

US EPA ARCHIVE DOCUMENT

Data Evaluation Report on the Reproductive Effects of XDE-638 on Avian Species *Anas platyrhynchos*

PMRA Submission Number

EPA MRID Number 45830101

Data Requirement:

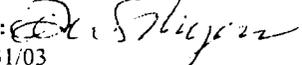
PMRA DATA CODE	
EPA DP Barcode	D288160
OECD Data Point	
EPA MRID	45830101
EPA Guideline	§71-4b

Test material: XDE-638 **Purity:** 97.5%
Common name: Penoxsulam
Chemical name: IUPAC: Not specified
CAS name: 2-(2,2-Difluoroethoxy)-N-(5,8-dimethoxy[1,2,4]triazolo[1,5-C]pyrimidin-2-yl)-6-(trifluoromethyl)benzenesulfonamide (pilot study, MRID 45831007)
CAS No.: Not specified
Synonyms: None specified

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

Signature: 
Date: 10/31/03

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OPP/EFED/ERB - III **James J. Goodyear, Ph.D.**
Ecological Effects Biologist
Secondary Reviewer(s): Office of Pesticide Programs
{EPA/OECD/PMRA} **703-305-7726**

Date: 
Date:

Reference/Submission No.:

Company Code:
Active Code:
EPA PC Code: 19903+

119031

Date Evaluation Completed:

CITATION: Mach, J.J. 2002. XDE-638: Avian Reproduction Study in Mallard (*Anas platyrhynchos*). Unpublished study performed by Genesis Laboratories, Inc., Wellington, CO. Laboratory Study No. 02014. Study submitted by The Dow Chemical Company, Midland, MI for Dow AgroSciences LLC, Indianapolis, IN. Study initiated May 6, 2002 and completed December 9, 2002.



EXECUTIVE SUMMARY:

The one-generation reproductive toxicity of XDE-638 to groups (13 pens/treatment level) of 1 male and 1 female of 16-week-old Mallard duck was assessed over approximately 21 weeks. XDE-638 was administered to the birds in the diet at mean-measured concentrations of 0 (solvent control, <LOD), 251, 497, and 891 ppm a.i. No treatment-related effects were observed on any adult, reproductive, or offspring parameter.

Due to extremely low hatching success and below normal egg shell thicknesses in all test and control groups, results of this study were compromised. Therefore, this study is scientifically unsound, does not fulfill U.S. EPA guideline §71-4(b), and is classified as INVALID.

Results Synopsis

Test Organism Size/Age : 16-weeks old at test initiation (860-1444 g)

NOAEC: Not determined (Invalid study)

LOAEL: Not determined (Invalid study)

Endpoint(s) Affected: Not determined (Invalid study)

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); and OECD Guideline 206 (1984). Deviations from §71-4 are:

1. The maximum anticipated field residue was not specified.
2. 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.
3. Due to equipment (incubator) failure, only data obtained for eggs and hatchlings during Weeks 14-21 were used for analyses.
4. A relatively high range was observed in the temperature and humidity levels during egg storage: 13-19°C and 45-92%. EPA requires that eggs are stored at approximately 16°C and 65% humidity.
5. The average temperature during hatching was 89 ± 3°F, lower than the recommended temperature of 102°F. The study author reported that on 10/3/02, the temperature was lowered (from approximately 92°F to approximately 86°F) to aid in increasing hatch size. The photo-period during hatching was not specified.
6. Egg shell thickness of the control group averaged 0.331 mm,

which is less than the 0.34 mm minimum criterion. Egg shell thickness was <0.34 mm in 3/4 of the group utilized.

7. Hatching success (hatchlings of viable 3-week embryos) averaged only 23.7% for the control group, 15.5% for the 250 ppm group, 27.6% for the 500 ppm group, and 19.3% for the 1000 ppm group (Table XV, p. 39). The study author described (on p. 22) problems encountered during the study with the incubator/hatcher (also refer to Reviewer's Comments section).
8. Hatchling body weights were not measured.
9. The highest concentration tested did not elicit an adverse effect; therefore, a LOAEL was not established. Since the maximum labeled field residue was not reported, it is unknown if the highest level tested was appropriate to approximate field exposure for this species.

These deviations are significant, and affect the scientific validity and acceptability of the study.

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.: ND05167938
Purity: 97.5%

Stability of Compound

Under Test Conditions: The stability of XDE-638 was not assessed in the treated feed. Treated feed was prepared bi-weekly and stored at -17°C until needed.

Storage conditions

of test chemical: Ambient

OECD requires water solubility, stability in water and light, pK_a , P_{ow} , and vapor pressure of the test compound.

OECD requirements were not reported.

2. Test organism:

Table 1: Test organism.

Parameter	Details	Remarks
		Criteria
Species (common and scientific names):	Mallard duck (<i>Anas platyrhynchos</i>)	<i>EPA requires: a wild waterfowl species, preferably the mallard, Anas platyrhynchos, or an upland game species, preferably the northern bobwhite, Colinus virginianus.</i>
Age at Study Initiation:	16 weeks	It was stated that birds were approaching their first breeding season. <i>EPA requires: birds should be approaching their first breeding season.</i>
Body Weight: (mean and range)	Males: Overall range (n=52) 1.066 to 1.444 kg, with group means of 1.177-1.274 kg. Females: Overall range (n=52) 0.912 to 1.292 kg, with group means of 1.114-1.160 kg.	Individual body weights were recorded at Weeks 0 (study initiation), 2, 4, 6, 8, and 21 (study termination). <i>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.</i>
Source:	Whistling Wings, Inc. Hanover, IL.	Birds were from the same hatch, and were phenotypically indistinguishable from wild birds. <i>EPA requires that all birds should be from the same source.</i>

B. STUDY DESIGN:

1. Experimental Conditions

a. Range-finding Study - A 28-day range-finding study was conducted with 22-week-old Mallard duck (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 45831007; Genesis Laboratory Study No. 99051). Reviewer-calculated mean-measured concentrations were 125, 254, 486, 898, and 1967 ppm a.i. (pp. 30 and 43 of Appendix B).

5

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 85.4-99.5% 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 19 and 22°C, and the mean minimum and maximum relative humidity were 26 and 47% (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 treatment-related mortality or clinical signs of toxicity were observed during the 28-day study (Table I, p. 16). One vehicle control male was found dead on Day 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 37 birds sacrificed at study termination (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):	15 days Same as test Water and feed were provided <i>ad libitum</i> . All test birds were normal and active throughout the acclimation period. No disease or abnormalities were observed, and no medication was provided.	Mallard were fed a basal diet of Ranch-way 16% Poultry Layer Complete diet (Appendix D1, p. 113), and provided public tap water from the Northern Colorado Water Association. 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 <i>ad libitum</i> and sickness, injuries or mortality be noted.
Test duration pre-laying exposure: egg-laying exposure: withdrawal period, if used:	Approximately 10 weeks Approximately 11 weeks No withdrawal period	Reduced reproduction was not observed by the study author, so a withdrawal period was not conducted. EPA requires <u>Pre-laying exposure duration</u> At least 10 weeks prior to the onset of egg-laying. <u>Exposure duration with egg-laying</u> At least 10 weeks. <u>Withdrawal period</u> 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: construction materials: number:	Parents (one pair) were housed in 61- x 76- x 46-cm pens. Offspring (by set and group) were housed in 90- x 70- x 23-cm battery brooders. Parental cages were constructed of perfluorocarbon-coated steel. Hatchling cages were constructed of wood. 13 parental pens/treatment level	Pens Adequate room and arranged to prevent cross contamination <u>Materials</u> Nontoxic material and nonbinding material, such as galvanized steel. <u>Number</u> At least 5 replicate pens are required for mallards housed in groups of 7. For other

