.36	0.09	4.67	7.58, 7.94
Dose2	18	7.76	0.64	0.15	8.23	7.44, 8.07
Dose3	12	7.53	0.46	0.13	6.10	7.24, 7.82

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	7.70	7.30	8.10	.	.
Dose1	7.70	7.14	8.60	101.12	-1.12
Dose2	7.75	6.60	9.00	101.03	-1.03
Dose3	7.50	6.70	8.50	98.07	1.93

****

NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	2.63	0.452

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	7.70	.	.
Dose1	7.70	1.000	0.736
Dose2	7.75	1.000	0.665
Dose3	7.50	0.279	0.218

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Bobwhite repro, Propanil, MRID 48235101
ANALYSIS RESULTS FOR VARIABLE SURVWT (Survivor Wt (d14))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.973	0.163	0.656	0.582	USE PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf. Interval	
Ctrl	17	28.68	1.81	0.44	6.30	27.75,	29.60
Dose1	18	28.58	2.56	0.60	8.94	27.30,	29.85
Dose2	18	29.51	2.64	0.62	8.94	28.20,	30.82
Dose3	12	28.26	2.31	0.67	8.16	26.80,	29.73

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	28.90	25.70	31.90	.	.
Dose1	28.70	21.20	32.70	99.65	0.35
Dose2	30.40	24.60	33.80	102.90	-2.90
Dose3	28.68	23.80	32.60	98.56	1.44

****

PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Analysis of Variance (ANOVA) - overall F-test

Numerator df	Denominator df	F-stat	P-value
3	61	0.82	0.489

Dunnett - testing each trt mean signif. less than control
Williams - test assumes dose-response relationship, testing negative trend
Tukey - two-sided tests, all possible comparisons, not used for NOEC or LOEC

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	28.68	.	28.92	.	0.999	0.725	0.967	.	.
Dose1	28.58	0.708	28.92	0.710	.	0.638	0.985	.	.
Dose2	29.51	0.971	28.92	0.744	.	.	0.495	.	.
Dose3	28.26	0.564	28.26	0.425	.	.	.	.	.

SUMMARY	NOEC	LOEC
Dunnett	Dose3	>highest dose
Williams	Dose3	>highest dose

Bobwhite repro, Propanil, MRID 48235101
ANALYSIS RESULTS FOR VARIABLE FOOD (Food Consumption)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.980	0.363	1.868	0.144	USE PARAMETRIC TESTS

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BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.	Interval
Ctrl	17	17.02	1.67	0.40	9.80	16.17,	17.88
Dose1	18	17.31	1.31	0.31	7.58	16.66,	17.96
Dose2	18	16.61	1.17	0.27	7.02	16.03,	17.19
Dose3	12	16.18	0.98	0.28	6.04	15.56,	16.80

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	16.90	13.90	19.40	.	.
Dose1	17.40	15.20	19.80	101.69	-1.69
Dose2	16.80	14.30	18.40	97.58	2.42
Dose3	16.25	14.60	17.50	95.06	4.94

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PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Analysis of Variance (ANOVA) - overall F-test

Numerator df	Denominator df	F-stat	P-value
3	61	2.02	0.120

Dunnett - testing each trt mean signif. less than control
Williams - test assumes dose-response relationship, testing negative trend
Tukey - two-sided tests, all possible comparisons, not used for NOEC or LOEC

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	17.02	.	17.17	.	0.918	0.795	0.343	.	.
Dose1	17.31	0.924	17.17	0.717	.	0.396	0.114	.	.
Dose2	16.61	0.362	16.61	0.231	.	.	0.823	.	.
Dose3	16.18	0.117	16.18	0.062	.	.	.	.	.

SUMMARY	NOEC	LOEC
Dunnett	Dose3	>highest dose
Williams	Dose3	>highest dose

Bobwhite repro, Propanil, MRID 48235101
ANALYSIS RESULTS FOR VARIABLE WTGAINM (Male wt gain)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.980	0.354	0.362	0.781	USE PARAMETRIC TESTS

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BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	17	-0.74	12.90	3.13	-1754.95	-7.37,	5.90
Dose1	18	-0.41	15.19	3.58	-3744.33	-7.96,	7.15
Dose2	18	-2.62	11.56	2.72	-440.78	-8.37,	3.13
Dose3	12	-9.13	12.11	3.50	-132.73	-16.82,	-1.43

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	-2.30	-23.40	22.90	.	.
Dose1	2.40	-36.80	22.00	55.16	44.84
Dose2	-0.30	-29.00	14.50	356.62	-256.62
Dose3	-10.10	-27.70	15.70	1241.00	-1141.00

