Data Evaluation Report on the Reproductive Effects of XDE-638 on Avian Species *Colinus virginianus*
PMRA Submission Number EPA MRID Number 45831006

Data Requirement:

PMRA DATA CODE	
EPA DP Barcode	D288160
OECD Data Point	
EPA MRID	45831006
EPA Guideline	§71-4a

Test material: XDE-635 **Purity:** 97.7%
Common name: Penoxsulam
Chemical name: IUPAC: Not reported
CAS name: 2-(2,2-Difluoroethoxy)-N-(5,8-dimethoxy[1,2,4]triazolo[1,5-C]pyrimidin-2-yl)-6-(trifluoromethyl)benzenesulfonamide (p. 110)
CAS No.: Not reported
Synonyms: XR-638, X638177

Primary Reviewer: Christie E. Padova
Staff Scientist, Dynamac Corporation

Signature: C. E. Padova
Date: 10/31/03

QC Reviewer: Teri Myers
Staff Scientist, Dynamac Corporation

Signature: Teri Myers
Date: 10/31/03

Primary Reviewer: ~~William Erickson Biologist~~
OPP/EFED/ERB - III
James J. Goodyear, Ph.D.
Ecological Effects Biologist
Office of Pesticide Programs
703-305-7726

Secondary Reviewer(s):
{EPA/OECD/PMRA}

Date: J. Goodyear

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Date Evaluation Completed:

CITATION: Medlicott, B.A., and J.J.Mach. 2001. XDE-638: Avian Reproduction Study with Northern Bobwhite (*Colinus virginianus*). Unpublished study performed by Genesis Laboratories, Inc., Wellington, CO. Laboratory Study No. 00012. Study submitted by Dow Chemical Company, Midland, MI for Dow AgroSciences LLC. Indianapolis, IN. Study initiated April 7, 2000 and completed August 17, 2001.

1

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EXECUTIVE SUMMARY:

The one-generation reproductive toxicity of XDE-638 (penoxsulam) to groups (20 pens/treatment level) of 1 male and 1 female of 22-week-old Northern Bobwhite quail was assessed over approximately 22 weeks. XDE-638 was administered to the birds in the diet at nominal concentrations of 0 (solvent control; concentration not specified), 250, 500, and 1000 ppm. Mean-measured concentrations were <1.10 (<LOQ, control), 231, 501, and 958 ppm a.i.

There were no significant treatment-related effects on any reproductive parameter; however, adult food consumption and male and female body weights were adversely affected. The reviewer's analysis detected a significant reduction in food consumption at the 501 ppm a.i. treatment level and significant reductions in male and female body weight gain at the highest treatment level. As a result, the NOAEC and LOAEC levels were 231 and 501 ppm a.i. diet, respectively.

This toxicity study is scientifically sound. However, because the amount of solvent (acetone) used in the test diet preparations was not specified, nor was it stated that the acetone was allowed to completely evaporate prior to offering, and because the only endpoints adversely affected (e.g., food consumption and male and female body weight gain) may have been related to this deviation, this study is classified as SUPPLEMENTAL but need not be redone.

Results Synopsis

Test Organism Size/Age: Approximately 22 weeks old at test initiation (219-337 g)

NOAEC: 231 ppm a.i.
LOAEC: 501 ppm a.i.
Endpoint(s) Affected: Food consumption (most sensitive), male and female body weight gain

I. MATERIALS AND METHODS

GUIDELINE FOLLOWED: The study protocol was based on procedures of the U.S. EPA Pesticide Assessment Guidelines, Series 71-4 (1988); U.S. EPA Ecological Effects Test Guidelines, OPPTS No. 850.2300 (draft, 1996); and OECD Guideline 206 (1984). Deviations from §71-4 are:

- Feeding of the birds during the 14-day acclimation period was not described.

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- The construction material of the offspring brooder pens was not specified.
- The maximum anticipated field residue was not specified.

4. The concentration of acetone used in preparation of the tests diets was not specified. Also, it was not specified if the acetone was allowed to completely evaporate off the treated feed prior to offering.

5. The temperature ranged from 17-31°C in the adult chambers during the 22-week study. EPA recommends that temperature be maintained at a relatively-constant 21°C.

6. A relatively high range was observed in the temperature and humidity levels during egg storage: 12-20°C and 31-89%. EPA requires that eggs are stored at approximately 16°C and 65% humidity.

7. The temperature during hatching ranged from 28.3 to 36.1°C, lower than the recommended temperature of 39°C.

8. The sex of the birds that died during the study was not specified.

These deviations did not affect the scientific validity of the study. However, this study does not fulfill guideline requirements.

COMPLIANCE: Signed and dated GLP, Quality Assurance, and Data Confidentiality statements were provided. This study was conducted in accordance with United States and OECD standards (p. 3).

A. MATERIALS:

1. Test Material XDE-638

Description: White powder

Lot No./Batch No.: B-765-44

Purity: 97.7%

Stability of Compound Under Test Conditions: The stability of XDE-638 in avian feed was assessed in the pilot study

(MRID 45831004). Treated feed was prepared at 125 and 2000 ppm and stored for either 27 days under frozen conditions, or for 7 or 14 days under ambient trough feeder conditions. Recoveries were 96.6-102.0% of initial values after 7 or 14 days of ambient storage, and 105.7-111.1% of initial values after 27 days of frozen storage (pp. 39, 41, and 44 of Appendix B).

Storage conditions of test chemical: Ambient

2. Test organism:

Table 1: Test organism.

Parameter	Details	Remarks / Criteria
Species (common and scientific names):	Northern Bobwhite quail (*Colinus virginianus*)	*EPA requires: a wild waterfowl species, preferably the mallard, Anas platyrhynchos, or an upland game species, preferably the northern bobwhite, Colinus virginianus.*
Age at Study Initiation:	Approximately 22 weeks	It was stated that birds were approaching their first breeding season. *EPA requires: birds should be approaching their first breeding season.*
Body Weight: (mean and range)	Males: Overall range (n=80) 219 to 337 g, with group means of 260 to 269 g. Females: Overall range (n=80) 227 to 302 g, with group means of 261 to 270 g.	Individual body weights were recorded at Weeks 0, 2, 4, 6, 8, and 22 (test termination). *EPA requires that 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:	Barrett's Quail Farm Houston, TX	Birds were from the same hatch, and were phenotypically

4

Parameter	Details	Remarks / Criteria
		indistinguishable from wild birds.
		EPA requires that all birds should be from the same source.

B. STUDY DESIGN:

1. Experimental Conditions

a. Range-finding Study - A 28-day range-finding study was conducted with 39-week-old Northern Bobwhite quail (6 pairs/treatment level) and XDE-638 (purity 97.5%) at nominal concentrations of 0 (acetone control), 125, 250, 500, 1000, and 2000 ppm diet (MRID 45831004; Genesis Laboratory Study No. 99050). Reviewer-calculated mean-measured concentrations were 125, 254, 486, 898, and 1967 ppm a.i. (pp. 30 and 43 of Appendix B).

To assess homogeneity of XDE-638, samples from the top, middle, and bottom of treated feed prepared at 125 and 2000 ppm were collected; coefficients of variation were 3.4% for the 125 ppm level and 4.0% for the 2000 ppm level (p. 37 of Appendix B). Stability was assessed in treated feed prepared at 125 and 2000 ppm after 27 days of frozen storage, or after 7 or 14 days of ambient trough feeder storage. Recoveries were 96.6-102.0% of initial values after 7 or 14 days of ambient storage, and 105.7-111.1% of initial values after 27 days of frozen storage (pp. 39, 41, and 44 of Appendix B).

The birds were observed daily for mortality and clinical signs of toxicity. Body weights were determined at study initiation, and on Days 14 and 28. Feed consumption was measured weekly. Any birds found dead during the study were subject to gross pathological examination, and at study termination, three male and three females were arbitrarily selected from each test and control group for gross examination. During the study, the mean minimum and maximum temperature were 20 and 24°C, and the mean minimum and maximum relative humidity were 19 and 26% (Appendix A2, p. 24).

Body weight and feed consumption data were analyzed by a Chi-square test for normality and Bartlett's test for homogeneity of variance. Data were then compared to the solvent control group using one-way ANOVA and Dunnett's t-test.

No mortality or clinical signs of toxicity were observed during the 28-day study (Table I, p. 16). No treatment-related effects on body weight were observed (Table II, p. 17), and no treatment-related effects on food consumption were observed (Table III, p. 18). No treatment-related abnormalities were observed upon gross necropsy of 36 birds sacrificed at study termination. Discolored livers were observed in one bird each from the 1000 and 2000 ppm groups, and lime green gizzard linings were observed in one bird each from the 500 and 2000 ppm groups (Table IV, p. 19). The NOAEC was 1967 ppm a.i.