Reproductive Effects of XDE-638 on Avian Species *Anas platyrhynchos*

MRID 45830101

Parameter	Details	Remarks
		Criteria
		<i>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.</i>
Number of birds per pen (male:female)	2 birds/pen (1 male:1 female)	<i>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.</i>
Number of pens per group/treatment negative control: solvent control: treated:	N/A 13 pens 13 pens/treatment	<i>EPA requires at least 12 pens, but considerably more if birds are kept in pairs. At least 16 is strongly recommended.</i>
Test concentrations (ppm diet) nominal: measured:	0, 250, 500, and 1000 ppm ND, 251, 497, and 891 ppm	Mean-measured concentrations were determined from treated feed collected from Batches 1, 2, and 10 (Table 1, p. 25). The limit of detection was not specified. <i>EPA requires at least two concentrations other than the control are required; three or more are recommended.</i>
Maximum labeled field residue anticipated and source of information:	Not specified	<i>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]</i>
Solvent/vehicle, if used type: amount:	Acetone Not specified	<i>EPA requires corn oil or other appropriate vehicle not more than 2% of diet by weight</i>
Was detailed description and nutrient analysis of the basal diet provided?	Yes	Basal diets contained 16.0% protein, 3.5% fat, 7.0% fiber,

8

Parameter	Details	Remarks
		<i>Criteria</i>
(Yes/No)		and 3-4% calcium (Appendix D1, p. 113). Offspring received Ranch-way Turkey and Game Bird Starter without the addition of test substance (Appendix D2, p. 114). <i>EPA requires a commercial breeder feed (or its equivalent) that is appropriate for the test species.</i>
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. 14). 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.	Dietary concentrations were corrected for the purity of the test substance. It was not specified if the acetone was allowed to completely evaporate prior to offering. <i>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.</i>
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, and 10 (Table 1, p. 25).
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 45831007). 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 85.4-99.5% of initial concentrations (pp. 39,

Parameter	Details	Remarks
		<i>Criteria</i>
		41, and 44 of Appendix B, MRID 45831007). 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 45831007).
Feeding and husbandry	Feeding and husbandry conditions appeared to be adequate, given guideline recommendations.	
Test conditions (pre-laying) temperature:	20-23°C	Light intensity averaged 23.0 foot-candles at bird level.
relative humidity:	48-69%	<i>EPA Requires</i> <i>Temperature:</i> About 21 °C (70 °F) <i>Relative humidity:</i> About 55% <i>Lighting</i> First 8 weeks: 7 h per day. Thereafter: 16-17 h per day. At least 6 foot candles at bird level.
photo-period:	7 hr light/day up through Week 8 and 17 hr light/day thereafter.	
Egg Collection and Incubation		
Egg collection and storage collection interval:	Daily	A relatively high range level was observed for the temperature and humidity during egg storage. Data are provided in Appendix B3, p. 79. <i>EPA requires eggs to be collected daily; egg storage temperature approximately 16 °C (61 °F); humidity approximately 65%</i>
storage temperature:	13-19°C	
storage humidity:	45-92%	
Were eggs candled for cracks prior to setting for incubation?	Yes	<i>EPA requires eggs to be candled on day 0</i>
Were eggs set weekly?	Yes	
Incubation conditions		Incubation and hatching

Parameter	Details	Remarks
		Criteria
temperature: humidity:	89 ± 3°F 65 ± 9%	occurred in the same incubator, in different compartments. Environmental conditions were the same for both phases (p. 15 and Appendix B4, p. 80). Appendix B4 erroneously reports that the temperature values provided are in °C.
When candling was done for fertility?	Day 14 for fertility and Day 21 for viability.	EPA requires: Quail: approx. day 11 Ducks: approx. day 14
When the eggs were transferred to the hatcher?	Day 24	EPA requires: Bobwhite: day 21 Mallard: day 23
Hatching conditions temperature: humidity: photoperiod:	89 ± 3°F 65 ± 9% Not specified	Incubation and hatching occurred in the same incubator, in different compartments. Environmental conditions were the same for both phases (p. 15 and Appendix B4, p. 80). Appendix B4 erroneously reports that the temperature values provided are in °C. The study author reported that on 10/3/02, the incubator thermostats were switched to a lower temperature to aid in increasing hatch size. Beginning on 10/17/02, a different incubator was used which appeared to provide more stable temperature (84-87°F) and humidity (56-62%) levels (Appendix B4, p. 80). EPA requires: temperature of 39°C (102°F) humidity of 70%
Day the hatched eggs were removed and counted	Day 27 or 28	EPA requires Bobwhite: day 24



Parameter	Details	Remarks
		<i>Criteria</i>
		<i>Mallard: day 27</i>
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.	<i>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.</i>
Reference chemical, if used	None used	

2. Observations:

Table 3: Observations.

Parameter	Details	Remarks/Criteria
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-day-old survivors, mortality, gross pathology, others)	<ul style="list-style-type: none"> - mortality - signs of toxicity, injury, or illness - body weight - food consumption - necropsy - 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 	At necropsy, specific examination was made on the gastro-intestinal tract, liver, kidneys, bile duct, heart, spleen, and reproductive organs. Other observations were recorded as necessary. Hatchling body weights were not measured. <i>EPA requires:</i> <ul style="list-style-type: none"> · 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 21 (test termination), and food consumption was determined weekly.	<i>Body weights and food consumption must be measured at least biweekly.</i>
Were raw data included?	Yes, sufficient.	

13

I. RESULTS AND DISCUSSION:

A. MORTALITY:

No treatment-related mortality was observed during the study. During Week 20, one male from the 500 ppm group was observed with an injured right leg, feather loss (of the head, neck, back, and breast), a partially missing lower bill, and a severely lacerated tongue. The male was subsequently euthanized. Besides the bill trauma, no abnormalities were observed upon necropsy and necropsy of the pen-mate was unremarkable (p. 20). No other mortality occurred during the study.

Table 4: Effect of XDE-638 on Mortality of *Anas Platyrhynchos*.

Treatment, ppm a.i. measured (and nominal) concentrations	Observation Period					
	Week 7		Week 14		Week 21	
	No. Dead Male	No. Dead Female	No. Dead Male	No. Dead Female	No. Dead Male	No. Dead Female
Control	0	0	0	0	0	0
251 (250)	0	0	0	0	0	0
497 (500)	0	0	0	0	1	0
891 (1000)	0	0	0	0	0	0

B. REPRODUCTIVE AND OTHER ENDPOINTS:

Abnormal Effects/Behavior: No overt signs of treatment-related toxicity were observed. Incidental clinical observations normally associated with pen wear and/or interactions among pen mates were observed and included fluffed feathers, feather loss, and injuries described above (Table II, p. 26). No abnormalities were observed in the hatchlings during the 14-day maintenance period (Table XIX, p. 43).

Food Consumption: No treatment-related effect on food consumption was observed (Table III, p. 27).

Body Weight: No treatment-related effect on parental body weight was observed (Table IV, p. 28). No treatment-related effects on 14-day-old body weight of hatchlings were observed (Table XX, p. 44).

Necropsy: All necropsy findings were considered incidental to treatment (Table V, p. 29).

Reproductive Effects: There were no treatment-related effects in the examined reproductive parameters (Tables VII through XVIII, pp. 31-42). Although no treatment-related trends were observed, hatching success (the number of hatchlings as a percentage of viable 3-week embryos) was extremely low. Hatching success averaged only 23.7% for the control group, 15.5% for the 250 ppm group, 27.6% for the 500 ppm group, and 19.3% for the 1000 ppm group (Table XV, p. 39). Refer to the Reviewer's Comments section for a discussion of the problems encountered by the study author during incubation/hatching.

