**Data Evaluation Report on the Reproductive Effects of JAU 6476 Technical (Prothioconazole) on Avian Species *Anas platyrhynchos***
PMRA Submission Number 2004-0843 EPA MRID Number 46246044

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| **Data Requirement:** | PMRA DATA CODE | 9.6.3.2 |
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| | EPA Guideline | §71-4b |

**Test material:** JAU 6476 Technical **Purity:** 98.7 and 96.1%
Common name: Prothioconazole
Chemical: IUPAC name: 2-[2-(1-Chlorocyclopropyl)-3-(2-chlorophenyl)-2-hydroxypropyl]-1,2-dihydro-3H-1,2,4-triazole-3-thione
CAS name: 2-[2-(1-Chlorocyclopropyl)-3-(2-chlorophenyl)-2-hydroxypropyl]-1,2-dihydro-3H-1,2,4-triazole-3-thione
CAS No.: 178928-70-6
Synonyms: JAU6476

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**CITATION:** Frieling, W.J.A.M. 2000. Reproduction Study in Mallard Duck with JAU 6476 (By Dietary Admixture). Unpublished study performed by NOTOX B.V., DD's-Hertogenbosch, The Netherlands. Laboratory Project No. 259919. Study sponsored by Bayer AG, Leverkusen, Germany. Study initiated September September 23, 1999 and completed November 7, 2000.

## EXECUTIVE SUMMARY:

The one-generation reproductive toxicity of JAU 6476 Technical (prothioconazole) to groups (16 pens/treatment level) of 1 male and 1 female of 7-month old Mallard duck was assessed over approximately 21 weeks. JAU 6476 Technical was administered to the birds in the diet at mean-measured concentrations of <LOD (negative control), 248, 698, and 1978 ppm a.i. diet. Nominal concentrations were 0, 245, 700, and 2000 ppm diet.

There were no significant treatment-related effects on any adult parameter. In addition, no treatment-related effects were observed on egg production or quality, fertility, early embryonic development, hatching success, or clinical effects or body weights of chicks during the 14-day observation period.

Study author reported results indicated that late embryo survival (after 21 days) was affected by treatment at the 2000 ppm level, based on a statistically-significant reduction in the percentage of post 21-day embryonic deaths of fertile eggs (28.9 versus 20.9% for the control group). Chick survival was also affected at the 2000 ppm level, based on a statistically-significant reduction in the percentage of 14-day old survivors of normal hatchlings (87.4 versus 92.9% for the control group). However, re-analysis of the data indicate that these results may be inaccurate since they were based on parametric analyses without meeting the necessary assumptions. Reviewer calculated statistics indicate no significant effects of JAU 6476 on hatchling survival at any treatment level.

This study is scientifically sound, fulfills guideline requirements for the reproductive toxicity of JAU 6476 Technical (prothioconazole) to Mallard duck (§71-4b), and is classified as ACCEPTABLE.

**Results Synopsis**

Test Organism Size/Age: Approximately 7 months old at test initiation (834-1301 g)

NOEC: 1978 ppm a.i.
LOEC: > 1978 ppm a.i.
Endpoint(s) Affected: None.

## I. MATERIALS AND METHODS

**GUIDELINE FOLLOWED:** The study protocol was based on procedures outlined in the OECD Guidelines for Testing of Chemicals, No. 206 (1984); the U.S. EPA CFR 40, Part 797.2130 (1991); the U.S. EPA FIFRA Pesticides Assessment Guidelines, §71-4 (1982); the U.S. EPA FIFRA Accelerated Re-registration Phase 3 Techn. Guidance, §71-4 (1989); and the U.S. EPA OPPTS, Series 850.2300 (*draft*, 1996). Deviations from §71-4b are:

1. The homogeneity of the test substance in powdered feed was only assessed in the definitive study at the 2000 ppm treatment level. Although homogeneity assessments were conducted in preliminary experiments, the analyses were performed on pelleted feed, which was ultimately not used in the definitive study.

2. Adult Mallard were maintained at 12-25°C, whereas guidance recommends maintaining the birds at a relatively constant temperature of approximately 21°C.

3. Egg storage temperature ranged from 13.7 to 15.0°C, which is slightly lower than the recommended

temperature of 16°C.

4. The temperature of the hatching chamber ranged from 36.5 to 37.0°C, which is slightly lower than the recommended 39°C.

5. The analytical LOD and/or LOQ were not reported.

6. The day the chicks were removed from the hatcher and counted was not clearly specified

7. It was not specified how long the opened eggshells (used for thickness measurements) were dried.

8. The number of eggs laid/hen/day was not assessed.

These deviations did not affect the scientific validity or acceptability of the study.

**COMPLIANCE:** Signed and dated GLP, Quality Assurance, and Data Confidentiality statements were provided. This study was conducted in accordance with OECD GLP standards.

**A. MATERIALS:**

**1. Test Material** JAU 6476 Technical (prothioconazole)

**Description:** White powder

**Lot No./Batch No.:** FL 6233/0031 (mixed batch) and NLL 6096-38

**Purity:** 98.7 and 96.1%, respectively

**Stability of Compound Under Test Conditions:** Stability experiments were conducted with powdered feed treated at 245 and 2000 ppm. Results demonstrated that the test substance was stable for up to 36 days under frozen (-20°C) storage conditions (89-102% of initial concentrations), and stable for up to 35 days under frozen (-20°C) storage conditions followed by 1 day under test room conditions (85-96% of initial concentrations). Based on information obtained from this study as well as the concurrently-submitted Bobwhite quail study (MRID 46246042), the food was replaced daily to ensure stability.

**Storage conditions of test chemical:** At room temperature in the dark.

*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<br>*Criteria* |
|---|---|---|
| Species (common and scientific names): | Mallard duck<br>(*Anas platyrhynchos L.*) | *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 7 months old | *EPA requires: birds should be approaching their first breeding season.* |
| Body Weight: (mean and range) | Males: Overall range (n=64) 834-1301 g<br><br>Females: Overall range (n=64) 863-1150 g | Individual body weights were recorded at Weeks 1, 3, 5, 7, 9, 11, and 22 (test termination).<br>*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: | Mr. J. Coles,<br>The County Game Farms,<br>Ashford, England | Birds were phenotypically indistinguishable from wild birds.<br>*EPA requires that all birds should be from the same source.* |

## B. STUDY DESIGN:

### 1. Experimental Conditions

a. Range-finding Study - Preliminary tests were performed to assess the homogeneity, stability, and accuracy of the test material in treated feed prepared at all test levels (p. 19). Results of these analyses are provided in Appendix VII, pp. 169-182.