****

PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Analysis of Variance (ANOVA) - overall F-test

Numerator df	Denominator df	F-stat	P-value
3	61	1.27	0.291

Dunnett - testing each trt mean signif. less than control
Williams - test assumes dose-response relationship, testing negative trend
Tukey - two-sided tests, all possible comparisons, not used for NOEC or LOEC

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	-0.74	.	-0.57	.	1.000	0.974	0.333	.	.
Dose1	-0.41	0.782	-0.57	0.600	.	0.957	0.290	.	.
Dose2	-2.62	0.581	-2.62	0.427	.	.	0.547	.	.
Dose3	-9.13	0.113	-9.13	0.060	.	.	.	.	.

SUMMARY	NOEC	LOEC
Dunnett	Dose3	>highest dose
Williams	Dose3	>highest dose

Bobwhite repro, Propanil, MRID 48235101
ANALYSIS RESULTS FOR VARIABLE WTGAINF (Female wt gain)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.954	0.017	1.607	0.197	USE PARAMETRIC TESTS

****
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	17	26.36	24.75	6.00	93.90	13.63, 39.08
Dose1	18	29.20	11.88	2.80	40.68	23.29, 35.11
Dose2	18	21.99	16.96	4.00	77.12	13.56, 30.43
Dose3	12	10.61	22.59	6.52	212.96	-3.75, 24.96

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	30.30	-44.00	57.10	.	.
Dose1	26.45	11.70	49.10	110.78	-10.78
Dose2	23.80	-15.40	52.20	83.44	16.56
Dose3	11.95	-29.50	45.70	40.25	59.75

****
PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Analysis of Variance (ANOVA) - overall F-test

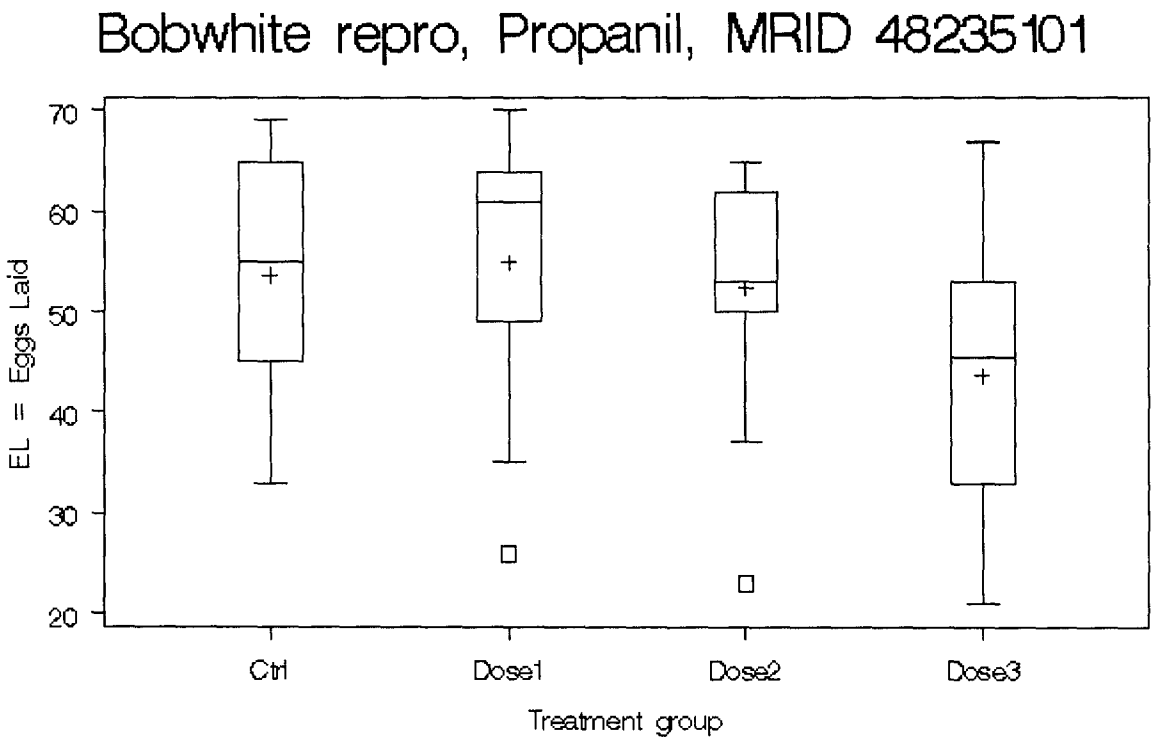
Numerator df	Denominator df	F-stat	P-value
3	61	2.46	0.071