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

Reproductive Effects of XDE-638 on Avian Species *Anas platyrhynchos*

MRID 45830101

Parameter	Control	251 ppm	497 ppm	891 ppm	NOAEC/ LOAEL
Eggs laid/hen	48.8	51.5	40.5	45.1	891 ppm >891 ppm
Eggs laid/hen/week	4.4	4.7	3.7	4.1	891 ppm >891 ppm
Eggs set ¹	516	545	446	498	N/A
Shell thickness (mm ± SD) ²	0.331	0.343	0.334	0.330	891 ppm >891 ppm
Viable embryos/eggs set (%)	87.4	90.8	82.7	90.6	891 ppm >891 ppm
Live 3-week embryos/viable embryos (%)	94.0	95.9	97.3	90.9	891 ppm >891 ppm
No. of hatchlings	103	76	102	87	N/A
Hatchlings/live 3-week embryos (%)	23.7	15.5	27.6	19.3	891 ppm >891 ppm
No. of 14-day old survivors/hen	83	60	82	79	N/A
No. of 14-day old survivors/- No. of hatchlings (%)	80.6	78.9	80.4	90.8	891 ppm >891 ppm
14-day old survivors weight (g)	78	86	82	83	891 ppm >891 ppm
Mean food consumption (g/bird/day) ¹	109	111	108	110	891 ppm >891 ppm
Weight of adult males, g at start of treatment: at Week 8: at termination:	1.274 1.246 1.340	1.177 1.174 1.268	1.232 1.181 1.310	1.220 1.192 1.290	891 ppm >891 ppm
Weight of adult females, g at start of treatment: at Week 9: at termination:	1.045 1.009 1.285	1.050 1.035 1.282	1.059 0.990 1.208	1.073 1.075 1.283	891 ppm >891 ppm
Gross pathology (proportion of birds with pathological incidents)	No notable abnormalities observed. Analysis not conducted.				

N/A = Not statistically-analyzed.

¹ Weeks 14-21 only

² Standard deviation not reported.

15

C. REPORTED STATISTICS:

The following variables were statistically analyzed: initial and terminal adult body weight, mean feed consumption, eggs laid, mean eggs laid/hen, mean eggs laid/hen/week, mean hatchlings/hen/week, mean shell thickness, cracked eggs of eggs laid, viable embryos of eggs set, live 3-week embryos of viable embryos, hatchlings of 3-week embryos, normal hatchlings of hatchlings, normal 14-day old hatchling survival of normal hatchlings, 14-day old survivors of eggs laid, and 14-day old hatchling body weight.

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 analyzed as described above, but if the untransformed data failed normality and/or homogeneity tests, the data were transformed with anscombe arcsin or arcsine (square root (Y)), and the appropriate test was performed (Kruskal-Wallis' or ANOVA), regardless of the results of the transformed 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	251 ppm	497 ppm	891 ppm	NOAEC/ LOAEL
Eggs laid/pen	48.8	51.5	42.9	45.1	891 ppm >891 ppm
Eggs cracked/pen	0	0	0	0	891 ppm >891 ppm
Eggs not cracked/eggs laid (%)	100	100	100	100	891 ppm >891 ppm

16

Reproductive Effects of XDE-638 on Avian Species *Anas platyrhynchos*

MRID 45830101

Parameter	Control	251 ppm	497 ppm	891 ppm	NOAEC/ LOAEL
Eggs set/pen	39.7	41.9	36.2	38.3	891 ppm >891 ppm
Shell thickness	0.33	0.34	0.33	0.33	891 ppm >891 ppm
Eggs set/eggs laid (%)	83.4	83.8	85.7	85.8	891 ppm >891 ppm
Viable embryo/pen	34.7	38.1	29.8	34.7	891 ppm >891 ppm
Viable embryos/eggs set (%)	84.2	90.2	81.2	91.2	891 ppm >891 ppm
Live embryos/pen	31.4	36.2	29.0	31.5	891 ppm >891 ppm
Live embryo/viable embryo (%)	91.4	95.2	96.8	91.1	891 ppm >891 ppm
No. of hatchlings/pen	7.9	5.8	8.2	6.7	891 ppm >891 ppm
No. of hatchlings/eggs laid (%)	15.4	11.3	19.2	15.9	891 ppm >891 ppm
No. of hatchlings/eggs set (%)	19.2	13.5	23.4	18.9	891 ppm >891 ppm
No. of hatchlings/live embryo (%)	22.4	15.7	29.4	21.3	891 ppm >891 ppm
Hatchling survival/pen	6.4	4.6	6.7	6.1	891 ppm >891 ppm
Hatchling survival/eggs set (%)	15.4	10.6	19.0	17.2	891 ppm >891 ppm
Hatchling survival/no. of hatchlings (%)	85.3	79.0	82.2	92.6	891 ppm >891 ppm
Hatchling weight (g)	N/A	N/A	N/A	N/A	N/A
Survivor weight (g)	78.1	86.1	84.6	83.0	891 ppm >891 ppm
Mean food consumption (g)	2281	2339	2258	2307	891 ppm >891 ppm
Male weight gain (g)	0.07	0.09	0.07	0.07	891 ppm

17

Parameter	Control	251 ppm	497 ppm	891 ppm	NOAEC/ LOAEL
					>891 ppm
Female weight gain (g)	0.24	0.23	0.15	0.21	891 ppm >891 ppm

N/A=not measured

E. STUDY DEFICIENCIES:

Extremely low ($\leq 27.6\%$) hatching success (hatchlings of viable 3-week embryos) was observed in all test and control groups. Since it was observed in the control group as well, this effect was not related to treatment with XDE-638. The study author concluded that the low hatchling success was due to a malfunction in the drum of the incubator/batcher (p. 22). Due to lack of viable embryos during Weeks 11-13, only data from Weeks 14-21 were used in analyses. In addition, egg shell thickness of the control group averaged 0.331 mm, which is less than the 0.34 mm minimum criterion. This was not unique to the control group, whereas the shell thickness was < 0.34 mm in three of the four groups utilized in the study. These deficiencies are significant, and as a result, this study is classified as INVALID.

Other notable deficiencies were observed:

- The highest concentration tested did not elicit an adverse effect on any parental or reproductive parameter, and therefore a LOAEL was not established. Furthermore, the maximum expected field residue level was not provided, and it is unknown if the highest level tested was at an appropriate level to approximate field exposure for this species.
- 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.

F. REVIEWER'S COMMENTS:

Although no treatment-related trends were observed in any reproductive parameter, hatching success (the number of hatchlings as a percentage of viable 3-week embryos) was extremely low in all test and control groups. Hatching success averaged only 23.7% for the control group, 15.5% for the 250 ppm group, 27.6% for the 500 ppm group, and 19.3% for the 1000 ppm group (Table XV, p. 39). During the viability check for Week 13, it was noted that none of the eggs were viable (p. 22). Due to the lack of development, these eggs and eggs from Week 12 were discarded. Week 11 eggs did not hatch. The cause was believed to be from a defective humidity motor that stopped operating in the incubator. The motor was immediately replaced upon discovery. Next, humidity parameters were lowered during Week 20 to attempt to increase hatch success, which would affect hatching success of Weeks 16-21. However, the change did not positively affect the hatch. Finally, the eggs were transferred to another incubator. After changing the eggs from incubator INC-7 to INC-3, the laboratory noted that the drum was rotating inconsistently (INC-7). Occasionally, it would operate as expected, but other times it would not rotate for several hours. The change into the other incubator increased hatch success, but the effects could not be reversed. As much as 3-4 weeks had to transpire before the laboratory could observe an increase in hatch success. Week 21 hatch (the final hatch) exhibited increased hatch success. Based on data provided in Appendix C8 (pp. 102-103), hatching success during Week 21 (reviewer-calculated) was 62.5% in the control group, 36.1% in the 250 ppm group, 45.9% in the 500 ppm group, and 63.6% in the 1000 ppm group.