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 Changed as required (not further specified) All birds were normal and active, with the exception of a few that were pecked (p. 21). No disease or abnormalities were observed and no medication was provided.	Birds were observed once daily for general physical condition, disease, and abnormalities; results, if any, were not specified. Birds were also examined by a veterinarian to assess their general physical condition and suitability for testing. *EPA recommends a 2-3 week health observation period prior to selection of birds for treatment. Birds must be generally healthy without excess mortality. Feeding should be ad libitum, and sickness, injuries or mortality be noted.*
Test duration pre-laying exposure: egg-laying exposure: withdrawal period, if used:	 Approximately 12 weeks Approximately 10 weeks None	 *EPA requires* ***Pre-laying exposure duration*** *At least 10 weeks prior to the onset of egg-laying.* ***Exposure duration with egg-laying*** *At least 10 weeks.* ***Withdrawal period*** *If reduced reproduction is evident, a withdrawal period of up to 3 weeks should be added to the test phase.*
Pen (for parental and offspring) size:	Parents (one pair) were housed in cages measuring 51 x 25 x 25.5 cm (floor surface of 1275 cm^2). Offspring (by set and group) were housed in	 *Pens* *Adequate room and arranged to prevent cross contamination*

6

Parameter	Details	Remarks
		Criteria
construction materials: number:	90 x 70 x 23 cm poultry brooders (floor surface of 6500 cm^2). Parental pens were constructed of galvanized steel. Offspring pens were described as box-type (not further specified). 20 parental pens (replicates) per treatment level	*Materials* *Nontoxic material and nonbinding material, such as galvanized steel.* *Number* *At least 5 replicate pens are required for mallards housed in groups of 7. For other arrangements, at least 12 pens are required, but considerably more may be needed if birds are kept in pairs. Chicks are to be housed according to parental grouping.*
Number of birds per pen (male:female)	2 birds/pen (1 male:1 female)	*EPA requires one male and 1 female per pen. For quail, 1 male and 2 females is acceptable. For ducks, 2 males and 5 females is acceptable.*
Number of pens per group/treatment negative control: solvent control: treated:	N/A 20 pens 20 pens/treatment	*EPA requires at least 12 pens, but considerably more if birds are kept in pairs. At least 16 is strongly recommended.*
Test concentrations (ppm diet) nominal: measured:	0 (solvent control), 250, 500, and 1000 ppm diet <1.10 (<LOQ, control), 231, 501, and 958 ppm a.i.	Mean-measured concentrations were determined from treated feed collected from Batches 1, 2, 3, 6, and 10 (Table 1, p. 27). *EPA requires at least two concentrations other than the control are required; three or more are recommended.*
Maximum labeled field residue anticipated and source of information:	Not specified	*EPA requires that 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 & ppm), label registration no., label date, and site should be cited]*
Solvent/vehicle, if used type:	Acetone	*EPA requires corn oil or other*

Parameter	**Details**	**Remarks**
		Criteria
amount:	Not specified	*appropriate vehicle not more than 2% of diet by weight*
Was detailed description and nutrient analysis of the basal diet provided? (Yes/No)	Yes. Basal diets contained ≥20.0% protein, ≥2.0% fat, ≤10.5% fiber, and 3.0-3.5% calcium (Appendix D, p. 107).	Offspring received Ranch-Way Turkey & Game Bird Starter without the addition of test substance (Appendix D, p. 108).
		EPA requires a commercial breeder feed (or its equivalent) that is appropriate for the test species.
Preparation of test diet	The appropriate amount of test material was suspended in acetone, then combined with basal ration and mixed for 25 minutes (p. 15). To facilitate mixing, each test group was split into sub-batches and pooled together after the mix to form a single batch. Treated diets were prepared bi-weekly, and were stored at approximately -17°C until needed.	It was not specified if the acetone was allowed to completely evaporate prior to offering.
		A premixed containing the test substance should be mechanically mixed with basal diet. If an evaporative vehicle is used, it must be completely evaporated prior to feeding.
Indicate whether stability and homogeneity of test material in diet determined (Yes/No)	Yes, in the pilot dietary study (MRID 45831004).	
Were concentrations in diet verified by chemical analysis?	Yes	Samples were analyzed from feed collected from Batches 1, 2, 3, 6, and 10 (Table 1, p. 27).
Did chemical analysis confirm that diet was stable? and homogeneous?	Yes Yes	Stability was assessed in the pilot study in powdered diet prepared at 125 and 2000 ppm (MRID 45831004). Samples were stored for either 27 days under frozen
conditions, or for 7 or 14 days under ambient trough feeder conditions. After 27 days of frozen storage, recoveries averaged 105.7-111.1% of initial concentrations, and after 7 or 14 days of ambient storage, recoveries averaged 96.6-102.0% of initial concentrations (pp. 39, 41, and 44 of Appendix B, MRID 45831004). Homogeneity was assessed by collecting samples from the top, middle, and bottom of treated feed prepared at 125 and 2000 ppm. Coefficients of variation were 3.4% for the 125 ppm level and 4.0% for the 2000 ppm level (p. 37 of Appendix B, MRID 45831004).		
Feeding and husbandry	Feeding and husbandry conditions appeared to be adequate, given guideline	

8

Parameter	Details	Remarks
		Criteria
	recommendations.	
Test conditions (pre-laying) temperature: relative humidity: photo-period:	17-31°C 24-76% 7 hours light/day up through Week 8, then increased 2 hours/day for 5 days to 17 hours light/day thereafter.	A relatively high temperature range was observed in the adult environment. Light intensity during the study averaged 0.7-1.0 foot-candles (p. 14).
		EPA Requires *Temperature:* *About 21 °C (70 °F)* *Relative humidity:* *About 55%* *Lighting* *First 8 weeks: 7 h per day.* *Thereafter: 16-17 h per day.* *At least 6 foot candles at bird level.*
Egg Collection and Incubation		
Egg collection and storage collection interval: storage temperature: storage humidity:	Daily 12-20°C 31-89%	A relatively high range level was observed for the temperature and humidity during egg storage. Data are provided in Appendix B3, p. 72.
		EPA requires eggs to be collected daily; egg storage temperature approximately 16 °C (61 °F); humidity approximately 65%.
Were eggs candled for cracks prior to setting for incubation?	Yes	
		EPA requires eggs to be candled on day 0
Were eggs set weekly?	Yes	
Incubation conditions temperature: humidity:	28.3-36.1°C 49-89%	Incubation and hatching occurred in the same incubator, in different compartments.
When candling was done for fertility?	Day 11 for fertility and Day 18 for viability.	
		EPA requires: *Quail: approx. day 11* *Ducks: approx. day 14*
When the eggs were transferred to the hatcher?	Day 21	

9

Parameter	Details	Remarks
		Criteria
		EPA requires: *Bobwhite: day 21* *Mallard: day 23*
Hatching conditions temperature: humidity: photoperiod:	28.3-36.1°C 49-89% 16 hours light/day	Incubation and hatching occurred in the same incubator, in different compartments. Environmental conditions were the same for both phases (Appendix B4, p. 73).
		EPA requires: *temperature of 39 °C (102 °F)* *humidity of 70%*
Day the hatched eggs were removed and counted	Days 24 and 25	
		EPA requires Bobwhite: day 24 *Mallard: 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 Every other week throughout the egg-laying period. Three points around the equatorial circumference were measured to the nearest 0.001 mm.	*EPA requires newly hatched eggs be collected at least once every two weeks. Thickness of the shell plus membrane should be measured to the nearest 0.01 mm; 3 - 4 measurements per shell.*
Reference chemical, if used	None used	

2. Observations:

Table 3: Observations.

Parameter	Details	Remarks/Criteria
Parameters measured		
Parental: (mortality, body weight, mean feed consumption)	- mortality - signs of toxicity, injury, or illness - body weight - food consumption - necropsy	At necropsy, specific examination was made on the gastrointestinal tract, liver, kidneys, bile duct, heart, spleen, and reproductive organs. Other observations were recorded as necessary.
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-day-old survivors, mortality, gross pathology, others)	- eggs laid - eggs broken, cracked, small, and soft shelled, etc. - egg shell thickness - eggs set - viable embryos - live 3-week embryos - number of hatchlings - signs of toxicity and physical defects of hatchlings - number of 14-day-old survivors - 14-day-old survivor body weight	*EPA requires:* · *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)	Mortality and signs of toxicity were observed daily for adults and hatchlings. Parental body weights were recorded at Weeks 0, 2, 4, 6, 8 and 22 (test termination), and food consumption was determined weekly.	*Body weights and food consumption must be measured at least biweekly.*
Were raw data included?	Yes, sufficient.	