b. Definitive Study

**Table 2: Experimental Parameters.**

| Parameter | Details | Remarks<br>*Criteria* |
|---|---|---|
| Acclimation period: | 5 weeks | |
| Conditions (same as test or not): | Same as test | |
| Feeding: | Ducks were offered a standard commercial quail breeder diet, Altromin, Lage, Germany (Type: 0770), *ad libitum*. | *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.* |
| Health (any mortality observed): | No pre-test mortality was observed. | |
| Test duration<br>pre-laying exposure: | Approximately 10 weeks | |
| egg-laying exposure: | Approximately 11 weeks | *EPA requires*<br>***Pre-laying exposure duration***<br>*At least 10 weeks prior to the onset of egg-laying.*<br>***Exposure duration with egg-laying***<br>*At least 10 weeks.*<br>***Withdrawal period***<br>*If reduced reproduction is evident, a withdrawal period of up to 3 weeks should be added to the test phase.* |
| withdrawal period, if used: | None | |
| Pen (for parental and offspring)<br>size: | Parents (one pair) were housed in battery breeding cages with 1 $m^2$ of floor space (not further specified). Offspring (in groups of five or six, by set and group) were housed in 50 x 60 x 25 cm brooders. | Parental pens contained nest boxes and bathing water.<br>*Pens*<br>*Adequate room and arranged to prevent cross contamination*<br>*Materials*<br>*Nontoxic material and nonbinding material, such as galvanized steel.*<br>*Number*<br>*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.* |
| construction materials: | Parental and offspring pens were constructed of wire mesh stainless steel. | |
| number: | 16 parental pens (replicates) per treatment level | |

| Parameter | Details | Remarks<br>*Criteria* |
|---|---|---|
| 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<br>negative control:<br>solvent control:<br>treated: | 16 pens<br>N/A<br>16 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)<br>nominal:<br><br>measured: | 0 (negative control), 245, 700, and 2000 ppm<br><br><LOD (control), 248, 698, and 1978 ppm a.i. (reviewer-calculated) | Mean-measured concentrations were determined from powdered treated feed prepared prior to Weeks 1, 10, and 19 and were corrected for corresponding procedural recoveries (p. 19 and Tables 6, 10, and 11 of Appendix VII, pp. 179 and 181).<br>*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<br>type:<br><br>amount: | None used | *EPA requires corn oil or other appropriate vehicle not more than 2% of diet by weight* |

| Parameter | Details | Remarks<br>*Criteria* |
|---|---|---|
| Was detailed description and nutrient analysis of the basal diet provided? (Yes/No) | Yes. Certificate of nutrient analysis of three batches of diet were provided; diets contained 22.0-24.9% protein, 6.65-6.90% fat, 4.31-4.60% fiber, and 2.56-2.76% calcium (Appendix IV, pp. 154-156). | Offspring received free access to similar diet, without the addition of test substance.<br><br>Results of contaminant analysis of the diet (batch no. not reported) are provided on pp. 157-159 of Appendix IV. Based on these results, the diets contained approximately 0.4 ppm lead, 0.12 ppm cadmium, 0.1 ppm arsenic, 0.27 ppm selenium, and 70 ppm fluorine.<br><br>*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 combined with a portion of basal diet (premix), and subsequently mixed with the bulk of the diet (20 kg in total). Because of substantial loss of the test substance after pelleting the diet, powder diet was used. Storage duration and temperature were not specified. New diets were prepared a few days prior to the start of Weeks 1, 4, 7, 10, 13, 16, and 19. | Due to instability of the test material in treated feed under ambient test-room conditions (established in trials conducted for MRID 46246042), fresh feed was provided on a daily basis.<br><br>*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 | |

| Parameter | Details | Remarks<br>*Criteria* |
|---|---|---|
| Were concentrations in diet verified by chemical analysis? | Yes | Samples were analyzed from feed prepared prior to Weeks 1, 10, and 19 (Tables 6, 10, and 11 of Appendix VII, pp. 179 and 181).<br><br>It was determined in preliminary experiments that recoveries of pelleted diet ranged from 45-51% of nominal, and that recoveries increased to 100-109% of nominal concentrations when powdered diet was analyzed (p. 25, Tables 2 and 3 of Appendix VII, pp. 176-177) |
| Did chemical analysis confirm that diet was stable? | Stability experiments were conducted with powdered feed treated at 245 and 2000 ppm. Results demonstrated that the test substance was stable for up to 36 days under frozen (-20°C) storage conditions (89-102% of initial concentrations), and stable for up to 35 days under frozen (-20°C) storage conditions followed by 1 day under test room conditions (84-96% of initial concentrations). | Three stability experiments were performed during the definitive study. Results are provided Tables 8, 9, and 12 of Appendix VII (pp. 169-182). Based on information obtained from this study as well as the concurrently-submitted Bobwhite quail study (MRID 46246042), the food was replaced daily to ensure stability. |
| and homogeneous? | Yes. Homogeneity was assessed in the first batch of powdered feed prepared at 2000 ppm by collecting samples from the 10, 50, and 90% depths (p. 19). The reviewer-calculated coefficient of variation was 1.4% (Table 7 of Appendix VII, p. 179). | |
| Feeding and husbandry | Feeding and husbandry conditions appeared to be adequate, given guideline recommendations. | |

| Parameter | Details | Remarks<br>*Criteria* |
|---|---|---|
| Test conditions (pre-laying)<br>temperature:<br><br>relative humidity:<br><br>photo-period: | <br>12-25°C<br><br>30-97%<br><br>7 hr light/day up through Week 8; 17 hr light/day thereafter. | Light intensity during the study ranged from 50-180 lux (p. 18).<br><br>*EPA Requires*<br>*Temperature:*<br>*About 21 °C (70 °F)*<br>*Relative humidity:*<br>*About 55%*<br>*Lighting*<br>*First 8 weeks: 7 h per day.*<br>*Thereafter: 16-17 h per day.*<br>*At least 6 foot candles at bird level.* |
| **Egg Collection and Incubation** | | |
| Egg collection and storage<br>collection interval:<br><br>storage temperature:<br><br>storage humidity: | <br>Daily<br><br>13.7-15.0°C<br><br>57-82% | <br><br><br>*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<br>temperature:<br><br>humidity: | <br>36.9-37.9°C<br><br>55-70% | |
| When candling was done for fertility? | Day 14 for fertility and Day 21 for viability. | *EPA requires:*<br>*Quail: approx. day 11*<br>*Ducks: approx. day 14* |