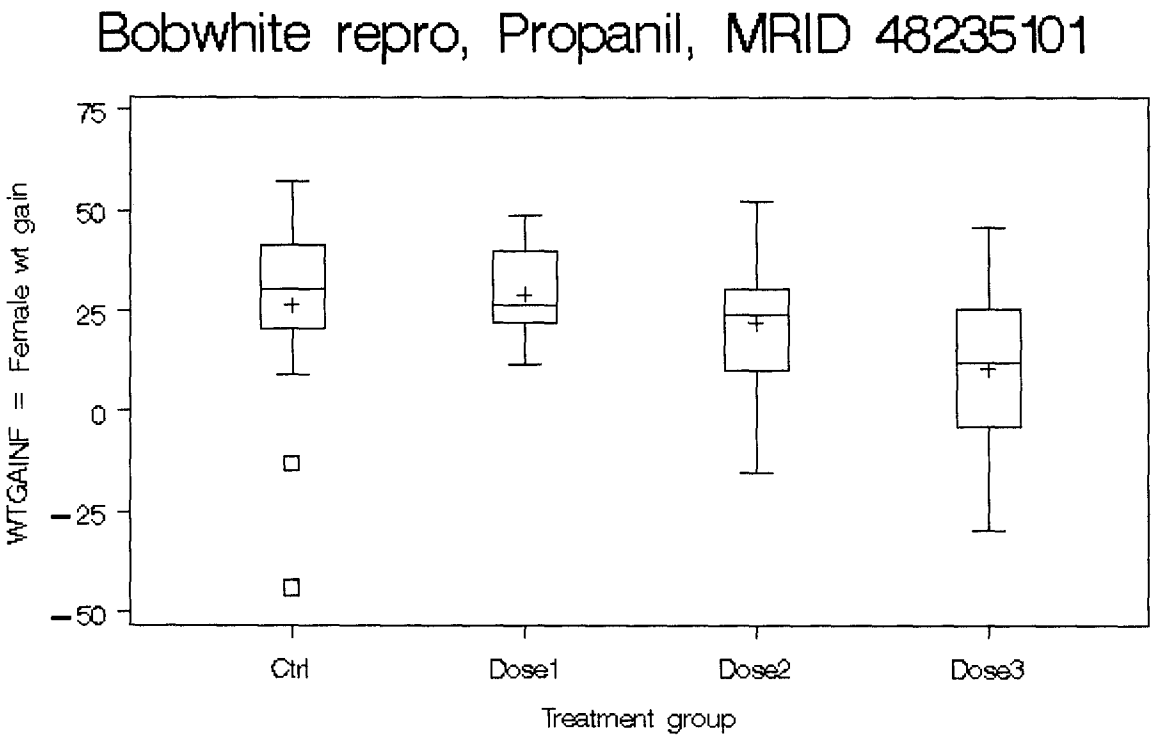
Dunnett - testing each trt mean signif. less than control
Williams - test assumes dose-response relationship, testing negative trend
Tukey - two-sided tests, all possible comparisons, not used for NOEC or LOEC