I. RESULTS AND DISCUSSION:

A. MORTALITY:

No treatment-related mortality was observed during the study (p. 22). However, two birds from the control group, three birds from the 250 ppm group, two birds from the 500 ppm group, and five birds from the 1000 ppm group were found dead during the study (not gender-specific; Table II, p. 28). It was reported that no treatment-related toxicological effects were observed prior to death.

Necropsy of both control birds that died during the study revealed severe head trauma caused by pecking from the pen-mates. At the 250 ppm level, the cause of death of two of the mortalities was undetermined, while the third bird appeared to have died from severe head trauma caused by pen-mate pecking (p. 23). At the 500 ppm level, one bird exhibited a low-head position, and was observed as being unkempt; however, necropsy did not reveal a specific cause of death. The other bird could not hold its head up or walk prior to death, and apparently died from a broken neck. Three of the birds that died in the 1000 ppm group had severe head trauma from pen-mate pecking; one died from clogged intestines; and the last bird appeared to have died from mishandling at the time of body weight measurements.

Table 4: Effect of XDE-638 on Mortality of *Colinus virginianus*.

Treatment, ppm measured (and nominal) concentrations	Observation Period		
	Week 7	Week 14	Week 22
	No. Dead	No. Dead	No. Dead
Solvent control	0	0	2
231 (250)	1	2	3
501 (500)	2	2	2
958 (1000)	2	3	5

B. REPRODUCTIVE AND OTHER ENDPOINTS:

Abnormal Effects/Behavior: No overt signs of toxicity were observed (p. 22). Incidental clinical observations normally associated with pen wear and/or interactions among pen mates were observed in all control and test groups and included injuries to the head/neck/eyes/scalp, fluffed feathers, and feather loss (Table III, p. 29). Additional observations included hypo-reactivity, moribund condition, unkempt appearance, emaciation, and inability to stand.

Food Consumption: No treatment-related effects on food consumption were observed (p. 22 and Table IV, p. 30). Overall feed consumption averaged 25 g/bird/day for the control group, and 24, 23, and 24 g/bird/day for the 250, 500, and 1000 ppm groups, respectively.

Body Weight: No treatment-related effects on the differences in body weights were observed (p. 22, and Table V, p. 31).

Necropsy: No treatment-related findings were observed at necropsy (pp. 22-23, and Tables VI and VII, pp. 32-33).

Reproductive Effects: No treatment-related effects on egg production or quality, fertility, embryonic development, hatchability, or chick survival were observed at any test level (Tables VIII-XVIII, pp. 34-44). In addition, none of the chicks showed any test substance-related toxicological symptoms during the 14-day maintenance period, and no treatment-related effects on chick body weights were observed (Tables XIX and XX, pp. 45-46). A statistically-significant decrease in hatchling body weight was observed at the 250 ppm level compared to the solvent control group (7 versus 8 g). Since there was no trend in body weight differences and no other sings of toxicity, this difference was not considered to be treatment-related.

Table 5: Reproductive and other parameters (nominal concentrations; study author-reported).

Parameter	Control	250 ppm	500 ppm	1000 ppm	NOAEC/ LOAEC (ppm)
Eggs laid	666	745	583	539	N/A
Eggs laid/hen	33	41	32	32	1000 / >1000
Eggs laid/hen/week	4	4	3	3	1000 / >1000
Eggs soft shelled, broken, or damaged	69	68	32	19	N/A
Eggs cracked	23	24	12	10	N/A
Eggs cracked/eggs laid (%)	3.5	3.2	2.1	1.9	1000 / >1000
Shell thickness (mm)	0.213	0.216	0.220	0.226	1000 / >1000
Eggs set	525	606	500	475	N/A
Viable 11-day old embryos	442	506	460	419	N/A
Viable embryos/eggs set (%)	84.2	83.5	92.0	88.2	1000 / >1000

Parameter	Control	250 ppm	500 ppm	1000 ppm	NOAEC/ LOAEC (ppm)
Live 18-day old embryos	429	496	455	408	N/A
Live 18-day old embryos/viable embryos (%)	97.1	98.0	98.9	97.4	1000 / >1000
No. of total hatchlings	391	433	416	386	N/A
Total hatchlings/viable embryos (%)	88.5	85.6	90.4	92.1	1000 / >1000
No. of normal hatchlings	389	424	412	383	N/A
Normal hatchlings/total hatchlings (%)	99.5	97.9	99.0	99.2	1000 / >1000
Hatchling weight (g)	8	7*	8	8	1000 / >1000
No. of 14-day old survivors	346	351	403	351	N/A
No. of 14-day old survivors/No. of normal hatchlings (%)	88.9	82.5	97.1	92.2	1000 / >1000
No. of 14-day old survivors/eggs laid (%)	52.0	47.1	69.1	65.1	1000 / >1000
14-day old survivors weight (g)	33	32	32	33	1000 / >1000
Mean adult food consumption (g/pen/day)	25	24	23	24	1000 / >1000
Weight of adult males (g) at start of treatment at Week 8: at Week 22 (study termination):	264 284 280	261 277 285	260 275 283	269 288 297	1000 / >1000
Weight of adult females (g) start of treatment: at Week 8: at Week 22 (study termination):	270 287 325	261 277 332	261 281 318	270 286 320	1000 / >1000
Gross pathology (proportion of birds with pathological incidents)	No notable abnormalities observed. Analysis not conducted.				

N/A = Not statistically-analyzed.
* Statistically-different from solvent control.

C. REPORTED STATISTICS:

The following variables were statistically analyzed: initial and terminal adult body weight, mean feed consumption, eggs laid/hen, egg shell thickness, percentage of no. eggs cracked/ no. eggs laid, percentage of no. eggs viable/no. eggs set, percentage of no. live 18-day embryos/no. eggs viable, percentage of no. of hatchlings/no. viable eggs, percentage of no. normal hatchlings/no. total hatchlings, percentage of no. 14-day normal survivors/no. normal hatchlings, percentage of no. 14-day survivors/no. eggs laid, and 0- and 14-day old hatchling body weights (Table XXI, p. 47).

Data were assessed for normality using the Chi-square test and for homogeneity of variance using Bartlett's test. If the data set passed the tests for normality and homogeneity, an analysis of variance (ANOVA) was performed to determine statistically-significant differences between groups. If necessary, Dunnett's test (equal replicates) or Bonferroni's test (not equal replicates) was then used to compare the treatment means with the control group mean. If the data set did not pass the tests for normality and homogeneity, they were transformed and re-analyzed. If an appropriate transformation did not succeed in normalizing the distribution, or if the variance was not homogeneous, the original untransformed data were analyzed by Kruskal-Wallis's non-parametric test (H-statistic). Dunn's multiple comparison procedure was used to compare each treatment group with the control. Proportional (percentage) data were arc sine transformed prior to analysis.

All variables were analyzed using TOXSTAT Version 3.4. Sample units were the individual pens within each experimental group, except adult body weights, where the sample unit was the individual bird. Nominal concentrations were used for all estimations.

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 nonparametric 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.

Table 6. Reproductive and other parameters (reviewer-reported).