| Parameter | Details | Remarks<br>*Criteria* |
|---|---|---|
| When the eggs were transferred to the hatcher? | Day 25 | *EPA requires:*<br>*Bobwhite: day 21*<br>*Mallard: day 23* |
| Hatching conditions<br>temperature:<br><br>humidity:<br><br>photoperiod: | <br>36.5-37.0°C<br><br>58-80%<br><br>14 hours light/day (chicks) | *EPA requires:*<br>*temperature of 39°C (102°F)*<br>*humidity of 70%* |
| Day the hatched eggs were removed and counted | Not clearly specified. Chicks hatched on Days 27-28, and were not taken out of the incubator until completely dry. | *EPA requires Bobwhite: day 24*<br>*Mallard: day 27* |
| Were egg shells washed and dried for at least 48 hrs before measuring? | Opened egg shells were washed and dried for an unspecified period of time. | |
| Egg shell thickness<br>no. of eggs used:<br><br>intervals:<br><br>mode of measurement: | <br>All eggs laid on a single day.<br><br>Once weekly beginning in Week 12.<br><br>Four points around the equatorial circumference were measured to the nearest 0.01 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:<br>(mortality, body weight, mean feed consumption) | - mortality<br>- body weight<br>- food consumption<br>- signs of toxicity<br>- necropsy | |
| Egg collection and subsequent development:<br>(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<br>- eggs cracked/broken<br>- eggshell thickness<br>- egg weight<br>- eggs set<br>- number of fertile eggs<br>- number of live 14-day embryos<br>- number of live 21-day embryos<br>- number of normal hatchlings<br>- number of 14-day survivors<br>- hatchling body weight at 1 and 14 days<br>- abnormalities of hatchlings | *EPA requires:*<br>• *Eggs laid/pen*<br>• *Eggs cracked/pen*<br>• *Eggs set/pen*<br>• *Viable embryos/pen*<br>• *Live 3-week embryos/pen*<br>• *Normal hatchlings/pen*<br>• *14-day-old survivors/pen*<br>• *14-day-old survivors/pen*<br>• *Weights of 14-day-old survivors (mean per pen)*<br>• *Egg shell thickness*<br>• *Food consumption (mean per pen)*<br>• *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) | Adult: mortality and signs of toxicity were recorded at least once daily; body weights were recorded at Weeks 1, 3, 5, 7, 9, and 22 and food consumption was determined daily. Hatchling mortality and signs of toxicity were recorded 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. 25). However, three incidental mortalities occurred during the test: one in the control group, one in the 245 ppm group, and one in the 700 ppm group. No mortality occurred at the 2000 ppm level (Table 1, p. 31).

One hen from the control group (animal no. 66) was found dead during Week 20. The animal exhibited nodules of the left and right legs during Weeks 16 through 20 prior to death (p. 53 of Table 11). Necropsy revealed an enlarged pale liver, a hemorrhagic cyst of the ovaries, and an enlarged spleen (p. 82 of Table 15). Necropsy of the pen-mate (animal no. 2) was unremarkable.

One hen from the 245 ppm group (animal no. 81) was found dead during Week 19. The animal exhibited nodules of the left and right legs during Weeks 16 through 19 prior to death (p. 55 of Table 11). Necropsy revealed a thickened yellowish and dark red liver, and an enlarged, dark red spleen (p. 84 of Table 15). Necropsy of the pen-mate (animal no. 17) was unremarkable.

One drake from the 700 ppm group (animal no. 40) was found dead during Week 12, without exhibiting prior clinical effects. Necropsy revealed nodules of the underside of the webs (feet) and an enlarged, dark red and irregular surface of the spleen (p. 78 of Table 15). Necropsy of the pen-mate (animal no. 104) was unremarkable.

No other mortalities were observed during the study, and due to the nature of lesions observed at necropsy, none of the mortalities were considered to be related to treatment.

**Table 4: Effect of JAU 6476 Technical (prothioconazole) on Mortality of *Anas platyrhynchos*.**

| Treatment, ppm a.i. measured (and nominal) concentrations | Observation Period | | | | | |
|---|---|---|---|---|---|---|
| | Week 7 | | Week 14 | | Week 22 | |
| | No. Dead | | No. Dead | | No. Dead | |
| | Male | Female | Male | Female | Male | Female |
| Control | 0 | 0 | 0 | 0 | 0 | 1 |
| 248 (245) | 0 | 0 | 0 | 0 | 0 | 1 |
| 698 (700) | 0 | 0 | 1 | 0 | 1 | 0 |
| 1978 (2000) | 0 | 0 | 0 | 0 | 0 | 0 |

### B. REPRODUCTIVE AND OTHER ENDPOINTS:

Abnormal Effects/Behavior: No treatment-related signs of toxicity were observed (p. 25). Observations such as abnormal gait/posture, ventro-lateral recumbency, uncoordinated movements, alopecia, swellings, scabs, ulcers, wounds, nodules, and ungroomed plumage were noted in all dose groups including the control group to a comparable degree (Table 2, pp. 32-36).

Food Consumption: No conclusive treatment-related effects on food consumption were observed (pp. 25-26). A statistically-significant reduction in food consumption was observed at the 245 ppm level during Weeks 3, 4, and 5 and at the 2000 ppm level during Weeks 10, 11, and 14 (Table 5, pp. 40-41). Also, overall (mean of means) food consumption was decreased at these levels (105 g/animal/day for the 245 and 2000 ppm groups versus 118 g/animal/day for the control group). The study author reported that since no dose relationship was observed, and no consistency was observed, that these differences were not considered to be related to treatment. Overall feed consumption averaged 118, 105, 116, and 105 g/bird/day for the control, 245, 700, and 2000 ppm groups, respectively.

Body Weight: No treatment-related effects on body weight or body weight gains were observed (p. 25 and Tables 3 and 4, pp. 37-39).

Necropsy: No treatment-related findings were observed at necropsy (p. 26 and Table 6, pp. 42-43).

Reproductive Effects: No treatment-related effects were observed on egg production, egg quality, fertility, or early embryonic development (Tables 7-9, pp. 44-46). Egg weights were statistically increased at the 245 and 2000 ppm levels compared to the control; however, the study author reported that since a dose-response was not observed, that these differences were not considered to be related to treatment.

Late embryo survival (after 21 days) was affected by treatment at the 2000 ppm level, based on a statistically-significant reduction in the percentage of post 21-day embryonic deaths of fertile eggs (28.9 versus 20.9% for the control group). Chick survival was also affected at the 2000 ppm level, based on a statistically-significant reduction in the percentage of 14-day old survivors of normal hatchlings (87.4 versus 92.9% for the control group).

There were no treatment-related clinical effects during the 14-day chick maintenance period, and no treatment-related effects on chick body weights (Tables 9-10, pp. 46-47). The most common clinical observations were weak and crippled chicks. Incidental observations (mainly observed between Weeks 13 and 16) included abnormal behavior, abnormal beak/neck, abnormal gait, abnormal posture leg/neck and head down; findings were noted in the control and test groups to a comparable degree and were not considered to be related to treatment (p. 27).