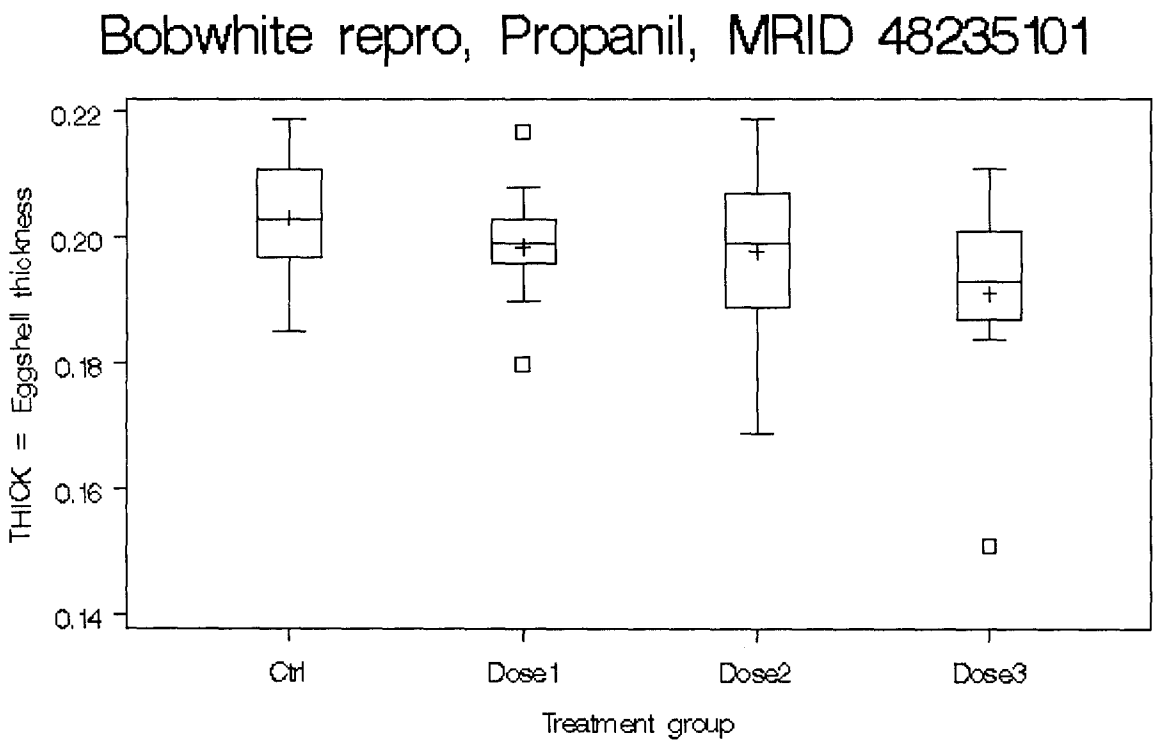
Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	26.36	.	27.82	.	0.972	0.908	0.145	.	.
Dose1	29.20	0.884	27.82	0.676	.	0.678	0.057	.	.
Dose2	21.99	0.472	21.99	0.323	.	.	0.395	.	.
Dose3	10.61	0.044	10.61	0.021	.	.	.	.	.

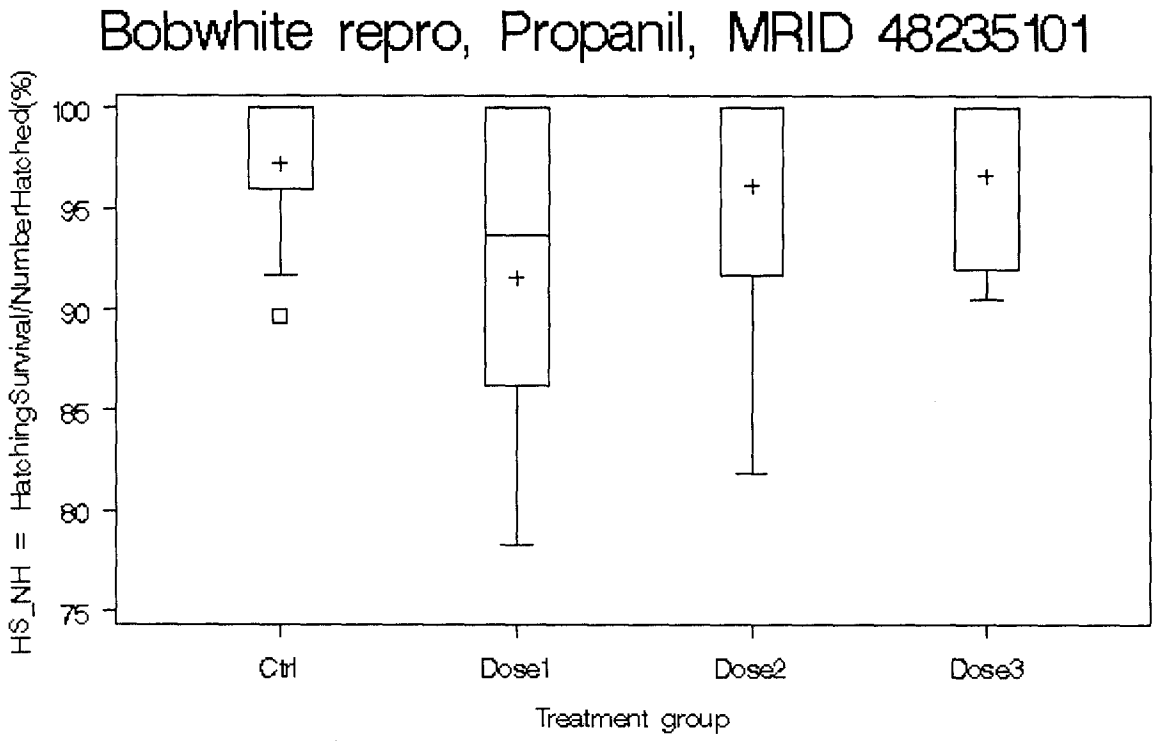
SUMMARY	NOEC	LOEC
Dunnett	Dose2	Dose3
Williams	**Dose2**	**Dose3**