Parameter	Control	231 ppm	501 ppm	958 ppm	NOAEC/ LOAEC (ppm)
Eggs laid/pen	35.6	43.6	32.4	35.3	958 / >958
Eggs cracked/pen	1.2	1.4	0.7	0.7	958 / >958
Eggs not cracked/eggs laid (%)	96.0	96.3	97.8	97.7	958 / >958
Eggs set/pen	28.1	35.4	27.8	31.1	958 / >958
Shell thickness /	0.21	0.22	0.22	0.22	958 / >958
Eggs set/eggs laid (%)	77.9	80.1	80.8	87.9	958 / >958
Viable embryo/pen	23.6	29.8	25.6	27.9	958 / >958
Viable embryos/eggs set (%)	85.4	84.1	92.5	91.4	958 / >958
Live embryos/pen	22.9	29.2	25.3	27.2	958 / >958
Live embryo/viable embryo (%)	95.6	97.6	98.3	97.4	958 / >958
No. of hatchlings/pen	20.9	25.5	23.1	25.7	958 / >958
No. of hatchlings/ eggs laid (%)	57.0	57.2	66.5	74.1	958 / >958
No. of hatchlings/ eggs set (%)	74.4	71.1	82.4	84.4	958 / >958
No. of hatchlings/ live embryo (%)	90.1	85.5	90.8	95.2	958 / >958
Hatchling survival/pen	20.9	25.5	23.1	25.7	958 / >958
Hatchling survival/ eggs set (%)	74.4	71.1	82.4	84.4	958 / >958
Hatchling survival/ no. hatchlings (%)	100	100	100	100	958 / >958
Hatchling weight (g)	7.9	7.4	7.9	7.5	958 / >958
Survivor weight (g)	33.6	32.5	32.1	32.9	958 / >958
Mean food consumption (g/bird/day)	24.7	24.4	22.7	24.5	231 / 501
Male weight gain (g)	14.3	-1.24	2.06	-6.40	501 / 958
Female weight gain (g)	53.3	47.2	34.4	22.5	501 / 958

E. STUDY DEFICIENCIES:

This study is considered scientifically sound, and the deficiencies listed were generally considered minor by the reviewer. However, the solvent concentration was not reported, nor was it stated that the acetone was allowed to completely evaporate prior to offering. This deviation may have contributed to the reductions in food consumption and, thus, male and female body weight, so this study is classified as SUPPLEMENTAL, but it need not be repeated.

F. REVIEWER'S COMMENTS:

Results of the reviewer's statistical analyses for adult parameters (i.e., food consumption and male and female body weight gain) differed from those of the study authors. The reviewer's analysis detected reductions in these parameters and because the solvent concentration was not reported, nor was it stated that the acetone was allowed to completely evaporate prior to offering, this study is classified as Supplemental, but it need not be repeated.

Data from a supplemental hatchling brooder density test was submitted (MRID 45831005; Genesis Study No. 01001; 2002). The objective of the study was to determine the optimum density of Bobwhite hatchlings in commercially-available brooders during the 14-day hatchling phase without reducing hatchling body weights.

> "Northern Bobwhite eggs (from a reputable game bird farm) were incubated for 21 days in the laboratory, and hatched over a 42-hour period. Body weights were measured (minimum requirement of 7 g), and the hatchlings were randomly placed into one of three brooders in a single battery according to a 3 by 3 Latin square design, generated by a computer program (RAN30). The density of the bobwhite in the three brooders was 30 (T1 group), 40 (T2 group), and 50 (T3 group; dead or removed birds were replaced, so the density was maintained). Body weights were again measured on Days 7 and 14. Brooder dimensions were 91 x 77 x 24 cm; the floor area per bird was 234 cm^2 for the 30-bird cage, 175 cm^2 for the 40-bird cage, and 140 cm^2 for the 50-bird cage (Table I, p. 14). Body weight data were analyzed using a repeated-measures analysis of variance with the factors of brooder density and time (repeated over time) via SAS and Statistica software (p. 11). Initially, the initial body weights were used as a covariate, to determine if "low-weight" birds remained at a lower weight for the duration, and if "high-weight" birds maintained a weight level above the other birds.
>
> During the study, the mean brooder temperatures were 37-39°C, and the birds were maintained on a 16-hour light/8-hour dark regimen (average intensity of 13.3 foot-

candles). The hatchlings were fed Turkey and Game Bird Starter feed (Ranchway Feeds, Fort Collins, CO) and provided water as needed.

No density-effect on the mortality or replacement of Bobwhite was observed (Table III, p. 16). Ten quail were replaced during the 14-day study, with six dying during the test. A summary of mean body weights are provided in Table V, p. 18. No density-effect on the growth of Bobwhite was observed, as neither the Density factor (p=0.7538) nor the interaction (p-0.8758) were significant (Table VI, p. 19, and Figure IV, p. 24). In conclusion, based upon the similarity of Bobwhite body weight data, the optimum density could range from 30 to 50 birds per brooder."

G. CONCLUSIONS:

This study is scientifically sound, but does not fulfill guideline requirements because the quantity of acetone used to prepared the treated feed was not specified, nor was it reported if the acetone was allowed to completely evaporate prior to offering. Furthermore, food consumption and male and female body weights were adversely affected, which could have been related to this deviation. As a result, this study is classified as SUPPLEMENTAL, but it need not be repeated.

NOAEC: 231 ppm a.i.
LOAEC: 501 ppm a.i.
Endpoint(s) Affected: Food consumption (most sensitive), male and female body weight gain

III. REFERENCES:

U.S. Environmental Protection Agency. 1988. Pesticide Assessment Guidelines, Subdivision E, Hazard Evaluation: Wildlife and Aquatic Organisms. Series 71-4: Avian Reproduction Test. pp. 48-57.

U.S. Environmental Protection Agency. 1996. Ecological Effects Test Guidelines, OPPTS 850.2300: Avian Reproduction Test (Public Draft). 14 pp.

Organization for Economic Cooperation and Development. 1984. OECD Guidelines for Testing of Chemicals, 206, Avian Reproduction Test. 10 pp.

TOXSTAT v. 3.4. Western Ecosystems Technology, Inc. 2003 Central Ave., Cheyenne, WY.

APPENDIX I. OUTPUT OF REVIEWER'S STATISTICAL VERIFICATION:

Quail repro, Penoxsulam, MRID 45831006
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	12	0	100.00	9	75.00	8	88.89	8	100.00	8	66.67	88.89
2	Ctrl	55	3	94.55	41	74.55	40	97.56	39	97.50	38	69.09	92.68
3	Ctrl	45	0	100.00	36	80.00	32	88.89	31	96.88	30	66.67	83.33
4	Ctrl	42	2	95.24	28	66.67	28	100.00	28	100.00	24	57.14	85.71
5	Ctrl	41	0	100.00	36	87.80	31	86.11	29	93.55	29	70.73	80.56
6	Ctrl	0	0	.	0	.	0	.	0	.	0	.	.
7	Ctrl	39	0	100.00	31	79.49	30	96.77	29	96.67	26	66.67	83.87
8	Ctrl	18	1	94.44	15	83.33	14	93.33	14	100.00	14	77.78	93.33
9	Ctrl	29	2	93.10	21	72.41	20	95.24	18	90.00	17	58.62	80.95
10	Ctrl	28	4	85.71	20	71.43	20	100.00	18	90.00	17	60.71	85.00
11	Ctrl	59	3	94.92	50	84.75	49	98.00	49	100.00	44	74.58	88.00
12	Ctrl	9	0	100.00	8	88.89	6	75.00	4	66.67	2	22.22	25.00
13	Ctrl	37	0	100.00	33	89.19	20	60.61	20	100.00	18	48.65	54.55
14	Ctrl	55	2	96.36	48	87.27	47	97.92	47	100.00	41	74.55	85.42
15	Ctrl	.	.	.	.	.	.	.	.	.	.	.	.
16	Ctrl	51	0	100.00	47	92.16	0	0.00	0	.	0	0.00	0.00
17	Ctrl	53	3	94.34	25	47.17	25	100.00	25	100.00	19	35.85	76.00
18	Ctrl	.	.	.	.	.	.	.	.	.	.	.	.
19	Ctrl	7	1	85.71	4	57.14	3	75.00	3	100.00	3	42.86	75.00
20	Ctrl	61	1	98.36	53	86.89	52	98.11	51	98.08	46	75.41	86.79
21	Dose1	49	3	93.88	33	67.35	19	57.58	17	89.47	8	16.33	24.24
22	Dose1	59	1	98.31	48	81.36	45	93.75	45	100.00	43	72.88	89.58
23	Dose1	53	3	94.34	40	75.47	39	97.50	39	100.00	39	73.58	97.50
24	Dose1	50	2	96.00	43	86.00	41	95.35	41	100.00	38	76.00	88.37
25	Dose1	43	2	95.35	35	81.40	35	100.00	34	97.14	18	41.86	51.43
26	Dose1	.	.	.	.	.	.	.	.	.	.	.	.
27	Dose1	44	0	100.00	38	86.36	33	86.84	32	96.97	29	65.91	76.32
28	Dose1	58	2	96.55	52	89.66	51	98.08	50	98.04	45	77.59	86.54
29	Dose1	58	1	98.28	49	84.48	48	97.96	47	97.92	43	74.14	87.76
30	Dose1	46	2	95.65	38	82.61	7	18.42	7	100.00	5	10.87	13.16
31	Dose1	35	0	100.00	29	82.86	10	34.48	10	100.00	10	28.57	34.48
32	Dose1	17	2	88.24	11	64.71	11	100.00	10	90.91	10	58.82	90.91
33	Dose1	12	1	91.67	9	75.00	9	100.00	9	100.00	7	58.33	77.78
34	Dose1	39	0	100.00	34	87.18	34	100.00	33	97.06	30	76.92	88.24
35	Dose1	.	.	.	.	.	.	.	.	.	.	.	.
36	Dose1	.	.	.	.	.	.	.	.	.	.	.	.
37	Dose1	39	0	100.00	30	76.92	28	93.33	28	100.00	26	66.67	86.67
38	Dose1	59	1	98.31	53	89.83	45	84.91	45	100.00	40	67.80	75.47
39	Dose1	45	2	95.56	34	75.56	27	79.41	26	96.30	23	51.11	67.65
40	Dose1	35	2	94.29	26	74.29	24	92.31	23	95.83	19	54.29	73.08
41	Dose2	52	2	96.15	43	82.69	43	100.00	43	100.00	36	69.23	83.72
42	Dose2	42	2	95.24	36	85.71	36	100.00	35	97.22	35	83.33	97.22
43	Dose2	46	0	100.00	38	82.61	38	100.00	37	97.37	28	60.87	73.68
44	Dose2	59	1	98.31	47	79.66	46	97.87	46	100.00	43	72.88	91.49
45	Dose2	0	0	.	0	.	0	.	0	.	0	.	.
46	Dose2	55	1	98.18	48	87.27	45	93.75	45	100.00	44	80.00	91.67
47	Dose2	13	1	92.31	11	84.62	10	90.91	9	90.00	6	46.15	54.55
48	Dose2	46	2	95.65	37	80.43	36	97.30	36	100.00	29	63.04	78.38
49	Dose2	32	0	100.00	29	90.63	27	93.10	27	100.00	26	81.25	89.66
50	Dose2	37	0	100.00	34	91.89	25	73.53	25	100.00	23	62.16	67.65