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

| Parameter | Control | 245 ppm | 700 ppm | 2000 ppm | NOEC/ LOEC |
|---|---|---|---|---|---|
| Eggs laid | 612 | 702 | 644 | 742 | N/A |
| Eggs laid/hen | 38.3 | 43.9 | 40.3 | 46.4 | 2000 ppm >2000 ppm |
| Eggs laid/hen/day | Not determined. | | | | |
| Eggs cracked | 14 | 5 | 10 | 3 | N/A |
| Eggs cracked/eggs laid (%) | 2.3 | 0.7 | 1.6 | 0.4 | 2000 ppm >2000 ppm |
| Eggs broken | 9 | 5 | 8 | 4 | N/A |

| Parameter | Control | 245 ppm | 700 ppm | 2000 ppm | NOEC/ LOEC |
|---|---|---|---|---|---|
| Eggs broken/eggs laid (%) | 1.5 | 0.7 | 1.2 | 0.5 | 2000 ppm >2000 ppm |
| Mean egg weight (g ± SD) | 58.8 ± 4.5 | 60.5 ± 5.0* | 59.3 ± 5.0 | 60.3 ± 4.3* | 2000 ppm >2000 ppm |
| Shell thickness (mm ± SD) | 0.37 ± 0.02 | 0.37 ± 0.02 | 0.37 ± 0.02 | 0.37 ± 0.02 | 2000 ppm >2000 ppm |
| Eggs set | 539 | 639 | 576 | 683 | N/A |
| Fertile eggs/egg set (%) | 90.4 | 90.9 | 91.0 | 94.3 | 2000 ppm >2000 ppm |
| Viable 14-day old embryos | 447 | 534 | 484 | 603 | N/A |
| Viable 14-day old embryos/eggs set (%) | 82.9 | 83.6 | 84.0 | 88.3 | 2000 ppm >2000 ppm |
| Live 21-day old embryos | 442 | 518 | 476 | 599 | N/A |
| Live 21-day old embryos/eggs set (%) | 82.0 | 81.1 | 82.6 | 87.7 | 2000 ppm >2000 ppm |
| Live 21-day old embryos/fertile eggs (%) | 90.8 | 89.2 | 90.8 | 93.0 | 2000 ppm >2000 ppm |
| No. of normal hatchlings | 340 | 381 | 373 | 412 | N/A |
| No. of normal hatchlings/eggs set (%) | 63.1 | 59.6 | 64.8 | 60.3 | 2000 ppm >2000 ppm |
| No. of normal hatchlings/fertile eggs (%) | 69.8 | 65.6 | 71.2 | 64.0 | 2000 ppm >2000 ppm |
| No. of normal hatchlings/live 14-day old embryos (%) | 76.1 | 71.3 | 77.1 | 68.3 | 2000 ppm >2000 ppm |
| No. of normal hatchlings/live 21-day old embryos (%) | 76.9 | 73.6 | 78.4 | 68.8 | 2000 ppm >2000 ppm |
| Hatchling weight (g) | 36.4 | 37.9 | 37.0 | 37.1 | 2000 ppm >2000 ppm |
| No. of 14-day old survivors | 316 | 348 | 338 | 360 | N/A |
| No. of 14-day old survivors/hen | 19.8 | 21.8 | 21.1 | 22.5 | 2000 ppm >2000 ppm |
| No. of 14-day old survivors/No. of normal hatchlings (%) | 92.9 | 91.3 | 90.6 | 87.4* | 700 ppm 2000 ppm |

| Parameter | Control | 245 ppm | 700 ppm | 2000 ppm | NOEC/ LOEC |
|---|---|---|---|---|---|
| 14-day old survivors weight (g) | 151.2 | 148.3 | 144.2* | 149.5 | 2000 ppm >2000 ppm |
| Mean adult food consumption (g/pen/day) | 118 | 105 | 116 | 105 | 2000 ppm >2000 ppm |
| Weight of adult males, (g ± SD)<br>at start of treatment:<br>at Week 9:<br>at Week 22 (study termination): | <br>1058 ± 91.4<br>1091 ±125.1<br>1117 ± 94.3 | <br>1060 ± 97.7<br>1066 ±118.8<br>1136 ±118.6 | <br>1064 ±79.6<br>1086 ±94.2<br>1142 ±110.6 | <br>1085 ±108.5<br>1148 ±117.6<br>1158 ±117.3 | <br>2000 ppm<br>>2000 ppm |
| Weight of adult females, g<br>at start of treatment:<br>at Week 9:<br>at Week 22 (study termination): | <br>1011 ±75.0<br>1028 ±102.4<br>1154 ±123.0 | <br>997 ±83.5<br>1055 ±115.0<br>1158 ±131.3 | <br>978 ±68.1<br>989 ±110.2<br>1074 ±84.1 | <br>1003 ±70.1<br>1045 ±101.2<br>1129 ±116.2 | <br>2000 ppm<br>>2000 ppm |
| Gross pathology (proportion of birds with pathological incidents | 4/32 | 5/32 | 4/32 | 6/32 | 2000 ppm >2000 ppm |

N/A = Not statistically-analyzed.

## C. REPORTED STATISTICS:

Parental endpoints statistically analyzed included adult body weight, adult body weight gain, and adult food consumption. These variables were assumed to follow a normal distribution, and were analyzed using the Dunnett t-test.

Reproductive endpoints statistically analyzed included number of eggs laid per pen, percentage of eggs cracked of eggs laid, percentage of eggs broken of eggs laid, rate of viability (fertile/infertile eggs as percentage of eggs set), live 14- and 21-day old embryos as percentage of eggs set, live 21-day old embryos as percentage of fertile eggs, normal hatchlings as percentage of eggs set, normal hatchlings as percentage of fertile eggs, normal hatchlings as percentage of 14-day old embryos, normal hatchlings as percentage of 21-day old embryos, early and late embryonic death as percentage of fertile eggs, number of 14-day old survivors as percentage of normal hatchlings, number of 14-day old survivors expressed per hen, mean eggshell thickness, mean egg weight on day of incubation, mean body weight of hatchlings and surviving chicks, and mean chicks growth rate.

Continuous variables (i.e., eggshell thickness, egg weights, chick weights, number of eggs laid per pen, normal hatchlings per pen, and 14-day old survivors per pen) were assumed to follow a normal distribution, and were analyzed using one-way ANOVA, followed by Dunnett's test (many-to-one t-test).

Ratio variables were assumed not to be normally distributed, and the data were first arc-sine transformed, then analyzed using one-way ANOVA, followed by Dunnett's t-test.

For reproductive endpoints, sample units were the weekly data per pen, except for egg shell thickness, egg weights, and chick weights, where the sample unit was the individual measurement. Nominal concentrations were used for all comparisons.

## D. VERIFICATION OF STATISTICAL RESULTS:

Statistical Method: Analysis was conducted using "chicks.sas" (Ver. 3; March 2002), a SAS program provided by EFED/OPP/USEPA. Data for all endpoints were examined graphically using box plots to determine if they exhibited a dose-dependent response, which was ultimately used to select the multiple comparison test to detect LOAEC and NOAEC. Data for each endpoint were tested to determine if their distributions were normal and if their variances were homogeneous using Shapiro-Wilk's and Levene's tests, respectively. Data that satisfied these assumptions were subjected to Dunnett's and William's tests and data that did not satisfy these assumptions were subjected to the non-parametric MannWhitney-U (with a Bonferroni adjustment) and Jonckheere's tests. Data for dead birds were excluded from the analyses. See Appendix I for output of reviewer's statistical verification and graphs for affected endpoints to support any reviewer-generated conclusions that may differ from those reported in the study.