The study author noted that egg shell thickness of the control group averaged <0.34 mm, a minimum criterion established by the protocol and respective avian reproduction guidelines (p. 21). Egg shell thickness averaged 0.331 mm for the control group, 0.343 mm for the 250 ppm group, 0.334 mm for the 500 ppm group, and 0.330 mm for the 1000 ppm group (Table XI, p. 35). The study author further noted that since the shell thickness of 3/4 groups averaged <0.34 mm, this occurrence appears to be a function of the adult birds, and that based on all of the data, it could be assumed that the mallards were in good health. The Study Director suggested that there was no scientific reason to question the data.

The study author noted that due to an equipment failure on the incubator, the first three weeks of egg development data were lost as well as the respective hatchlings (p. 15). Egg and hatchling data generated during Weeks 14-21 were used for analyses.

The reviewer's statistical analyses agreed with the study author's; no significant effects were detected.

Method validation was conducted concurrently with the analytical portion of the study. Mean recoveries of XDE-638 from matrix spike samples averaged $96.6 \pm 1.2\%$ (p. 119).

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 Mallard hatchlings in commercially-available brooders during the 14-day hatchling phase without reducing hatchling body weights.

Mallard eggs (from a reputable game bird farm) were incubated for 24 days in the laboratory, and hatched over a 24-hour period. Body weights were measured (minimum requirement of 30 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 ducklings in the three brooders was 20 (T1 group), 30 (T2 group), and 40 (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 90 x 70 x 23 cm; the floor area per bird was 315 cm² for the 20-bird cage, 210 cm² for the 30-bird cage, and 158 cm² for the 40-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 36-40°C, and the birds were maintained on a 16-hour light/8-hour dark regimen (average intensity of 12.5 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 ducklings was observed (Table II, p. 15). Three ducklings were replaced during the 14-day study, with only one T2 group bird found dead. Dry down and wet feathers on back were observed during the study and believed to be from the crowding and competition for water (p. 12).

A summary of mean body weights are provided in Table IV, p. 17. Overall brooder density had a clear effect on the growth of Mallard ducklings (Table VI, p. 19, and Figure III, p. 23). A density effect on body weight was indicated by both the Density factor ($p = 0.0014$) and the Density*Time interaction ($p=0.0001$) being significant. In conclusion, duckling body weights were greatly affected as the brooder density increased to 30 and 40 birds/brooder. In this test, 20 ducklings/brooder was the optimum density as identified by increased body weight gains.

G. CONCLUSIONS:

Due to extremely low hatching success and below normal egg shell thicknesses in all test and control groups, results of this study were compromised. Therefore, this study is scientifically unsound, does not fulfill U.S. EPA guideline §71-4(b), and is classified as INVALID.

NOAEC: Not determined (Invalid study)

LOAEL: Not determined (Invalid study)

Endpoint(s) Affected: Not determined (Invalid study)

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.

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

APPENDIX I. OUTPUT OF REVIEWER'S STATISTICAL VERIFICATION:

Mallard repro, Penoxsulam, MRID 45830101

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	61	0	100.00	50	81.97	46	92.00	41	89.13	13	21.31	26.00
2	Ctrl	45	0	100.00	42	93.33	37	88.10	33	89.19	5	11.11	11.90
3	Ctrl	49	0	100.00	40	81.63	35	87.50	27	77.14	6	12.24	15.00
4	Ctrl	51	0	100.00	48	94.12	46	95.83	42	91.30	9	17.65	18.75
5	Ctrl	39	0	100.00	36	92.31	27	75.00	27	100.00	12	30.77	33.33
6	Ctrl	35	0	100.00	32	91.43	31	96.88	31	100.00	6	17.14	18.75
7	Ctrl	19	0	100.00	18	94.74	2	11.11	2	100.00	0	0.00	0.00
8	Ctrl	67	0	100.00	46	68.66	46	100.00	42	91.30	19	28.36	41.30
9	Ctrl	48	0	100.00	45	93.75	30	66.67	27	90.00	1	2.08	2.22
10	Ctrl	65	0	100.00	45	69.23	44	97.78	44	100.00	11	16.92	24.44
11	Ctrl	59	0	100.00	39	66.10	37	94.87	35	94.59	12	20.34	30.77
12	Ctrl	39	0	100.00	32	82.05	32	100.00	32	100.00	8	20.51	25.00
13	Ctrl	57	0	100.00	43	75.44	38	88.37	25	65.79	1	1.75	2.33
14	Dose1	63	0	100.00	46	73.02	34	73.91	34	100.00	7	11.11	15.22
15	Dose1	56	0	100.00	49	87.50	47	95.92	47	100.00	7	12.50	14.29
16	Dose1	72	0	100.00	50	69.44	46	92.00	45	97.83	3	4.17	6.00
17	Dose1	49	0	100.00	45	91.84	42	93.33	33	78.57	3	6.12	6.67
18	Dose1	29	0	100.00	27	93.10	24	88.89	23	95.83	2	6.90	7.41
19	Dose1	26	0	100.00	24	92.31	20	83.33	19	95.00	0	0.00	0.00
20	Dose1	74	0	100.00	50	67.57	48	96.00	48	100.00	8	10.81	16.00
21	Dose1	51	0	100.00	42	82.35	41	97.62	41	100.00	2	3.92	4.76
22	Dose1	57	0	100.00	48	84.21	45	93.75	43	95.56	20	35.09	41.67
23	Dose1	43	0	100.00	39	90.70	36	92.31	34	94.44	9	20.93	23.08
24	Dose1	46	0	100.00	43	93.48	37	86.05	34	91.89	1	2.17	2.33
25	Dose1	71	0	100.00	52	73.24	50	96.15	46	92.00	6	8.45	11.54
26	Dose1	33	0	100.00	30	90.91	25	83.33	24	96.00	8	24.24	26.67
27	Dose2	46	0	100.00	43	93.48	29	67.44	26	89.66	2	4.35	4.65
28	Dose2												
29	Dose2	0	0	0	0	0	0	0	0	0	0	0	0
30	Dose2	42	0	100.00	40	95.24	39	97.50	37	94.87	8	19.05	20.00
31	Dose2	59	0	100.00	51	86.44	49	96.08	48	97.96	4	6.78	7.84
32	Dose2	46	0	100.00	43	93.48	43	100.00	43	100.00	19	41.30	44.19
33	Dose2	37	0	100.00	35	94.59	31	88.57	29	93.55	3	8.11	8.57
34	Dose2	43	0	100.00	29	67.44	24	82.76	23	95.83	13	30.23	44.83
35	Dose2	73	0	100.00	51	69.86	50	98.04	50	100.00	20	27.40	39.22
36	Dose2	50	0	100.00	36	72.00	28	77.78	27	96.43	13	26.00	36.11
37	Dose2	41	0	100.00	37	90.24	0	0.00	0	0	0	0.00	0.00
38	Dose2	46	0	100.00	41	89.13	39	95.12	39	100.00	6	13.04	14.63
39	Dose2	32	0	100.00	29	90.63	26	89.66	26	100.00	11	34.38	37.93
40	Dose3	47	0	100.00	38	80.85	34	89.47	25	73.53	1	2.13	2.63
41	Dose3	49	0	100.00	43	87.76	40	93.02	36	90.00	9	18.37	20.93
42	Dose3	46	0	100.00	42	91.30	41	97.62	40	97.56	12	26.09	28.57
43	Dose3	63	0	100.00	47	74.60	37	78.72	37	100.00	11	17.46	23.40
44	Dose3	43	0	100.00	39	90.70	35	89.74	34	97.14	9	20.93	23.08
45	Dose3	41	0	100.00	37	90.24	36	97.30	36	100.00	7	17.07	18.92
46	Dose3	42	0	100.00	30	71.43	29	96.67	29	100.00	7	16.67	23.33
47	Dose3	48	0	100.00	32	66.67	30	93.75	25	83.33	10	20.83	31.25
48	Dose3	19	0	100.00	18	94.74	18	100.00	18	100.00	8	42.11	44.44
49	Dose3	55	0	100.00	48	87.27	47	97.92	43	91.49	9	16.36	18.75
50	Dose3	38	0	100.00	35	92.11	32	91.43	29	90.63	2	5.26	5.71
51	Dose3	44	0	100.00	41	93.18	30	73.17	24	80.00	0	0.00	0.00
52	Dose3	51	0	100.00	48	94.12	42	87.50	34	80.95	2	3.92	4.17