20

51 Dose2 48 1 97.92 44 91.67 24 54.55 24 100.00 24 50.00 54.55
52 Dose2 19 1 94.74 17 89.47 16 94.12 16 100.00 14 73.68 82.35
53 Dose2 50 0 100.00 44 88.00 44 100.00 44 100.00 41 82.00 93.18
54 Dose2 25 1 96.00 17 68.00 17 100.00 16 94.12 16 64.00 94.12
55 Dose2 31 0 100.00 29 93.55 29 100.00 29 100.00 29 93.55 100.00
56 Dose2 0 0 . 0 . 0 . 0 . 0 . .
57 Dose2 27 0 100.00 26 96.30 24 92.31 23 95.83 22 81.48 84.62
58 Dose2 . . . . . .
59 Dose2 . . . . . .
60 Dose2 1 0 100.00 0 0.00 0 . 0 . 0 0.00 .
61 Dose3 59 2 96.61 52 88.14 51 98.08 51 100.00 50 84.75 96.15
62 Dose3 11 0 100.00 10 90.91 10 100.00 9 90.00 8 72.73 80.00
63 Dose3 . . . . . .
64 Dose3 8 1 87.50 7 87.50 6 85.71 6 100.00 6 75.00 85.71
65 Dose3 . . . . . .
66 Dose3 31 3 90.32 23 74.19 23 100.00 23 100.00 22 70.97 95.65
67 Dose3 . . . . . .
68 Dose3 . . . . . .
69 Dose3 9 0 100.00 8 88.89 7 87.50 7 100.00 7 77.78 87.50
70 Dose3 14 0 100.00 12 85.71 12 100.00 12 100.00 12 85.71 100.00
71 Dose3 42 2 95.24 34 80.95 32 94.12 24 75.00 21 50.00 61.76
72 Dose3 49 0 100.00 47 95.92 47 100.00 47 100.00 46 93.88 97.87
73 Dose3 46 0 100.00 39 84.78 39 100.00 39 100.00 37 80.43 94.87
74 Dose3 45 0 100.00 40 88.89 40 100.00 40 100.00 35 77.78 87.50
75 Dose3 53 2 96.23 46 86.79 44 95.65 42 95.45 40 75.47 86.96
76 Dose3 38 0 100.00 34 89.47 34 100.00 34 100.00 28 73.68 82.35
77 Dose3 39 0 100.00 36 92.31 35 97.22 35 100.00 35 89.74 97.22
78 Dose3 . . . . . .
79 Dose3 34 0 100.00 31 91.18 28 90.32 28 100.00 28 82.35 90.32
80 Dose3 52 0 100.00 48 92.31 11 22.92 11 100.00 11 21.15 22.92

Quail repro, Penoxsulam, MRID 45831006
PRINTOUT OF RAW DATA (continued)

Obs	TRT	NH_LE	HS	HS_ES	HS_NH	THICK	HATWT	SURVWT	FOOD	WTGAINM	WTGAINF
1	Ctrl	100.00	8	88.89	100.00	0.21	7	30	23	19	21
2	Ctrl	97.44	38	92.68	100.00	0.20	8	39	24	38	55
3	Ctrl	96.77	30	83.33	100.00	0.21	8	35	26	19	76
4	Ctrl	85.71	24	85.71	100.00	0.21	8	37	23	-38	68
5	Ctrl	100.00	29	80.56	100.00	0.19	8	34	22	20	65
6	Ctrl	.	0	.	.	.	.	19	6	-20	
7	Ctrl	89.66	26	83.87	100.00	0.21	8	32	30	12	70
8	Ctrl	100.00	14	93.33	100.00	0.21	8	35	24	-28	63
9	Ctrl	94.44	17	80.95	100.00	0.21	8	31	24	36	-18
10	Ctrl	94.44	17	85.00	100.00	0.21	8	32	25	20	74
11	Ctrl	89.80	44	88.00	100.00	0.22	8	31	23	15	80
12	Ctrl	50.00	2	25.00	100.00	0.22	7	.	23	40	53
13	Ctrl	90.00	18	54.55	100.00	0.23	8	31	22	18	25
14	Ctrl	87.23	41	85.42	100.00	0.23	8	34	32	38	82
15	Ctrl	.	.	.	.	.	.	.	.	.	.
16	Ctrl	.	0	0.00	.	0.24	.	.	25	-41	76
17	Ctrl	76.00	19	76.00	100.00	0.20	9	35	26	12	62
18	Ctrl	.	.	.	.	.	.	.	.	.	.
19	Ctrl	100.00	3	75.00	100.00	.	8	33	29	33	56
20	Ctrl	90.20	46	86.79	100.00	0.21	7	35	25	39	72
21	Dose1	47.06	8	24.24	100.00	0.23	7	23	26	-10	76
22	Dose1	95.56	43	89.58	100.00	0.21	8	34	27	33	91