**Table 6. Reproductive and other parameters (mean-measured concentrations; reviewer-reported).**

| Parameter | Control | 248 ppm | 698 ppm | 1978 ppm | NOEC/ LOEC |
|---|---|---|---|---|---|
| Eggs laid/pen | 37.8 | 45.7 | 42.8 | 46.4 | 1978 ppm >1978 ppm |
| Eggs cracked/pen | 0.93 | 0.33 | 0.67 | 0.19 | 1978 ppm >1978 ppm |
| Eggs not cracked/eggs laid (%) | 98.0 | 99.2 | 98.5 | 99.6 | 1978 ppm >1978 ppm |
| Eggs set/pen | 33.3 | 41.7 | 38.3 | 42.7 | 1978 ppm >1978 ppm |
| Shell thickness | 0.37 | 0.37 | 0.37 | 0.37 | 1978 ppm >1978 ppm |
| Eggs set/eggs laid (%) | 87.4 | 91.1 | 90.4 | 92.3 | 1978 ppm >1978 ppm |
| Viable embryo/pen | 29.9 | 37.8 | 34.9 | 40.2 | 1978 ppm >1978 ppm |
| Viable embryos/eggs set (%) | 88.3 | 90.3 | 90.7 | 95.0 | 1978 ppm >1978 ppm |
| Live embryos/pen | 27.3 | 33.6 | 31.7 | 37.4 | 1978 ppm >1978 ppm |
| Live embryo/viable embryo (%) | 84.6 | 87.9 | 90.2 | 93.5 | 1978 ppm >1978 ppm |
| No. of hatchlings/pen | 21.2 | 24.7 | 24.9 | 25.8 | 1978 ppm >1978 ppm |
| No. of hatchlings/eggs laid (%) | 50.6 | 51.8 | 59.0 | 56.0 | 1978 ppm >1978 ppm |

| Parameter | Control | 248 ppm | 698 ppm | 1978 ppm | NOEC/ LOEC |
|---|---|---|---|---|---|
| No. of hatchlings/eggs set (%) | 57.3 | 56.8 | 65.4 | 60.7 | 1978 ppm >1978 ppm |
| No. of hatchlings/live embryos (%) | 77.4 | 70.6 | 79.4 | 68.5 | 1978 ppm >1978 ppm |
| Hatchling survival/pen | 19.9 | 22.4 | 22.5 | 22.5 | 1978 ppm >1978 ppm |
| Hatchling survival/eggs set (%) | 53.6 | 51.4 | 58.8 | 53.0 | 1978 ppm >1978 ppm |
| Hatchling survival/no. of hatchlings (%) | 93.5 | 90.2 | 89.9 | 86.8 | 1978 ppm >1978 ppm |
| Hatchling weight (g) | 36.5 | 37.3 | 36.6 | 37.3 | 1978 ppm >1978 ppm |
| Survivor weight (g) | 147.9 | 144.5 | 142.1 | 147.5 | 1978 ppm >1978 ppm |
| Mean food consumption (g/bird/day) | 115.3 | 106.8 | 116.5 | 126.1 | 1978 ppm >1978 ppm |
| Male weight gain (g) | 59.1 | 75.4 | 76.1 | 72.6 | 1978 ppm >1978 ppm |
| Female weight gain (g) | 143.8 | 156.7 | 93.6 | 125.8 | 1978 ppm >1978 ppm |

## E. STUDY DEFICIENCIES:

There were no significant deviations from U.S. EPA guideline §71-4b that affected the validity or acceptability of this study.

## F. REVIEWER'S COMMENTS:

Results of the reviewer's statistical analyses for some endpoints differed from those of the study author. First, the study author used nominal exposure levels instead of measured exposure levels. Secondly, the study author's analysis detected significant reductions in late embryonic survival (percentage of post 21-day embryonic death of fertile eggs) and chick survival (percentage of 14-day old survivors of normal hatchlings), while the reviewer's analysis did not. Late embryonic survival as a function of the percentage of post 21-day embryonic death of fertile eggs was not analyzed by the reviewer and the reviewer presumes that differences in the statistical methods used to analyze chick survival (study author used a parametric test, while the reviewer used a non-parametric test) is likely the reason why the reviewer's analysis did not detect a significant reduction in this endpoint. Given that the reviewers statistical analysis indicated that some data did not meet the assumptions required for parametric tests, the reviewers results are reported in the Conclusions and Executive Summary.

Procedural recoveries were conducted concurrently with sample analysis (Appendix VII, pp. 169-182). Mean recoveries of JAU 6476 from feed fortified with JAU 6476 (prothioconazole) in acetonitrile at 243 to 2045 ppm ranged from 80 to 99% of nominal concentrations (Table 5 of Appendix VII, p. 178). Sample concentrations were corrected for the mean procedural recovery analyzed on the same day and concentration level.

In Week 3 of treatment, animal numbers 97 and 98 were exchanged because they frequently moved to each other's pen (p. 17). This was considered not be affect the study integrity, because both animals were of the same dose group (females from the 700 ppm group) and this exchange resulted in fewer movements into each other's pen.

## G. CONCLUSIONS:

This study is scientifically sound, fulfills U.S. EPA guideline §71-4b, and is classified as ACCEPTABLE.

NOEC: 1978 ppm a.i.
LOEC: >1978 ppm a.i.
Endpoint(s) Affected: None.

## III. REFERENCES:

Dunnet, C.W. 1955. A Multiple Comparison Procedure for Comparing Several Treatments with a Control. J. Amer. Stat. Assoc. 50:1096-121.

Miller, R.G. 1981. Simultaneous Statistical Inference. Springer Verlag. New York.

Fisher, R.A. 1950. Statistical Method for Research Workers. Oliver and Boyd, Edinburgh.

SAS. 1988. SAS Institute Inc., SAS/STAT User's Guide. Release 6.03 Edition. Cary, NC: SAS Institute Inc. 1028 pp.