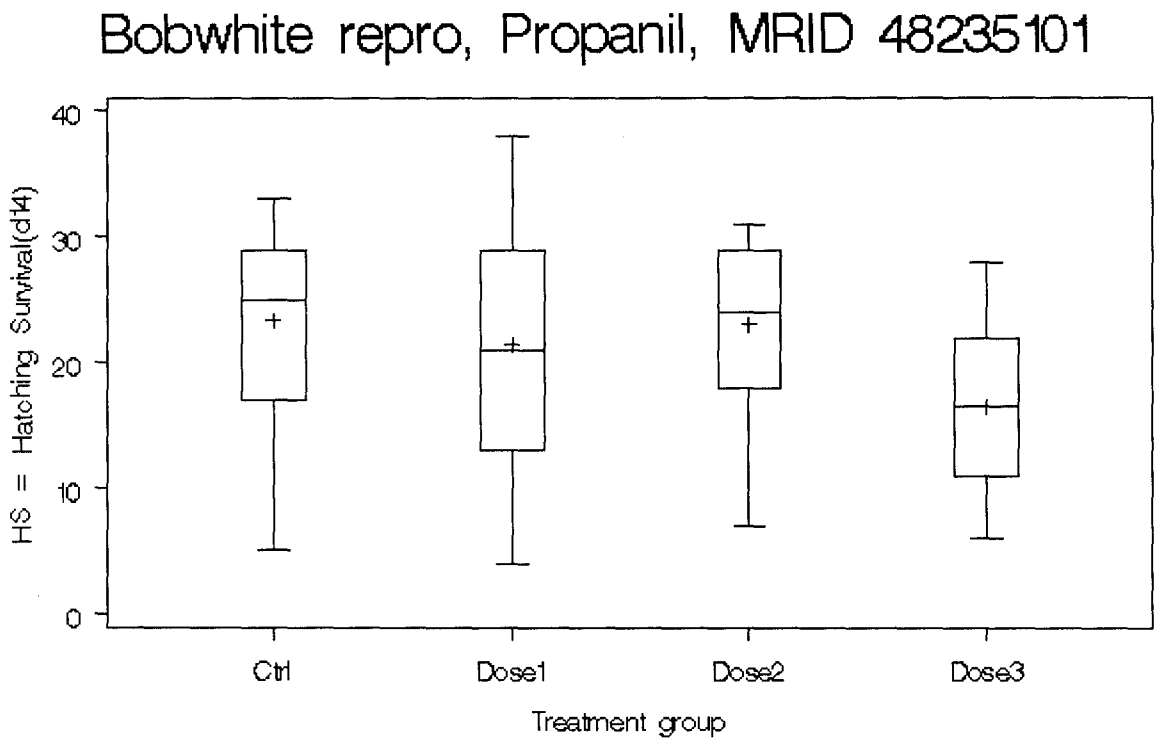
Box Plots:

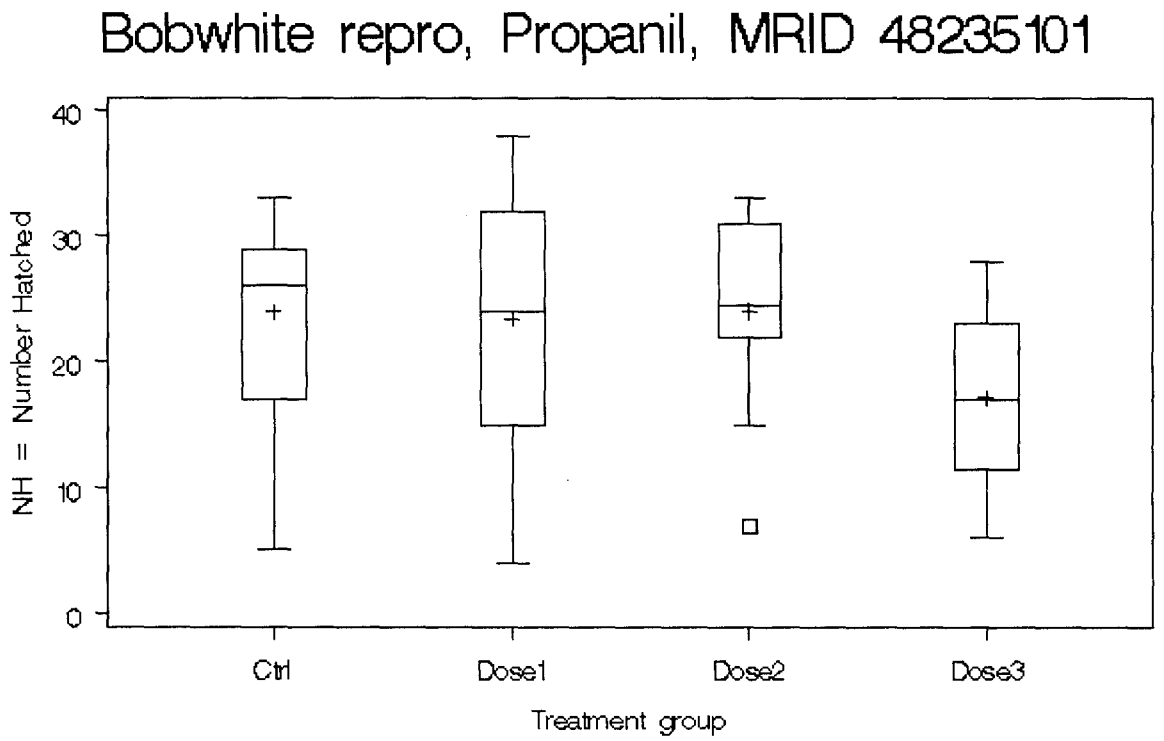

Bobwhite repro, Propanil, MRID 48235101
EL = Eggs Laid
70
60
50
40
30
20
Ctrl
Dose1
Dose2
Dose3
Treatment group

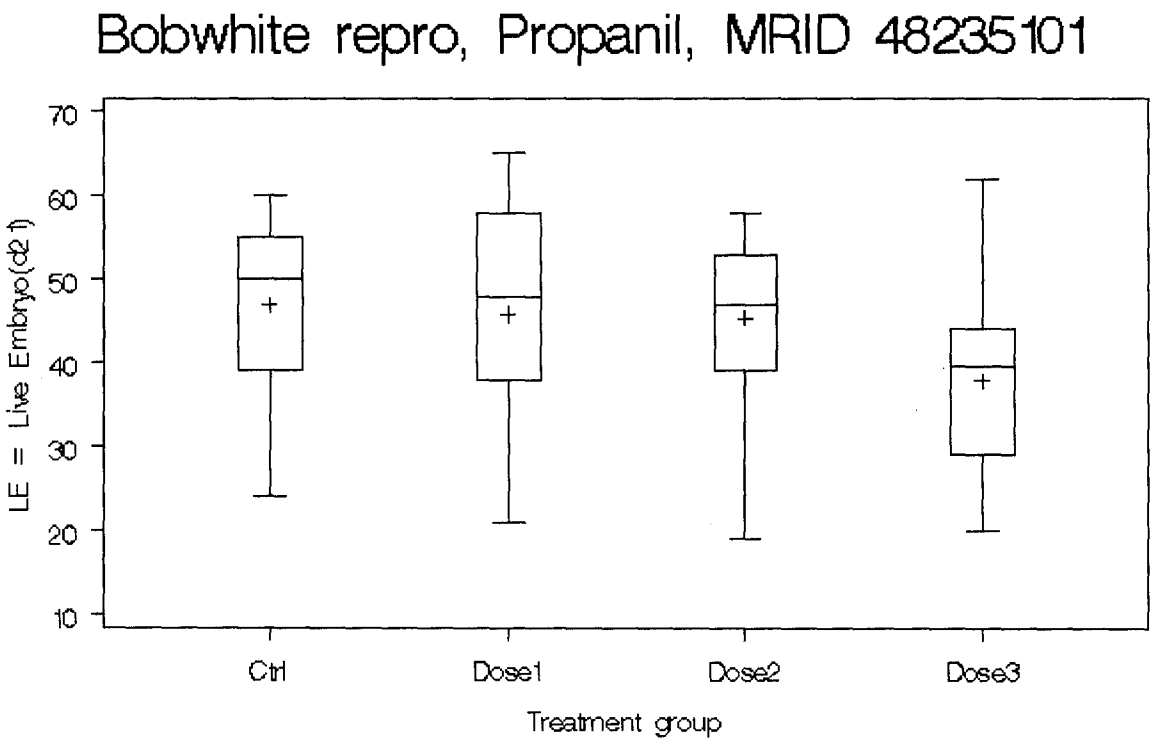

Bobwhite repro, Propanil, MRID 48235101
WTGAINF = Female wt gain
75
50
25
0
−25
−50
Ctrl
Dose1
Dose2
Dose3
Treatment group