23	Dose1	100.00	39	97.50	100.00	0.20	8	35	23	-32	23
24	Dose1	92.68	38	88.37	100.00	0.20	8	36	25	-42	-2
25	Dose1	52.94	18	51.43	100.00	0.22	7	27	22	12	26
26	Dose1	.	.	.	.	.	.	.	.	.	.
27	Dose1	90.63	29	76.32	100.00	0.23	7	34	23	-31	44
28	Dose1	90.00	45	86.54	100.00	0.21	7	35	23	-3	49
29	Dose1	91.49	43	87.76	100.00	0.21	8	30	25	-32	20
30	Dose1	71.43	5	13.16	100.00	0.25	8	31	26	48	98
31	Dose1	100.00	10	34.48	100.00	0.25	8	33	24	6	70
32	Dose1	100.00	10	90.91	100.00	0.22	7	33	26	21	47
33	Dose1	77.78	7	77.78	100.00	.	6	34	22	-5	30
34	Dose1	90.91	30	88.24	100.00	0.19	8	36	23	-2	26
35	Dose1	.	.	.	.	.	.	.	.	.	.
36	Dose1	.	.	.	.	.	.	.	.	.	.
37	Dose1	92.86	26	86.67	100.00	0.20	7	32	23	6	30
38	Dose1	88.89	40	75.47	100.00	0.23	7	32	23	8	44
39	Dose1	88.46	23	67.65	100.00	0.20	7	30	31	-24	16
40	Dose1	82.61	19	73.08	100.00	0.20	8	37	22	26	114
41	Dose2	83.72	36	83.72	100.00	0.23	8	30	27	12	37
42	Dose2	100.00	35	97.22	100.00	0.22	8	33	23	26	83
43	Dose2	75.68	28	73.68	100.00	0.21	8	33	25	8	67
44	Dose2	93.48	43	91.49	100.00	0.21	9	31	25	9	91
45	Dose2	.	0	.	.	.	.	.	18	-4	-58
46	Dose2	97.78	44	91.67	100.00	0.21	8	35	24	19	77
47	Dose2	66.67	6	54.55	100.00	.	6	36	24	45	40
48	Dose2	80.56	29	78.38	100.00	0.22	8	33	27	-32	26
49	Dose2	96.30	26	89.66	100.00	0.23	8	28	22	8	21
50	Dose2	92.00	23	67.65	100.00	0.22	8	33	23	-24	4
51	Dose2	100.00	24	54.55	100.00	0.23	9	32	24	-19	43
52	Dose2	87.50	14	82.35	100.00	0.23	8	26	19	44	61
53	Dose2	93.18	41	93.18	100.00	0.25	7	28	21	-27	29
54	Dose2	100.00	16	94.12	100.00	0.21	8	35	22	-48	-52
55	Dose2	100.00	29	100.00	100.00	0.23	7	35	20	0	44
56	Dose2	.	0	.	.	.	.	.	20	-31	-37
57	Dose2	95.65	22	84.62	100.00	0.22	9	34	25	31	110
58	Dose2	.	.	.	.	.	.	.	.	.	.
59	Dose2	.	.	.	.	.	.	.	.	.	.
60	Dose2	.	0	.	.	0.19	.	.	19	20	33
61	Dose3	98.04	50	96.15	100.00	0.23	8	32	27	-16	3
62	Dose3	88.89	8	80.00	100.00	0.23	8	29	23	-62	-47
63	Dose3	.	.	.	.	.	.	.	.	.	.
64	Dose3	100.00	6	85.71	100.00	.	8	35	27	21	61
65	Dose3	.	.	.	.	.	.	.	.	.	.
66	Dose3	95.65	22	95.65	100.00	0.21	7	31	25	-20	-24
67	Dose3	.	.	.	.	.	.	.	.	.	.
68	Dose3	.	.	.	.	.	.	.	.	.	.
69	Dose3	100.00	7	87.50	100.00	0.24	7	30	20	-14	-38
70	Dose3	100.00	12	100.00	100.00	0.23	8	35	21	-1	3
71	Dose3	87.50	21	61.76	100.00	0.22	7	32	27	-20	3
72	Dose3	97.87	46	97.87	100.00	0.24	8	32	28	25	85
73	Dose3	94.87	37	94.87	100.00	0.23	7	34	21	-59	-35
74	Dose3	87.50	35	87.50	100.00	0.23	8	35	25	21	79
75	Dose3	95.24	40	86.96	100.00	0.22	8	30	26	51	72
76	Dose3	82.35	28	82.35	100.00	0.23	7	37	22	45	109
77	Dose3	100.00	35	97.22	100.00	0.22	8	37	27	-14	37

78	Dose3	.	.	.	.	.	.	.	.	.	.
79	Dose3	100.00	28	90.32	100.00	0.23	7	36	25	-41	-3
80	Dose3	100.00	11	22.92	100.00	0.20	7	28	23	-12	33

Quail repro, Penoxsulam, MRID 45831006
ANALYSIS RESULTS FOR VARIABLE EL (Eggs Laid)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levene's 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	Levene's Test Stat	Levene's P-value	Conclusion
0.933	0.001	1.556	0.209	USE NON-PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	18	35.61	19.43	4.58	54.56	25.95, 45.27
Dose1	17	43.59	13.58	3.29	31.16	36.60, 50.57
Dose2	18	32.39	19.35	4.56	59.75	22.77, 42.01
Dose3	15	35.33	17.15	4.43	48.54	25.84, 44.83

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	40.00	0.00	61.00	.	.
Dose1	45.00	12.00	59.00	122.40	-22.40
Dose2	34.50	0.00	59.00	90.95	9.05
Dose3	39.00	8.00	59.00	99.22	0.78

****

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	3.32	0.345

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	40.00	.	.
Dose1	45.00	1.000	0.866
Dose2	34.50	0.923	0.292
Dose3	39.00	1.000	0.238

SUMMARY	NOAEC	LOAEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Quail repro, Penoxsulam, MRID 45831006
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
0.922	<.001	2.984	0.038	USE NON-PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	18	1.22	1.35	0.32	110.68	0.55, 1.89
Dose1	17	1.41	1.00	0.24	71.09	0.90, 1.93
Dose2	18	0.67	0.77	0.18	115.04	0.29, 1.05
Dose3	15	0.67	1.05	0.27	156.98	0.09, 1.25

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	1.00	0.00	4.00	.	.
Dose1	2.00	0.00	3.00	115.51	-15.51
Dose2	0.50	0.00	2.00	54.55	45.45
Dose3	0.00	0.00	3.00	54.55	45.45

****

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	6.31	0.098

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	1.00	.	.
Dose1	2.00	0.779	0.252
Dose2	0.50	1.000	0.905
Dose3	0.00	1.000	0.977

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

25

Quail repro, Penoxsulam, MRID 45831006
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
0.856	<.001	1.415	0.247	USE NON-PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	17	96.04	4.65	1.13	4.85	93.65, 98.44
Dose1	17	96.26	3.25	0.79	3.38	94.59, 97.93
Dose2	16	97.78	2.46	0.62	2.52	96.47, 99.09
Dose3	15	97.73	3.97	1.03	4.06	95.53, 99.93

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	96.36	85.71	100.00	.	.
Dose1	96.00	88.24	100.00	100.22	-0.22
Dose2	98.24	92.31	100.00	101.81	-1.81
Dose3	100.00	87.50	100.00	101.75	-1.75

****

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	4.59	0.204

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	96.36	.	.
Dose1	96.00	1.000	0.376
Dose2	98.24	1.000	0.838
Dose3	100.00	1.000	0.973

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

Quail repro, Penoxsulam, MRID 45831006
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
0.944	0.004	1.126	0.345	USE NON-PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	18	28.06	16.47	3.88	58.71	19.86, 36.25
Dose1	17	35.41	12.46	3.02	35.17	29.01, 41.82
Dose2	18	27.78	16.57	3.91	59.65	19.54, 36.02
Dose3	15	31.13	15.51	4.01	49.83	22.54, 39.72

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	29.50	0.00	53.00	.	.
Dose1	35.00	9.00	53.00	126.22	-26.22
Dose2	31.50	0.00	48.00	99.01	0.99
Dose3	34.00	7.00	52.00	110.97	-10.97

****

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	2.38	0.496

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	29.50	.	.
Dose1	35.00	1.000	0.922
Dose2	31.50	1.000	0.536
Dose3	34.00	1.000	0.587

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

37

Quail repro, Penoxsulam, MRID 45831006
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
0.678	<.001	1.922	0.135	USE NON-PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	17	77.89	12.23	2.97	15.71	71.60, 84.18
Dose1	17	80.06	7.32	1.78	9.15	76.29, 83.83
Dose2	16	80.78	22.58	5.65	27.95	68.75, 92.81
Dose3	15	87.86	5.21	1.34	5.93	84.98, 90.75

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	80.00	47.17	92.16	.	.
Dose1	81.40	64.71	89.83	102.79	-2.79
Dose2	86.49	0.00	96.30	103.71	-3.71
Dose3	88.89	74.19	95.92	112.80	-12.80

****

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	12.34	0.006

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	80.00	.	.
Dose1	81.40	1.000	0.568
Dose2	86.49	1.000	0.970
Dose3	88.89	1.000	1.000

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

Quail repro, Penoxsulam, MRID 45831006
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
0.954	0.014	0.091	0.965	USE PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	18	23.61	16.59	3.91	70.26	15.36, 31.86
Dose1	17	29.76	14.51	3.52	48.74	22.31, 37.22
Dose2	18	25.56	15.72	3.70	61.49	17.74, 33.37
Dose3	15	27.93	15.42	3.98	55.22	19.39, 36.48

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	22.50	0.00	52.00	.	.
Dose1	33.00	7.00	51.00	126.06	-26.06
Dose2	26.00	0.00	46.00	108.24	-8.24
Dose3	32.00	6.00	51.00	118.31	-18.31

****

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	64	0.52	0.672

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	23.61	.	26.62	.	0.650	0.982	0.858	.	.
Dose1	29.76	0.979	26.62	0.799	.	0.855	0.987	.	.
Dose2	25.56	0.869	26.62	0.833	.	.	0.972	.	.
Dose3	27.93	0.945	26.62	0.841	.	.	.	.	.