## APPENDIX I. OUTPUT OF REVIEWER'S STATISTICAL VERIFICATION:

Mallard repro, Prothioconazole, MRID 46246044
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 | 41 | 1 | 97.56 | 37 | 90.24 | 35 | 94.59 | 33 | 94.29 | 28 | 68.29 | 75.68 |
| 2 | Ctrl | . | . | . | . | . | . | . | . | . | . | . | . |
| 3 | Ctrl | 47 | 1 | 97.87 | 44 | 93.62 | 43 | 97.73 | 41 | 95.35 | 36 | 76.60 | 81.82 |
| 4 | Ctrl | 0 | 0 | . | 0 | . | 0 | . | 0 | . | 0 | . | . |
| 5 | Ctrl | 32 | 0 | 100.00 | 29 | 90.63 | 17 | 58.62 | 17 | 100.00 | 17 | 53.13 | 58.62 |
| 6 | Ctrl | 40 | 0 | 100.00 | 36 | 90.00 | 36 | 100.00 | 34 | 94.44 | 24 | 60.00 | 66.67 |
| 7 | Ctrl | 57 | 3 | 94.74 | 48 | 84.21 | 48 | 100.00 | 45 | 93.75 | 44 | 77.19 | 91.67 |
| 8 | Ctrl | 37 | 0 | 100.00 | 32 | 86.49 | 31 | 96.88 | 26 | 83.87 | 13 | 35.14 | 40.63 |
| 9 | Ctrl | 31 | 0 | 100.00 | 27 | 87.10 | 5 | 18.52 | 4 | 80.00 | 3 | 9.68 | 11.11 |
| 10 | Ctrl | 4 | 0 | 100.00 | 3 | 75.00 | 3 | 100.00 | 0 | 0.00 | 0 | 0.00 | 0.00 |
| 11 | Ctrl | 63 | 4 | 93.65 | 53 | 84.13 | 53 | 100.00 | 49 | 92.45 | 33 | 52.38 | 62.26 |
| 12 | Ctrl | 34 | 0 | 100.00 | 31 | 91.18 | 29 | 93.55 | 24 | 82.76 | 19 | 55.88 | 61.29 |
| 13 | Ctrl | 34 | 0 | 100.00 | 32 | 94.12 | 32 | 100.00 | 28 | 87.50 | 17 | 50.00 | 53.13 |
| 14 | Ctrl | 50 | 1 | 98.00 | 44 | 88.00 | 37 | 84.09 | 36 | 97.30 | 24 | 48.00 | 54.55 |
| 15 | Ctrl | 58 | 1 | 98.28 | 52 | 89.66 | 51 | 98.08 | 46 | 90.20 | 37 | 63.79 | 71.15 |
| 16 | Ctrl | 39 | 3 | 92.31 | 31 | 79.49 | 29 | 93.55 | 27 | 93.10 | 23 | 58.97 | 74.19 |
| 17 | Dose1 | . | . | . | . | . | . | . | . | . | . | . | . |
| 18 | Dose1 | 67 | 0 | 100.00 | 62 | 92.54 | 62 | 100.00 | 53 | 85.48 | 52 | 77.61 | 83.87 |
| 19 | Dose1 | 41 | 0 | 100.00 | 37 | 90.24 | 36 | 97.30 | 35 | 97.22 | 24 | 58.54 | 64.86 |
| 20 | Dose1 | 48 | 0 | 100.00 | 44 | 91.67 | 43 | 97.73 | 43 | 100.00 | 29 | 60.42 | 65.91 |
| 21 | Dose1 | 40 | 1 | 97.50 | 36 | 90.00 | 21 | 58.33 | 16 | 76.19 | 11 | 27.50 | 30.56 |
| 22 | Dose1 | 48 | 0 | 100.00 | 43 | 89.58 | 42 | 97.67 | 39 | 92.86 | 26 | 54.17 | 60.47 |
| 23 | Dose1 | 25 | 0 | 100.00 | 23 | 92.00 | 23 | 100.00 | 22 | 95.65 | 10 | 40.00 | 43.48 |
| 24 | Dose1 | 55 | 0 | 100.00 | 51 | 92.73 | 41 | 80.39 | 36 | 87.80 | 22 | 40.00 | 43.14 |
| 25 | Dose1 | 48 | 1 | 97.92 | 42 | 87.50 | 39 | 92.86 | 38 | 97.44 | 32 | 66.67 | 76.19 |
| 26 | Dose1 | 58 | 0 | 100.00 | 53 | 91.38 | 52 | 98.11 | 51 | 98.08 | 46 | 79.31 | 86.79 |
| 27 | Dose1 | 46 | 1 | 97.83 | 40 | 86.96 | 38 | 95.00 | 33 | 86.84 | 22 | 47.83 | 55.00 |
| 28 | Dose1 | 44 | 0 | 100.00 | 42 | 95.45 | 36 | 85.71 | 35 | 97.22 | 34 | 77.27 | 80.95 |
| 29 | Dose1 | 45 | 0 | 100.00 | 41 | 91.11 | 39 | 95.12 | 25 | 64.10 | 19 | 42.22 | 46.34 |
| 30 | Dose1 | 34 | 1 | 97.06 | 31 | 91.18 | 30 | 96.77 | 22 | 73.33 | 13 | 38.24 | 41.94 |
| 31 | Dose1 | 47 | 0 | 100.00 | 44 | 93.62 | 41 | 93.18 | 39 | 95.12 | 20 | 42.55 | 45.45 |
| 32 | Dose1 | 40 | 1 | 97.50 | 36 | 90.00 | 24 | 66.67 | 17 | 70.83 | 10 | 25.00 | 27.78 |
| 33 | Dose2 | 46 | 0 | 100.00 | 42 | 91.30 | 40 | 95.24 | 37 | 92.50 | 24 | 52.17 | 57.14 |
| 34 | Dose2 | 43 | 0 | 100.00 | 36 | 83.72 | 36 | 100.00 | 34 | 94.44 | 27 | 62.79 | 75.00 |
| 35 | Dose2 | 60 | 1 | 98.33 | 54 | 90.00 | 54 | 100.00 | 48 | 88.89 | 38 | 63.33 | 70.37 |
| 36 | Dose2 | 15 | 0 | 100.00 | 15 | 100.00 | 15 | 100.00 | 14 | 93.33 | 13 | 86.67 | 86.67 |
| 37 | Dose2 | 14 | 0 | 100.00 | 14 | 100.00 | 9 | 64.29 | 7 | 77.78 | 7 | 50.00 | 50.00 |
| 38 | Dose2 | 30 | 2 | 93.33 | 25 | 83.33 | 25 | 100.00 | 21 | 84.00 | 18 | 60.00 | 72.00 |
| 39 | Dose2 | 47 | 0 | 100.00 | 42 | 89.36 | 41 | 97.62 | 38 | 92.68 | 31 | 65.96 | 73.81 |
| 40 | Dose2 | . | . | . | . | . | . | . | . | . | . | . | . |
| 41 | Dose2 | 50 | 0 | 100.00 | 44 | 88.00 | 43 | 97.73 | 40 | 93.02 | 34 | 68.00 | 77.27 |
| 42 | Dose2 | 52 | 0 | 100.00 | 48 | 92.31 | 47 | 97.92 | 40 | 85.11 | 32 | 61.54 | 66.67 |
| 43 | Dose2 | 46 | 2 | 95.65 | 41 | 89.13 | 41 | 100.00 | 39 | 95.12 | 32 | 69.57 | 78.05 |
| 44 | Dose2 | 62 | 0 | 100.00 | 53 | 85.48 | 49 | 92.45 | 46 | 93.88 | 37 | 59.68 | 69.81 |
| 45 | Dose2 | 41 | 0 | 100.00 | 38 | 92.68 | 21 | 55.26 | 19 | 90.48 | 11 | 26.83 | 28.95 |
| 46 | Dose2 | 55 | 3 | 94.55 | 48 | 87.27 | 30 | 62.50 | 29 | 96.67 | 20 | 36.36 | 41.67 |
| 47 | Dose2 | 38 | 0 | 100.00 | 36 | 94.74 | 35 | 97.22 | 32 | 91.43 | 29 | 76.32 | 80.56 |
| 48 | Dose2 | 43 | 2 | 95.35 | 38 | 88.37 | 38 | 100.00 | 32 | 84.21 | 20 | 46.51 | 52.63 |
| 49 | Dose3 | 41 | 0 | 100.00 | 35 | 85.37 | 34 | 97.14 | 30 | 88.24 | 27 | 65.85 | 77.14 |
| 50 | Dose3 | 40 | 0 | 100.00 | 39 | 97.50 | 34 | 87.18 | 34 | 100.00 | 30 | 75.00 | 76.92 |
| 51 | Dose3 | 63 | 0 | 100.00 | 57 | 90.48 | 54 | 94.74 | 47 | 87.04 | 41 | 65.08 | 71.93 |
| 52 | Dose3 | 19 | 0 | 100.00 | 18 | 94.74 | 18 | 100.00 | 18 | 100.00 | 9 | 47.37 | 50.00 |
| 53 | Dose3 | 40 | 0 | 100.00 | 39 | 97.50 | 39 | 100.00 | 37 | 94.87 | 17 | 42.50 | 43.59 |
| 54 | Dose3 | 51 | 0 | 100.00 | 47 | 92.16 | 44 | 93.62 | 44 | 100.00 | 41 | 80.39 | 87.23 |
| 55 | Dose3 | 58 | 0 | 100.00 | 54 | 93.10 | 38 | 70.37 | 36 | 94.74 | 29 | 50.00 | 53.70 |
| 56 | Dose3 | 60 | 0 | 100.00 | 54 | 90.00 | 52 | 96.30 | 50 | 96.15 | 24 | 40.00 | 44.44 |
| 57 | Dose3 | 56 | 1 | 98.21 | 49 | 87.50 | 46 | 93.88 | 32 | 69.57 | 25 | 44.64 | 51.02 |
| 58 | Dose3 | 48 | 0 | 100.00 | 45 | 93.75 | 41 | 91.11 | 39 | 95.12 | 4 | 8.33 | 8.89 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 59 | Dose3 | 46 | 0 | 100.00 | 44 | 95.65 | 44 | 100.00 | 43 | 97.73 | 38 | 82.61 | 86.36 |
| 60 | Dose3 | 48 | 0 | 100.00 | 44 | 91.67 | 42 | 95.45 | 36 | 85.71 | 13 | 27.08 | 29.55 |
| 61 | Dose3 | 40 | 0 | 100.00 | 37 | 92.50 | 37 | 100.00 | 35 | 94.59 | 29 | 72.50 | 78.38 |
| 62 | Dose3 | 45 | 2 | 95.56 | 40 | 88.89 | 40 | 100.00 | 38 | 95.00 | 27 | 60.00 | 67.50 |
| 63 | Dose3 | 40 | 0 | 100.00 | 38 | 95.00 | 38 | 100.00 | 37 | 97.37 | 30 | 75.00 | 78.95 |
| 64 | Dose3 | 47 | 0 | 100.00 | 43 | 91.49 | 43 | 100.00 | 43 | 100.00 | 28 | 59.57 | 65.12 |