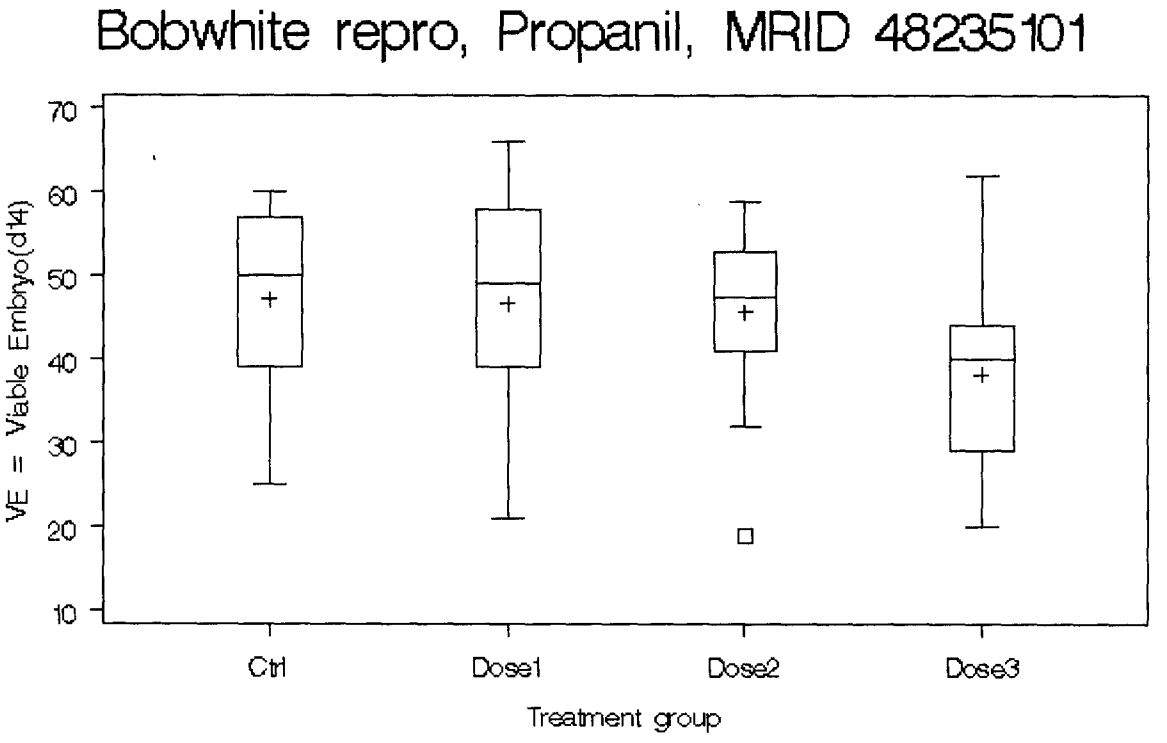

Bobwhite repro, Propanil, MRID 48235101
THICK = Eggshell thickness
0.22
0.20
0.18
0.16
0.14
Ctrl
Dose1
Dose2
Dose3
Treatment group