21

Reproductive Effects of XDE-638 on Avian Species *Anas platyrhynchos*

MRID 45830101

Mallard repro, Penoxsulam, MRID 45830101

PRINTOUT OF RAW DATA (continued)

Obs	TRT	NH_LE	HS	HS_ES	HS_NH	THICK	HATWT	SURVWT	FOOD	WTGAINM	WTGAINF
1	Ctrl	31.71	12	24.00	92.31	0.32	79	2192	0	1	
2	Ctrl	15.15	4	9.52	80.00	0.32	91	2104	0	0	
3	Ctrl	22.22	6	15.00	100.00	0.34	86	2766	0	0	
4	Ctrl	21.43	8	16.67	88.89	0.35	71	1928	-0	0	
5	Ctrl	44.44	8	22.22	66.67	0.31	89	2037	0	0	
6	Ctrl	19.35	5	15.63	83.33	0.34	84	2516	0	0	
7	Ctrl	0.00	0	0.00	0.34		2288	0	0	0	
8	Ctrl	45.24	13	28.26	68.42	0.33	74	2168	0	-0	
9	Ctrl	3.70	1	2.22	100.00	0.32	71	2242	0	0	
10	Ctrl	25.00	9	20.00	81.82	0.33	69	2147	0	0	
11	Ctrl	34.29	9	23.08	75.00	0.35	79	2531	-0	0	
12	Ctrl	25.00	7	21.88	87.50	0.34	78	2671	0	0	
13	Ctrl	4.00	1	2.33	100.00	0.32	66	2063	0	0	
14	Dose1	20.59	6	13.04	85.71	0.33	104	2597	0	0	
15	Dose1	14.89	6	12.24	85.71	0.32	71	2190	0	0	
16	Dose1	6.67	3	6.00	100.00	0.37	76	2295	0	0	
17	Dose1	9.09	1	2.22	33.33	0.34	117	2521	0	0	
18	Dose1	8.70	1	3.70	50.00	0.34	108	1983	0	0	
19	Dose1	0.00	0	0.00	0.34		2531	0	0	0	
20	Dose1	16.67	7	14.00	87.50	0.37	88	1868	-0	0	
21	Dose1	4.88	2	4.76	100.00	0.31	86	2672	-0	0	
22	Dose1	46.51	15	31.25	75.00	0.33	70	2413	-0	0	
23	Dose1	26.47	8	20.51	88.89	0.36	77	2335	0	0	
24	Dose1	2.94	1	2.33	100.00	0.35	63	2286	-0	0	
25	Dose1	13.04	4	7.69	66.67	0.36	91	2741	0	0	
26	Dose1	33.33	6	20.00	75.00	0.35	82	1972	0	0	
27	Dose2	7.69	2	4.65	100.00	0.33	79	2246	0	0	
28	Dose2										
29	Dose2	0					1872	0	0		
30	Dose2	21.62	5	12.50	62.50	0.33	80	2407	0	0	
31	Dose2	8.33	4	7.84	100.00	0.33	80	2351	-0	0	
32	Dose2	44.19	15	34.88	78.95	0.31	84	2217	0	0	
33	Dose2	10.34	2	5.71	66.67	0.34	105	2182	0	0	
34	Dose2	56.52	12	41.38	92.31	0.35	82	2336	0	0	
35	Dose2	40.00	16	31.37	80.00	0.34	83	2121	0	0	
36	Dose2	48.15	10	27.78	76.92	0.34	90	2546	0	0	
37	Dose2	0	0.00	0.33			2195	0	0		
38	Dose2	15.38	5	12.20	83.33	0.34	88	2373	0	0	
39	Dose2	42.31	9	31.03	81.82	0.30	75	2248	0	0	
40	Dose3	4.00	1	2.63	100.00	0.30	106	2321	0	0	
41	Dose3	25.00	9	20.93	100.00	0.31	78	2286	0	0	
42	Dose3	30.00	11	26.19	91.67	0.31	81	2339	-0	0	
43	Dose3	29.73	10	21.28	90.91	0.34	81	2447	0	0	
44	Dose3	26.47	7	17.95	77.78	0.35	66	1995	0	0	
45	Dose3	19.44	6	16.22	85.71	0.35	82	2304	0	0	
46	Dose3	24.14	6	20.00	85.71	0.32	85	2152	0	0	
47	Dose3	40.00	9	28.13	90.00	0.34	86	2350	0	0	
48	Dose3	44.44	8	44.44	100.00	0.35	70	2280	-0	0	
49	Dose3	20.93	8	16.67	88.89	0.34	70	2177	-0	0	
50	Dose3	6.90	2	5.71	100.00	0.36	90	2285	-0	0	
51	Dose3	0.00	0	0.00	0.31		2581	0	0		
52	Dose3	5.88	2	4.17	100.00	0.32	101	2471	0	0	

22

Mallard repro, Penoxsulam, MRID 45830101
 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 Shapiro-Wilks Levenes Levenes Conclusion
 Test Stat P-value Test Stat P-value
 0.964 0.123 0.921 0.438 USE PARAMETRIC TESTS

 BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	13	48.77	13.55	3.76	27.79	40.58, 56.96
Dose1	13	51.54	16.07	4.46	31.17	41.83, 61.25
Dose2	12	42.92	17.17	4.96	40.01	32.01, 53.83
Dose3	13	45.08	10.19	2.82	22.60	38.92, 51.23

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	49.00	19.00	67.00		
Dose1	51.00	26.00	74.00	105.68	-5.68
Dose2	44.50	0.00	73.00	88.00	12.00
Dose3	46.00	19.00	63.00	92.43	7.57

 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 47 0.89 0.454

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 NOAEC or LOAEL

Level	Mean	Dunnett		Williams					Tukey p-values					
		p-value	mean	p-value	Dose1	Dose2	Dose3	Dose4	Dose5	Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	48.77		50.15	0.961	0.743	0.914								
Dose1	51.54	0.892	50.15	0.684	0.450	0.666								
Dose2	42.92	0.322	44.04	0.267		0.982								
Dose3	45.08	0.476	44.04	0.270										

SUMMARY
 Dunnett NOAEC LOAEL
 Williams Dose3 >highest dose
 Williams Dose3 >highest dose

43

Mallard repro, Penoxsulam, MRID 45830101
 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	Shapiro-Wilks	Levenes	Levenes	Conclusion
Test Stat	P-value	Test Stat	P-value	
NO DATA FOR TEST				

 BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	13	0.00	0.00	0.00	.	.
Dose1	13	0.00	0.00	0.00	.	.
Dose2	12	0.00	0.00	0.00	.	.
Dose3	13	0.00	0.00	0.00	.	.