Mallard repro, Prothioconazole, MRID 46246044
PRINTOUT OF RAW DATA (continued)

| Obs | TRT | NH_LE | HS | HS_ES | HS_NH | THICK | HATWT | SURVWT | FOOD | WTGAINM | WTGAINF |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Ctrl | 84.85 | 24 | 64.86 | 85.71 | 0.36 | 35 | 157 | 117 | 190 | 51 |
| 2 | Ctrl | . | . | . | . | . | . | . | . | . | . |
| 3 | Ctrl | 87.80 | 34 | 77.27 | 94.44 | 0.37 | 35 | 156 | 128 | 98 | 241 |
| 4 | Ctrl | . | 0 | . | . | . | . | . | 78 | -48 | -26 |
| 5 | Ctrl | 100.00 | 17 | 58.62 | 100.00 | 0.40 | 40 | 183 | 118 | 68 | 275 |
| 6 | Ctrl | 70.59 | 23 | 63.89 | 95.83 | 0.37 | 37 | 159 | 110 | 0 | 175 |
| 7 | Ctrl | 97.78 | 41 | 85.42 | 93.18 | 0.38 | 35 | 139 | 101 | 83 | 159 |
| 8 | Ctrl | 50.00 | 10 | 31.25 | 76.92 | 0.36 | 41 | 137 | 140 | 77 | 202 |
| 9 | Ctrl | 75.00 | 3 | 11.11 | 100.00 | 0.35 | 36 | 134 | 109 | 180 | 228 |
| 10 | Ctrl | . | 0 | 0.00 | . | 0.37 | . | . | 94 | -33 | 84 |
| 11 | Ctrl | 67.35 | 32 | 60.38 | 96.97 | 0.38 | 37 | 146 | 136 | 8 | 175 |
| 12 | Ctrl | 79.17 | 17 | 54.84 | 89.47 | 0.36 | 34 | 135 | 122 | 102 | 9 |
| 13 | Ctrl | 60.71 | 15 | 46.88 | 88.24 | 0.39 | 38 | 130 | 73 | -63 | 163 |
| 14 | Ctrl | 66.67 | 24 | 54.55 | 100.00 | 0.36 | 32 | 125 | 128 | 8 | 119 |
| 15 | Ctrl | 80.43 | 35 | 67.31 | 94.59 | 0.36 | 39 | 164 | 114 | -3 | 287 |
| 16 | Ctrl | 85.19 | 23 | 74.19 | 100.00 | 0.35 | 37 | 158 | 161 | 220 | 15 |
| 17 | Dose1 | . | . | . | . | . | . | . | . | . | . |
| 18 | Dose1 | 98.11 | 50 | 80.65 | 96.15 | 0.35 | 37 | 152 | 127 | 12 | 223 |
| 19 | Dose1 | 68.57 | 16 | 43.24 | 66.67 | 0.36 | 37 | 130 | 87 | 4 | 113 |
| 20 | Dose1 | 67.44 | 29 | 65.91 | 100.00 | 0.38 | 41 | 168 | 100 | 150 | 225 |
| 21 | Dose1 | 68.75 | 10 | 27.78 | 90.91 | 0.40 | 37 | 131 | 138 | 66 | 95 |
| 22 | Dose1 | 66.67 | 18 | 41.86 | 69.23 | 0.36 | 36 | 138 | 103 | 99 | 252 |
| 23 | Dose1 | 45.45 | 9 | 39.13 | 90.00 | 0.37 | 34 | 136 | 95 | 194 | 156 |
| 24 | Dose1 | 61.11 | 20 | 39.22 | 90.91 | 0.36 | 37 | 143 | 112 | 38 | 289 |
| 25 | Dose1 | 84.21 | 32 | 76.19 | 100.00 | 0.39 | 40 | 149 | 118 | 129 | 121 |
| 26 | Dose1 | 90.20 | 45 | 84.91 | 97.83 | 0.37 | 40 | 146 | 97 | 91 | 421 |
| 27 | Dose1 | 66.67 | 20 | 50.00 | 90.91 | 0.35 | 41 | 153 | 116 | 109 | 207 |
| 28 | Dose1 | 97.14 | 31 | 73.81 | 91.18 | 0.38 | 37 | 144 | 107 | 95 | 211 |
| 29 | Dose1 | 76.00 | 17 | 41.46 | 89.47 | 0.37 | 37 | 175 | 85 | 39 | 63 |
| 30 | Dose1 | 59.09 | 11 | 35.48 | 84.62 | 0.36 | 38 | 131 | 102 | 14 | -4 |
| 31 | Dose1 | 51.28 | 19 | 43.18 | 95.00 | 0.37 | 34 | 138 | 110 | 97 | 119 |
| 32 | Dose1 | 58.82 | 10 | 27.78 | 100.00 | 0.38 | 34 | 134 | 105 | -6 | -140 |
| 33 | Dose2 | 64.86 | 22 | 52.38 | 91.67 | 0.38 | 40 | 136 | 98 | 2 | 210 |
| 34 | Dose2 | 79.41 | 24 | 66.67 | 88.89 | 0.37 | 37 | 117 | 113 | 54 | 123 |
| 35 | Dose2 | 79.17 | 33 | 61.11 | 86.84 | 0.36 | 34 | 148 | 139 | 21 | 121 |
| 36 | Dose2 | 92.86 | 12 | 80.00 | 92.31 | . | 35 | 131 | 83 | 236 | 143 |
| 37 | Dose2 | 100.00 | 6 | 42.86 | 85.71 | . | 35 | 134 | 140 | 159 | 188 |
| 38 | Dose2 | 85.71 | 12 | 48.00 | 66.67 | 0.37 | 35 | 121 | 126 | 71 | 69 |
| 39 | Dose2 | 81.58 | 29 | 69.05 | 93.55 | . | 41 | 151 | 109 | 37 | 196 |
| 40 | Dose2 | . | . | . | . | . | . | . | . | . | . |