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

29

Quail repro, Penoxsulam, MRID 45831006
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
0.656	<.001	1.189	0.322	USE NON-PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	17	85.38	24.63	5.97	28.84	72.72, 98.04
Dose1	17	84.11	24.32	5.90	28.91	71.61, 96.61
Dose2	15	92.50	12.53	3.23	13.54	85.56, 99.43
Dose3	15	91.43	19.57	5.05	21.40	80.60, 100.00

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	95.24	0.00	100.00	.	.
Dose1	93.75	18.42	100.00	98.52	1.48
Dose2	97.30	54.55	100.00	108.34	-8.34
Dose3	98.08	22.92	100.00	107.09	-7.09

****

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	3.15	0.369

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	95.24	.	.
Dose1	93.75	1.000	0.500
Dose2	97.30	1.000	0.832
Dose3	98.08	1.000	0.949

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

30

Quail repro, Penoxsulam, MRID 45831006
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
0.955	0.016	0.085	0.968	USE PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	18	22.94	16.52	3.89	72.01	14.73, 31.16
Dose1	17	29.18	14.51	3.52	49.72	21.72, 36.63
Dose2	18	25.28	15.73	3.71	62.24	17.45, 33.10
Dose3	15	27.20	15.35	3.96	56.43	18.70, 35.70

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	22.50	0.00	51.00	.	.
Dose1	32.00	7.00	50.00	127.16	-27.16
Dose2	26.00	0.00	46.00	110.17	-10.17
Dose3	28.00	6.00	51.00	118.55	-18.55

****

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	64	0.51	0.677

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	22.94	.	26.06	.	0.639	0.969	0.862	.	.
Dose1	29.18	0.980	26.06	0.805	.	0.880	0.984	.	.
Dose2	25.28	0.887	26.06	0.839	.	.	0.985	.	.
Dose3	27.20	0.944	26.06	0.847	.	.	.	.	.

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

Quail repro, Penoxsulam, MRID 45831006
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
0.624	<.001	1.830	0.151	USE NON-PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	16	95.58	8.45	2.11	8.84	91.08, 100.00
Dose1	17	97.63	3.19	0.77	3.27	95.99, 99.27
Dose2	15	98.30	2.97	0.77	3.02	96.66, 99.95
Dose3	15	97.36	6.77	1.75	6.95	93.62, 100.00

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	99.04	66.67	100.00		
Dose1	98.04	89.47	100.00	102.14	-2.14
Dose2	100.00	90.00	100.00	102.85	-2.85
Dose3	100.00	75.00	100.00	101.86	-1.86

****

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	2.95	0.399

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	99.04		
Dose1	98.04	1.000	0.561
Dose2	100.00	1.000	0.839
Dose3	100.00	1.000	0.953

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

Quail repro, Penoxsulam, MRID 45831006
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
0.950	0.008	0.047	0.986	USE NON-PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	18	20.89	15.05	3.55	72.06	13.40, 28.37
Dose1	17	25.47	14.20	3.45	55.77	18.17, 32.77
Dose2	18	23.11	14.54	3.43	62.89	15.88, 30.34
Dose3	15	25.73	14.66	3.79	56.97	17.61, 33.85

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	18.50	0.00	46.00	.	.
Dose1	26.00	5.00	45.00	121.93	-21.93
Dose2	25.00	0.00	44.00	110.64	-10.64
Dose3	28.00	6.00	50.00	123.19	-23.19

****

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	0.771

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	18.50	.	.
Dose1	26.00	1.000	0.827
Dose2	25.00	1.000	0.653
Dose3	28.00	1.000	0.741

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

Quail repro, Penoxsulam, MRID 45831006
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
0.848	<.001	0.507	0.679	USE NON-PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	17	56.95	21.21	5.14	37.23	46.05, 67.85
Dose1	17	57.16	21.15	5.13	37.01	46.28, 68.03
Dose2	16	66.48	21.84	5.46	32.86	54.84, 78.12
Dose3	15	74.10	17.76	4.59	23.98	64.26, 83.93

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	66.67	0.00	77.78	.	.
Dose1	65.91	10.87	77.59	100.36	-0.36
Dose2	71.06	0.00	93.55	116.72	-16.72
Dose3	77.78	21.15	93.88	130.10	-30.10

****

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	12.71	0.005

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	66.67	.	.
Dose1	65.91	1.000	0.514
Dose2	71.06	1.000	0.941
Dose3	77.78	1.000	1.000

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

Quail repro, Penoxsulam, MRID 45831006
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
0.783	<.001	1.105	0.354	USE NON-PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	17	74.42	25.28	6.13	33.97	61.42, 87.42
Dose1	17	71.13	25.21	6.11	35.44	58.17, 84.09
Dose2	15	82.45	14.32	3.70	17.37	74.52, 90.39
Dose3	15	84.45	19.53	5.04	23.13	73.64, 95.27

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	83.87	0.00	93.33	.	.
Dose1	77.78	13.16	97.50	95.58	4.42
Dose2	84.62	54.55	100.00	110.80	-10.80
Dose3	87.50	22.92	100.00	113.49	-13.49

****

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	6.00	0.112

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	83.87	.	.
Dose1	77.78	1.000	0.411
Dose2	84.62	1.000	0.852
Dose3	87.50	1.000	0.987

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

Quail repro, Penoxsulam, MRID 45831006
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
0.820	<.001	1.886	0.142	USE NON-PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	16	90.11	12.55	3.14	13.93	83.42, 96.79
Dose1	17	85.49	15.36	3.72	17.96	77.59, 93.38
Dose2	15	90.83	10.12	2.61	11.14	85.23, 96.44
Dose3	15	95.19	5.84	1.51	6.13	91.96, 98.43

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	92.32	50.00	100.00	.	.
Dose1	90.63	47.06	100.00	94.87	5.13
Dose2	93.48	66.67	100.00	100.81	-0.81
Dose3	97.87	82.35	100.00	105.65	-5.65

****

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	4.87	0.182

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	92.32	.	.
Dose1	90.63	0.617	0.197
Dose2	93.48	1.000	0.583
Dose3	97.87	1.000	0.941

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

Quail repro, Penoxsulam, MRID 45831006
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
0.950	0.008	0.047	0.986	USE NON-PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	18	20.89	15.05	3.55	72.06	13.40, 28.37
Dose1	17	25.47	14.20	3.45	55.77	18.17, 32.77
Dose2	18	23.11	14.54	3.43	62.89	15.88, 30.34
Dose3	15	25.73	14.66	3.79	56.97	17.61, 33.85

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	18.50	0.00	46.00	.	.
Dose1	26.00	5.00	45.00	121.93	-21.93
Dose2	25.00	0.00	44.00	110.64	-10.64
Dose3	28.00	6.00	50.00	123.19	-23.19

****

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	0.771

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	18.50	.	.
Dose1	26.00	1.000	0.827
Dose2	25.00	1.000	0.653
Dose3	28.00	1.000	0.741

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

Quail repro, Penoxsulam, MRID 45831006
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
0.783	<.001	1.105	0.354	USE NON-PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	17	74.42	25.28	6.13	33.97	61.42, 87.42
Dose1	17	71.13	25.21	6.11	35.44	58.17, 84.09
Dose2	15	82.45	14.32	3.70	17.37	74.52, 90.39
Dose3	15	84.45	19.53	5.04	23.13	73.64, 95.27

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	83.87	0.00	93.33	.	.
Dose1	77.78	13.16	97.50	95.58	4.42
Dose2	84.62	54.55	100.00	110.80	-10.80
Dose3	87.50	22.92	100.00	113.49	-13.49

****

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	6.00	0.112

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	83.87	.	.
Dose1	77.78	1.000	0.411
Dose2	84.62	1.000	0.852
Dose3	87.50	1.000	0.987

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

Quail repro, Penoxsulam, MRID 45831006
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
.	.	.	.	NO DATA FOR TEST

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	16	100.00	0.00	0.00	0.00	. , .
Dose1	17	100.00	0.00	0.00	0.00	. , .
Dose2	15	100.00	0.00	0.00	0.00	. , .
Dose3	15	100.00	0.00	0.00	0.00	. , .

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	100.00	100.00	100.00	.	.
Dose1	100.00	100.00	100.00	100.00	0.00
Dose2	100.00	100.00	100.00	100.00	0.00
Dose3	100.00	100.00	100.00	100.00	0.00

Quail repro, Penoxsulam, MRID 45831006
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
0.977	0.297	0.820	0.488	USE PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	16	0.21	0.01	0.00	5.94	0.21, 0.22
Dose1	16	0.22	0.02	0.00	7.73	0.21, 0.22
Dose2	15	0.22	0.01	0.00	6.23	0.21, 0.23
Dose3	14	0.22	0.01	0.00	5.53	0.22, 0.23

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	0.21	0.19	0.24	.	.
Dose1	0.21	0.19	0.25	101.83	-1.83
Dose2	0.22	0.19	0.25	103.65	-3.65
Dose3	0.23	0.20	0.24	105.63	-5.63

****

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	57	2.01	0.123

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	0.21	.	0.22	.	0.862	0.422	0.103	.	.
Dose1	0.22	0.944	0.22	0.929	.	0.869	0.402	.	.
Dose2	0.22	0.993	0.22	0.944	.	.	0.851	.	.
Dose3	0.22	1.000	0.22	0.950	.	.	.	.	.