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

Mallard repro, Penoxsulam, MRID 45830101
 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 Shapiro-Wilks Levenes Levenes Conclusion

Test Stat P-value Test Stat P-value
 NO DATA FOR TEST

 BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	13	100.00	0.00	0.00	0.00	
Dose1	13	100.00	0.00	0.00	0.00	
Dose2	11	100.00	0.00	0.00	0.00	
Dose3	13	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

25

Mallard repro, Penoxsulam, MRID 45830101
 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	Shapiro-Wilks	Levenes	Levenes	Conclusion
Test Stat	P-value	Test Stat	P-value	
0.895	<.001	0.373	0.773	USE NON-PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	13	39.69	8.62	2.39	21.71	34.49, 44.90
Dose1	13	41.92	9.31	2.58	22.22	36.29, 47.55
Dose2	12	36.25	13.43	3.88	37.05	27.72, 44.78
Dose3	13	38.31	8.37	2.32	21.85	33.25, 43.37

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	42.00	18.00	50.00		
Dose1	45.00	24.00	52.00	105.62	-5.62
Dose2	38.50	0.00	51.00	91.33	8.67
Dose3	39.00	18.00	48.00	96.51	3.49

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	2.61	0.456

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	42.00		
Dose1	45.00	1.000	0.823
Dose2	38.50	0.753	0.324
Dose3	39.00	0.865	0.193

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

26

Mallard repro, Penoxsulam, MRID 45830101

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 Shapiro-Wilks Levenes Levenes Conclusion

Test Stat	P-value	Test Stat	P-value	Conclusion
0.856	<.001	0.205	0.893	USE NON-PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	13	83.44	10.73	2.98	12.86	76.96, 89.92
Dose1	13	83.82	9.70	2.69	11.57	77.96, 89.68
Dose2	11	85.68	10.58	3.19	12.35	78.57, 92.80
Dose3	13	85.77	9.34	2.59	10.88	80.13, 91.41

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	82.05	66.10	94.74	.	.
Dose1	87.50	67.57	93.48	100.45	-0.45
Dose2	90.24	67.44	95.24	102.69	-2.69
Dose3	90.24	66.67	94.74	102.79	-2.79

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	0.47	0.924

MannWhit(Bonf) - testing each trt median signif. less than control

Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bonf adjust)p-value	Jonckheere p-value
Ctrl	82.05		
Dose1	87.50	1.000	0.419
Dose2	90.24	1.000	0.662
Dose3	90.24	1.000	0.664

SUMMARY

	NOAEC	LOAEL
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose



Mallard repro, Penoxsulam, MRID 45830101
 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 Shapiro-Wilks Levenes Levenes Conclusion
 Test Stat P-value Test Stat P-value
 0.921 0.002 1.624 0.196 USE NON-PARAMETRIC TESTS

 BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	13	34.69	11.77	3.26	33.93	27.58, 41.81
Dose1	13	38.08	9.89	2.74	25.96	32.10, 44.05
Dose2	12	29.83	16.38	4.73	54.89	19.43, 40.24
Dose3	13	34.69	7.32	2.03	21.10	30.27, 39.11

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	37.00	2.00	46.00		
Dose1	41.00	20.00	50.00	109.76	-9.76
Dose2	30.00	0.00	50.00	85.99	14.01
Dose3	35.00	18.00	47.00	100.00	0.00

 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	2.30	0.512

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

Level	Median	MannWhit(Bonf adjust)p-value	Jonckheere p-value
Ctrl	37.00		
Dose1	41.00	1.000	0.780
Dose2	30.00	0.633	0.291
Dose3	35.00	1.000	0.250

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

58

Mallard repro, Penoxsulam, MRID 45830101

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 Shapiro-Wilks Levenes Levenes Conclusion

Test Stat P-value Test Stat P-value

0.668 <.001 2.558 0.067 USE NON-PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	13	84.16	24.03	6.67	28.56	69.64, 98.69
Dose1	13	90.20	6.86	1.90	7.61	86.05, 94.35
Dose2	11	81.18	28.71	8.66	35.36	61.89, 100.00
Dose3	13	91.25	7.85	2.18	8.61	86.51, 96.00

Level	Median	Min	Max	%Of Control(means)	%Reduction(means)
Ctrl	92.00	11.11	100.00		
Dose1	92.31	73.91	97.62	107.17	-7.17
Dose2	89.66	0.00	100.00	96.45	3.55
Dose3	93.02	73.17	100.00	108.43	-8.43

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 0.55 0.907

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	92.00		
Dose1	92.31	1.000	0.439
Dose2	89.66	1.000	0.423
Dose3	93.02	1.000	0.671

SUMMARY

NOAEC LOAEL
 MannWhit (Bonf adjust) Dose3 >highest dose
 Jonckheere Dose3 >highest dose



Mallard repro, Penoxsulam, MRID 45830101
 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	Levenes	Shapiro-Wilks	Levenes	Conclusion
Test Stat	P-value	Test Stat	P-value	
0.938	0.010	1.606	0.201	USE NON-PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	13	31.38	11.01	3.05	35.09	24.73, 38.04
Dose1	13	36.23	9.76	2.71	26.93	30.33, 42.13
Dose2	12	29.00	16.24	4.69	56.01	18.68, 39.32
Dose3	13	31.54	7.21	2.00	22.85	27.18, 35.89

Level	Median	Min	Max	% of Control (means)	% Reduction (means)
Ctrl	32.00	2.00	44.00		
Dose1	34.00	19.00	48.00	115.44	-15.44
Dose2	28.00	0.00	50.00	92.40	7.60
Dose3	34.00	18.00	43.00	100.49	-0.49

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	1.90	0.593

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

Level	Median	MannWhit(Bonf adjust)p-value	Jonckheere p-value
Ctrl	32.00		
Dose1	34.00	1.000	0.886
Dose2	28.00	1.000	0.484
Dose3	34.00	1.000	0.310

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



Mallard repro, Penoxsulam, MRID 45830101

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 Shapiro-Wilks Levenes Levenes Conclusion

Test Stat	P-value	Test Stat	P-value	Conclusion
0.884	<.001	2.648	0.060	USE NON-PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	13	91.42	10.21	2.83	11.17	85.25, 97.59
Dose1	13	95.16	5.76	1.60	6.06	91.68, 98.65
Dose2	10	96.83	3.48	1.10	3.59	94.34, 99.32
Dose3	13	91.13	9.09	2.52	9.98	85.63, 96.62

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	91.30	65.79	100.00		
Dose1	95.83	78.57	100.00	104.10	-4.10
Dose2	97.19	89.66	100.00	105.92	-5.92
Dose3	91.49	73.53	100.00	99.68	0.32

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	2.85	0.415

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	91.30		
Dose1	95.83	1.000	0.859
Dose2	97.19	1.000	0.936
Dose3	91.49	1.000	0.569

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

31

Mallard repro, Penoxsulam, MRID 45830101
 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
0.953	0.044	1.522	0.221	USE PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	13	7.92	5.53	1.53	69.79	4.58, 11.26
Dose1	13	5.85	5.21	1.44	89.11	2.70, 8.99
Dose2	12	8.25	6.96	2.01	84.32	3.83, 12.67
Dose3	13	6.69	4.05	1.12	60.51	4.25, 9.14