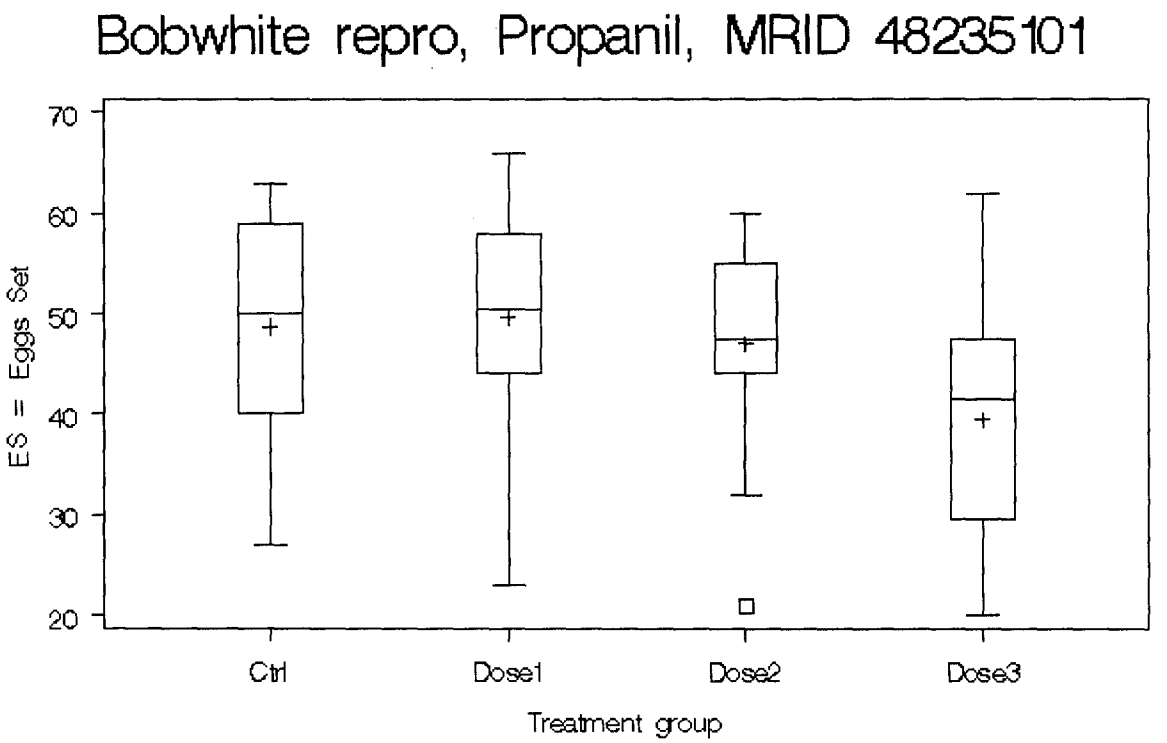

Bobwhite repro, Propanil, MRID 48235101
HS_NH = HatchingSurvival/NumberHatched(%)
100
95
90
85
80
75
Ctrl
Dose1
Dose2
Dose3
Treatment group


Bobwhite repro, Propanil, MRID 48235101
HS = Hatching Survival(d14)
40
30
20
10
0
Ctrl
Dose1
Dose2
Dose3
Treatment group


Bobwhite repro, Propanil, MRID 48235101
NH = Number Hatched
40
30
20
10
0
Ctrl
Dose1
Dose2
Dose3
Treatment group


Bobwhite repro, Propanil, MRID 48235101
LE = Live Embryo(d21)
70
60
50
40
30
20
10
Ctrl
Dose1
Dose2
Dose3
Treatment group


Bobwhite repro, Propanil, MRID 48235101
VE = Viable Embryo(d14)
70
60
50
40
30
20
10
Ctrl
Dose1
Dose2
Dose3
Treatment group


Bobwhite repro, Propanil, MRID 48235101
ES = Eggs Set
70
60
50
40
30
20
Ctrl
Dose1
Dose2
Dose3
Treatment group

APPENDIX II. COPY OF EXCEL WORKSHEET DETERMINING MEAN-MEASURED CONCENTRATIONS:

Nominal Concentration mg ai/kg diet	Sample type	Mean Recovery %	Converted to mg ai/kg diet	Overall Mean mg ai/kg diet
50	Homogeneity	92	46	
	Homogeneity	99	49.5	
	Homogeneity	88	44	47
250	Verification	103	257.5	
	Verification	87	217.5	
	Verification	106	265	247
500	Homogeneity	99	495	
	Homogeneity	91	455	
	Homogeneity	107	535	495

APPENDIX III. COPY OF EXCEL WORKSHEET DETERMINING MEAN OVERALL FOOD CONSUMPTION:

Feed Week	Control	50	250	500
1	15.6	15.5	14.2	12.7
2	12.8	12.7	12.6	12.2
3	11	11.6	10.8	11
4	12.7	13.4	13.1	12.3
5	11.3	11.9	11.1	11.4
6	10.8	11.5	10.7	11
7	10.7	11.4	10.7	10.6
8	11.9	12.2	12.4	11.8
9	13.1	13.1	13	12.9
10	13	13.2	12.6	13
11	13.5	14.9	14.1	13.9
12	16.3	17.1	15.5	15.2
13	19.3	19.4	18.1	17.2
14	15.9	16.5	15.3	15.4
15	14.2	14.9	14.2	12.8
16	19	18.6	17.9	17.1
17	20.6	19.3	17.7	15.5
18	20.2	20.2	18.9	17.7
19	23.7	23.1	23	21.4
20	21.7	21.9	22	20.5
21	21.1	21.5	19.4	20.1
22	22.8	22.5	23.2	20.8
23	23.1	23.3	24.2	22.5
24	23.8	24.8	23.8	23.9
25	27.6	28.1	27.2	26.7
Overall	17.028	17.304	16.628	15.984