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

Quail repro, Penoxsulam, MRID 45831006
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
0.945	0.007	1.157	0.334	USE NON-PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	16	7.88	0.50	0.13	6.35	7.61, 8.14
Dose1	17	7.41	0.62	0.15	8.34	7.09, 7.73
Dose2	15	7.93	0.80	0.21	10.07	7.49, 8.38
Dose3	15	7.53	0.52	0.13	6.85	7.25, 7.82

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	8.00	7.00	9.00	.	.
Dose1	7.00	6.00	8.00	94.12	5.88
Dose2	8.00	6.00	9.00	100.74	-0.74
Dose3	8.00	7.00	8.00	95.66	4.34

****

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	8.19	0.042

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	8.00	.	.
Dose1	7.00	0.058	0.015
Dose2	8.00	1.000	0.582
Dose3	8.00	1.000	0.220

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

41

Quail repro, Penoxsulam, MRID 45831006
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
0.969	0.124	0.356	0.785	USE PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	15	33.60	2.50	0.65	7.44	32.21, 34.99
Dose1	17	32.47	3.54	0.86	10.89	30.65, 34.29
Dose2	15	32.13	2.97	0.77	9.25	30.49, 33.78
Dose3	15	32.87	2.92	0.76	8.90	31.25, 34.49

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	34.00	30.00	39.00	.	.
Dose1	33.00	23.00	37.00	96.64	3.36
Dose2	33.00	26.00	36.00	95.63	4.37
Dose3	32.00	28.00	37.00	97.82	2.18

****

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	58	0.66	0.582

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	33.60	.	33.60	.	0.719	0.550	0.910	.	.
Dose1	32.47	0.302	32.49	0.182	.	0.989	0.983	.	.
Dose2	32.13	0.206	32.49	0.203	.	.	0.910	.	.
Dose3	32.87	0.466	32.49	0.211	.	.	.	.	.

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

42

Quail repro, Penoxsulam, MRID 45831006
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
0.981	0.371	0.306	0.821	USE PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	18	24.72	3.10	0.73	12.55	23.18, 26.26
Dose1	17	24.35	2.34	0.57	9.62	23.15, 25.56
Dose2	18	22.67	2.72	0.64	12.01	21.31, 24.02
Dose3	15	24.47	2.61	0.68	10.69	23.02, 25.91

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	24.00	19.00	32.00	.	.
Dose1	23.00	22.00	31.00	98.51	1.49
Dose2	23.00	18.00	27.00	91.69	8.31
Dose3	25.00	20.00	28.00	98.97	1.03

****

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	64	2.11	0.108

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	24.72	.	24.72	.	0.978	0.116	0.993	.	.
Dose1	24.35	0.592	24.35	0.410	.	0.267	0.999	.	.
Dose2	22.67	0.035	23.48	0.111	.	.	0.241	.	.
Dose3	24.47	0.649	23.48	0.129	.	.	.	.	.

SUMMARY	NOEC	LOEC
Dunnett	**Dose1**	**Dose2**
Williams	Dose3	>highest dose

43

Quail repro, Penoxsulam, MRID 45831006
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
0.976	0.216	0.811	0.492	USE PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	18	14.33	25.44	6.00	177.47	1.68, 26.98
Dose1	17	-1.24	25.31	6.14	-2049.06	-14.25, 11.78
Dose2	18	2.06	27.23	6.42	1324.80	-11.49, 15.60
Dose3	15	-6.40	33.93	8.76	-530.16	-25.19, 12.39

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	19.00	-41.00	40.00	.	.
Dose1	-2.00	-42.00	48.00	-8.62	108.62
Dose2	8.00	-48.00	45.00	14.34	85.66
Dose3	-14.00	-62.00	51.00	-44.65	144.65

****

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	64	1.69	0.179

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	14.33	.	14.33	.	0.360	0.555	0.157	.	.
Dose1	-1.24	0.124	0.46	0.087	.	0.985	0.954	.	.
Dose2	2.06	0.213	0.46	0.088	.	.	0.823	.	.
Dose3	-6.40	0.048	-6.40	0.023	.	.	.	.	.

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

44

Quail repro, Penoxsulam, MRID 45831006
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
0.985	0.584	2.289	0.087	USE PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	18	53.33	31.11	7.33	58.34	37.86, 68.81
Dose1	17	47.18	32.16	7.80	68.16	30.64, 63.71
Dose2	18	34.39	46.89	11.05	136.35	11.07, 57.71
Dose3	15	22.53	49.70	12.83	220.57	-4.99, 50.06

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	64.00	-20.00	82.00	.	.
Dose1	44.00	-2.00	114.00	88.46	11.54
Dose2	38.50	-58.00	110.00	64.48	35.52
Dose3	3.00	-47.00	109.00	42.25	57.75

****

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	64	1.87	0.143

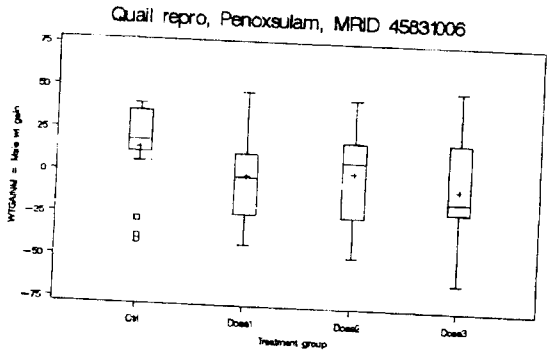
Dunnett - testing each trt mean signif. less than control
Williams - test assumes dose-response relationship, testing negative trend
Tukey - two-sided tests, all possible comparisons, not used for NOEC or LOEC

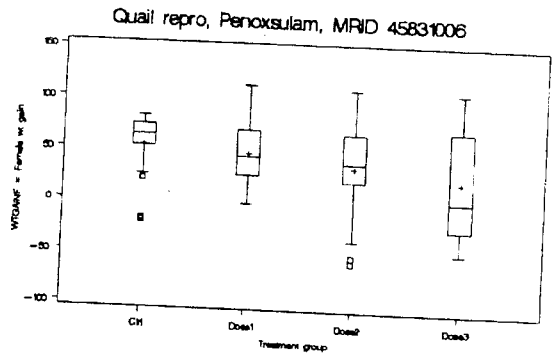
Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	53.33	.	53.33	.	0.969	0.502	0.141	.	.
Dose1	47.18	0.570	47.18	0.390	.	0.787	0.323	.	.
Dose2	34.39	0.186	34.39	0.104	.	.	0.836	.	.
Dose3	22.53	0.043	22.53	0.020	.	.	.	.	.

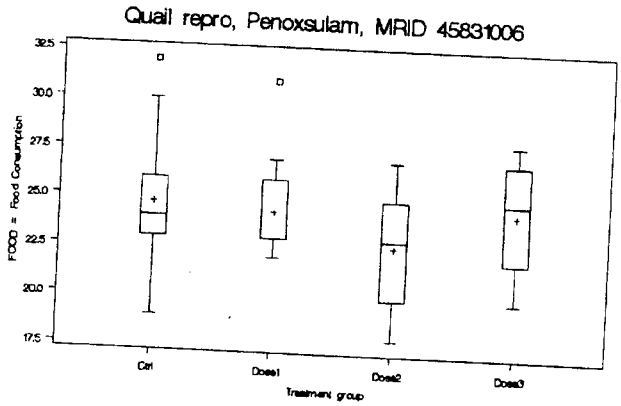
SUMMARY	NOEC	LOEC
Dunnett	Dose2	Dose3
Williams	Dose2	Dose3

45

Box Plots:


Quail repro, Penoxsulam, MRID 45831006
Ctrl
Dose1
Dose2
Dose3
Treatment group


Quail repro, Penoxsulam, MRID 45831006
Ctrl
Dose1
Dose2
Dose3
Treatment group


Quail repro, Penoxsulam, MRID 45831006
FOOD = Food Consumption
32.5
30.0
27.5
25.0
22.5
20.0
17.5
Ctrl
Dose1
Dose2
Dose3
Treatment group

46