Level	Median	Min	Max	%Of Control(means)	%Reduction(means)
Ctrl	8.00	0.00	19.00		
Dose1	6.00	0.00	20.00	73.79	26.21
Dose2	7.00	0.00	20.00	104.13	-4.13
Dose3	8.00	0.00	12.00	84.47	15.53

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	47	0.52	0.671

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 NOAEC or LOAEL

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values
					Dose1 Dose2 Dose3 Dose4 Dose5
Ctrl	7.92		7.92	0.771	0.999 0.940
Dose1	5.85	0.342	7.00	0.399	0.696 0.979
Dose2	8.25	0.802	7.00	0.430	0.894
Dose3	6.69	0.513	6.69	0.377	

SUMMARY

	NOAEC	LOAEL
Dunnett	Dose3	>highest dose
Williams	Dose3	>highest dose

30

Mallard repro, Penoxsulam, MRID 45830101

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 Shapiro-Wilks Levenes Levenes Conclusion

Test Stat P-value Test Stat P-value

0.972 0.267 1.033 0.387 USE PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level N Mean StdDev StdErr Coef of Var 95% Conf.Interval

Ctrl	13	15.40	9.70	2.69	62.99	9.54, 21.26
Dose1	13	11.26	9.99	2.77	88.73	5.22, 17.30
Dose2	11	19.15	13.63	4.11	71.19	9.99, 28.31
Dose3	13	15.94	11.36	3.15	71.30	9.07, 22.81

Level Median Min Max %of Control(means) %Reduction(means)

Ctrl	17.14	0.00	30.77	.	.
Dose1	8.45	0.00	35.09	73.13	26.87
Dose2	19.05	0.00	41.30	124.34	-24.34
Dose3	17.07	0.00	42.11	103.50	-3.50

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	46	1.02	0.394

Dunnnett - 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 NOAEC or LOAEL

Level	Mean	Dunnnett p-value	Isotonic mean	Williams p-value	Tukey p-values				
					Dose1	Dose2	Dose3	Dose4	Dose5

Ctrl	15.40	.	15.40	.	0.781	0.845	0.999	.	.
Dose1	11.26	0.351	15.25	0.569	.	0.323	0.711	.	.
Dose2	19.15	0.948	15.25	0.603	.	.	0.896	.	.
Dose3	15.94	0.796	15.25	0.621	.	.	.	.	.

SUMMARY

Dunnnett	NOAEC	LOAEL
Williams	Dose3	>highest dose
	Dose3	>highest dose

Mallard repro, Penoxsulam, MRID 45830101

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 Shapiro-Wilks Levenes Levenes Conclusion

Test Stat P-value Test Stat P-value

0.973 0.305 2.123 0.110 USE PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level N Mean StdDev StdErr Coef of Var 95% Conf.Interval

Ctrl	13	19.22	12.72	3.53	66.21	11.53, 26.90
Dose1	13	13.51	11.53	3.20	85.36	6.54, 20.48
Dose2	11	23.45	17.21	5.19	73.40	11.89, 35.02
Dose3	13	18.86	12.82	3.56	67.98	11.11, 26.61

Level Median Min Max %of Control(means) %Reduction(means)

Ctrl	18.75	0.00	41.30		
Dose1	11.54	0.00	41.67	70.30	29.70
Dose2	20.00	0.00	44.83	122.05	-22.05
Dose3	20.93	0.00	44.44	98.15	1.85

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 46 1.09 0.363

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 NOAEC or LOAEL

Level Mean Dunnett Isotonic Williams Tukey p-values
p-value mean p-value Dose1 Dose2 Dose3 Dose4 Dose5

Ctrl	19.22		19.22		0.708	0.871	1.000		
Dose1	13.51	0.300	18.35	0.513		0.292	0.747		
Dose2	23.45	0.940	18.35	0.548			0.842		
Dose3	18.86	0.729	18.35	0.563					

SUMMARY

Dunnett	NOAEC	LOAEL
Williams	Dose3	>highest dose
	Dose3	>highest dose

34

Mallard repro, Penoxsulam, MRID 45830101

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 Shapiro-Wilks Levenes Levenes Conclusion

Test Stat P-value Test Stat P-value

0.966 0.167 1.658 0.190 USE PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	13	22.43	14.44	4.00	64.38	13.70, 31.15
Dose1	13	15.68	13.26	3.68	84.58	7.66, 23.69
Dose2	10	29.45	18.62	5.89	63.21	16.14, 42.77
Dose3	13	21.30	13.79	3.82	64.74	12.97, 29.64

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	22.22	0.00	45.24		
Dose1	13.04	0.00	46.51	69.90	30.10
Dose2	30.81	7.69	56.52	131.34	-31.34
Dose3	24.14	0.00	44.44	94.99	5.01

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	45	1.62	0.198

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 NOAEC or LOEL

Level	Mean	Dunnett		Williams		Tukey p-values				
		p-value	mean	p-value	Dose1	Dose2	Dose3	Dose4	Dose5	
Ctrl	22.43		22.43	0.659	0.679	0.997				
Dose1	15.68	0.271	21.67	0.527	0.140	0.772				
Dose2	29.45	0.976	21.67	0.564	0.568					
Dose3	21.30	0.682	21.30	0.550						

SUMMARY	NOAEC	LOAEL
Dunnett	Dose3	>highest dose
Williams	Dose3	>highest dose

Mallard repro, Penoxsulam, MRID 45830101
 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	Shapiro-Wilks	Levenes	Levenes	Conclusion
Test Stat	P-value	Test Stat	P-value	
0.966	0.151	1.573	0.208	USE PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	13	6.38	4.09	1.14	64.11	3.91, 8.86
Dose1	13	4.62	4.09	1.14	88.69	2.14, 7.09
Dose2	12	6.67	5.61	1.62	84.21	3.10, 10.23
Dose3	13	6.08	3.66	1.02	60.26	3.86, 8.29

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	7.00	0.00	13.00		
Dose1	4.00	0.00	15.00	72.29	27.71
Dose2	5.00	0.00	16.00	104.42	-4.42
Dose3	7.00	0.00	11.00	95.18	4.82

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	47	0.55	0.651

Dunnnett - 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 NOAEC or LOAEL

Level	Mean	Dunnnett p-value	Isotonic mean	Williams p-value	Tukey p-values
					Dose1 Dose2 Dose3 Dose4 Dose5
Ctrl	6.38		6.38	0.736	0.999 0.998
Dose1	4.62	0.317	5.76	0.428	0.652 0.832
Dose2	6.67	0.806	5.76	0.459	0.987
Dose3	6.08	0.683	5.76	0.472	

SUMMARY	NOAEC	LOAEL
Dunnnett	Dose3	>highest dose
Williams	Dose3	>highest dose

36

Mallard repro, Penoxsulam, MRID 45830101

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 Shapiro-Wilks Levenes Levenes Conclusion

Test Stat P-value Test Stat P-value

0.974 0.344 2.323 0.087 USE PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	13	15.45	9.25	2.56	59.86	9.86, 21.03
Dose1	13	10.60	9.11	2.53	85.96	5.09, 16.10
Dose2	11	19.03	14.44	4.35	75.86	9.33, 28.73
Dose3	13	17.25	12.22	3.39	70.83	9.87, 24.64

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	16.67	0.00	28.26		
Dose1	7.69	0.00	31.25	68.60	31.40
Dose2	12.50	0.00	41.38	123.22	-23.22
Dose3	17.95	0.00	44.44	111.71	-11.71

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	46	1.27	0.295

Dunnnett - 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 NOAEC or LOAEL.

Level	Mean	Dunnnett p-value	Isotonic mean	Williams p-value	Tukey p-values
					Dose1 Dose2 Dose3 Dose4 Dose5
Ctrl	15.45		15.45	0.696	0.866 0.977
Dose1	10.60	0.292	15.44	0.583	0.278 0.446
Dose2	19.03	0.942	15.44	0.617	0.981
Dose3	17.25	0.876	15.44	0.636	

SUMMARY	NOAEC	LOAEL
Dunnnett	Dose3	>highest dose
Williams	Dose3	>highest dose

Mallard repro, Penoxsulam, MRID 45830101

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 Shapiro-Wilks Levenes Levenes Conclusion

Test Stat	P-value	Test Stat	P-value	Conclusion
0.945	0.030	2.919	0.045	USE NON-PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	12	85.33	11.67	3.37	13.67	77.91, 92.74
Dose1	12	78.98	20.66	5.96	26.15	65.86, 92.11
Dose2	10	82.25	12.52	3.96	15.22	73.30, 91.20
Dose3	12	92.56	7.46	2.15	8.06	87.81, 97.30

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	85.42	66.67	100.00		
Dose1	85.71	33.33	100.00	92.57	7.43
Dose2	80.91	62.50	100.00	96.39	3.61
Dose3	91.29	77.78	100.00	108.47	-8.47

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	5.64	0.131

MannWhit(Bonf) - testing each trt median signif. less than control

Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bonf adjust)p-value	Jonckheere p-value
Ctrl	85.42		
Dose1	85.71	1.000	0.300
Dose2	80.91	0.771	0.262
Dose3	91.29	1.000	0.918

SUMMARY

	NOAEC	LOAEL
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

38

Mallard repro, Penoxsulam, MRID 45830101
 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	Levenes	Shapiro-Wilks	Levenes	Conclusion
Test Stat	P-value	Test Stat	P-value	
0.968	0.187	2.335	0.086	USE PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	13	0.33	0.01	0.00	4.18	0.32, 0.34
Dose1	13	0.34	0.02	0.00	5.12	0.33, 0.35
Dose2	11	0.33	0.01	0.00	4.01	0.32, 0.34
Dose3	13	0.33	0.02	0.01	6.07	0.32, 0.34

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	0.33	0.31	0.35		
Dose1	0.34	0.31	0.37	103.48	-3.48
Dose2	0.33	0.30	0.35	99.80	0.20
Dose3	0.34	0.30	0.36	99.54	0.46

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	46	1.79	0.163

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 NOAEC or LOAEL

Level	Mean	Dunnett		Isotonic		Williams		Tukey p-values		
		p-value	mean	p-value	Dose1	Dose2	Dose3	Dose4	Dose5	
Ctrl	0.33		0.34		0.296	1.000	0.995			
Dose1	0.34	0.996	0.34	0.882		0.286	0.197			
Dose2	0.33	0.718	0.33	0.575			0.999			
Dose3	0.33	0.661	0.33	0.529						

SUMMARY

	NOAEC	LOAEL
Dunnett	Dose3	>highest dose
Williams	Dose3	>highest dose

31

Mallard repro, Penoxsulam, MRID 45830101
 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 Shapiro-Wilks Levenes Levenes Conclusion

Test Stat P-value Test Stat P-value
 NO DATA FOR TEST

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	0	.	.	.	.	.
Dose1	0	.	.	.	.	.
Dose2	0	.	.	.	.	.
Dose3	0	.	.	.	.	.

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

Mallard repro, Penoxsulam, MRID 45830101
 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
0.965	0.185	2.293	0.092	USE PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	12	78.08	8.15	2.35	10.44	72.90, 83.26
Dose1	12	86.08	16.53	4.77	19.20	75.58, 96.58
Dose2	10	84.60	8.38	2.65	9.91	78.60, 90.60
Dose3	12	83.00	11.97	3.46	14.42	75.39, 90.61

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	78.50	66.00	91.00		
Dose1	84.00	63.00	117.00	110.25	-10.25
Dose2	82.50	75.00	105.00	108.35	-8.35
Dose3	81.50	66.00	106.00	106.30	-6.30

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	42	1.01	0.398

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 NOAEC or LOAEL

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values
					Dose1 Dose2 Dose3 Dose4 Dose5
Ctrl	78.08		82.87	0.364	0.581 0.743
Dose1	86.08	0.994	82.87	0.901	0.991 0.920
Dose2	84.60	0.984	82.87	0.915	0.989
Dose3	83.00	0.967	82.87	0.934	

SUMMARY	NOAEC	LOAEL
Dunnett	Dose3	>highest dose
Williams	Dose3	>highest dose

41

Mallard repro, Penoxsulam, MRID 45830101
 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
0.986	0.803	2.854	0.047	USE NON-PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	13	2281.00	259.53	71.98	11.38	2124.17, 2437.83
Dose1	13	2338.77	277.60	76.99	11.87	2171.02, 2506.52
Dose2	12	2257.83	168.56	48.66	7.47	2150.74, 2364.93
Dose3	13	2306.77	148.48	41.18	6.44	2217.04, 2396.50

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	2192.00	1928.00	2766.00		
Dose1	2335.00	1868.00	2741.00	102.53	-2.53
Dose2	2247.00	1872.00	2546.00	98.98	1.02
Dose3	2304.00	1995.00	2581.00	101.13	-1.13

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	1.41	0.702

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

Level	Median	MannWhit(Bonf adjust)p-value	Jonckheere p-value
Ctrl	2192.00		
Dose1	2335.00	1.000	0.764
Dose2	2247.00	1.000	0.564
Dose3	2304.00	1.000	0.654

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



Mallard repro, Penoxsulam, MRID 45830101
 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	Shapiro-Wilks	Levenes	Levenes	Conclusion
Test Stat	P-value	Test Stat	P-value	
0.979	0.479	3.315	0.028	USE NON-PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	13	0.07	0.06	0.02	94.95	0.03, 0.10
Dose1	13	0.09	0.14	0.04	157.42	0.00, 0.18
Dose2	12	0.07	0.08	0.02	105.41	0.02, 0.12
Dose3	13	0.07	0.10	0.03	136.23	0.01, 0.13

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	0.06	-0.02	0.20		
Dose1	0.06	-0.13	0.37	137.85	-37.85
Dose2	0.05	-0.01	0.25	109.60	-9.60
Dose3	0.09	-0.06	0.27	107.01	-7.01

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	0.22	0.975

MannWhit(Bonf) - testing each trt median signif. less than control

Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bonf adjust)p-value	Jonckheere p-value
Ctrl	0.06		
Dose1	0.06	1.000	0.621
Dose2	0.05	1.000	0.468
Dose3	0.09	1.000	0.433

SUMMARY

	NOAEC	LOAEL
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

43

Mallard repro, Penoxsulam, MRID 45830101
 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
0.993	0.990	1.407	0.252	USE PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	13	0.24	0.15	0.04	63.12	0.15, 0.33
Dose1	13	0.23	0.12	0.03	52.29	0.16, 0.30
Dose2	12	0.15	0.09	0.03	57.26	0.10, 0.21
Dose3	13	0.21	0.11	0.03	52.68	0.14, 0.27

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	0.20	-0.02	0.54		
Dose1	0.26	0.00	0.45	96.47	3.53
Dose2	0.18	0.03	0.31	63.86	36.14
Dose3	0.19	0.01	0.41	85.57	14.43

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	47	1.31	0.283

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 NOAEC or LOAEL

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values				
					Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	0.24		0.24	0.998	0.283	0.882			
Dose1	0.23	0.683	0.23	0.505		0.372	0.944		
Dose2	0.15	0.093	0.18	0.139			0.700		
Dose3	0.21	0.439	0.18	0.138					

SUMMARY	NOAEC	LOAEL
Dunnett	Dose3	>highest dose
Williams	Dose3	>highest dose

44