| 41 | Dose2 | 85.00 | 32 | 72.73 | 94.12 | 0.38 | 40 | 156 | 121 | 36 | 205 |
| 42 | Dose2 | 80.00 | 28 | 58.33 | 87.50 | 0.37 | 33 | 143 | 106 | -47 | -31 |
| 43 | Dose2 | 82.05 | 31 | 75.61 | 96.88 | 0.37 | 38 | 151 | 121 | 3 | 78 |
| 44 | Dose2 | 80.43 | 35 | 66.04 | 94.59 | 0.35 | 37 | 126 | 108 | 90 | 109 |
| 45 | Dose2 | 57.89 | 11 | 28.95 | 100.00 | 0.37 | 31 | 133 | 108 | 280 | -75 |
| 46 | Dose2 | 68.97 | 18 | 37.50 | 90.00 | 0.39 | 37 | 172 | 130 | 71 | 81 |
| 47 | Dose2 | 90.63 | 29 | 80.56 | 100.00 | 0.36 | 37 | 168 | 123 | 184 | -95 |
| 48 | Dose2 | 62.50 | 16 | 42.11 | 80.00 | 0.39 | 39 | 144 | 123 | -55 | 82 |
| 49 | Dose3 | 90.00 | 24 | 68.57 | 88.89 | 0.36 | 36 | 155 | 100 | -34 | 11 |
| 50 | Dose3 | 88.24 | 28 | 71.79 | 93.33 | 0.38 | 37 | 167 | 143 | -19 | 19 |
| 51 | Dose3 | 87.23 | 40 | 70.18 | 97.56 | 0.35 | 38 | 160 | 143 | -32 | 266 |
| 52 | Dose3 | 50.00 | 9 | 50.00 | 100.00 | 0.36 | 41 | 151 | 126 | -66 | 203 |
| 53 | Dose3 | 45.95 | 16 | 41.03 | 94.12 | 0.36 | 40 | 136 | 89 | 222 | 127 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 54 | Dose3 | 93.18 | 40 | 85.11 | 97.56 | 0.35 | 39 | 154 | 142 | 93 | 223 |
| 55 | Dose3 | 80.56 | 29 | 53.70 | 100.00 | 0.39 | 36 | 160 | 146 | 186 | 199 |
| 56 | Dose3 | 48.00 | 23 | 42.59 | 95.83 | 0.39 | 41 | 150 | 136 | -16 | 237 |
| 57 | Dose3 | 78.13 | 22 | 44.90 | 88.00 | 0.38 | 38 | 136 | 102 | 64 | 116 |
| 58 | Dose3 | 10.26 | 3 | 6.67 | 75.00 | 0.40 | 39 | 146 | 128 | 172 | 273 |
| 59 | Dose3 | 88.37 | 22 | 50.00 | 57.89 | 0.38 | 35 | 125 | 123 | 72 | 74 |
| 60 | Dose3 | 36.11 | 9 | 20.45 | 69.23 | 0.36 | 34 | 140 | 161 | 147 | -22 |
| 61 | Dose3 | 82.86 | 27 | 72.97 | 93.10 | 0.37 | 33 | 148 | 120 | 164 | 1 |
| 62 | Dose3 | 71.05 | 19 | 47.50 | 70.37 | 0.39 | 38 | 138 | 140 | 73 | -10 |
| 63 | Dose3 | 81.08 | 27 | 71.05 | 90.00 | 0.38 | 36 | 147 | 114 | 106 | 194 |
| 64 | Dose3 | 65.12 | 22 | 51.16 | 78.57 | 0.37 | 37 | 147 | 104 | 29 | 101 |

Mallard repro, Prothioconazole, MRID 46246044
ANALYSIS RESULTS FOR VARIABLE EL ( Eggs Laid )

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

| Shapiro-Wilks Test Stat | Shapiro-Wilks P-value | Levenes Test Stat | Levenes P-value | Conclusion |
|---|---|---|---|---|
| 0.932 | 0.002 | 1.178 | 0.326 | USE NON-PARAMETRIC TESTS |

**********
BASIC SUMMARY STATISTICS

| Level | N | Mean | StdDev | StdErr | Coef of Var | 95% Conf. | Interval |
|---|---|---|---|---|---|---|---|
| Ctrl | 15 | 37.80 | 17.61 | 4.55 | 46.59 | 28.05, | 47.55 |
| Dose1 | 15 | 45.73 | 9.87 | 2.55 | 21.59 | 40.27, | 51.20 |
| Dose2 | 15 | 42.80 | 14.09 | 3.64 | 32.93 | 35.00, | 50.60 |
| Dose3 | 16 | 46.38 | 10.52 | 2.63 | 22.68 | 40.77, | 51.98 |

| Level | Median | Min | Max | %of Control(means) | %Reduction(means) |
|---|---|---|---|---|---|
| Ctrl | 39.00 | 0.00 | 63.00 | . | . |
| Dose1 | 46.00 | 25.00 | 67.00 | 120.99 | -20.99 |
| Dose2 | 46.00 | 14.00 | 62.00 | 113.23 | -13.23 |
| Dose3 | 46.50 | 19.00 | 63.00 | 122.69 | -22.69 |

**********
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 | 3.31 | 0.346 |

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 | 39.00 | . | . |
| Dose1 | 46.00 | 1.000 | 0.927 |
| Dose2 | 46.00 | 1.000 | 0.861 |
| Dose3 | 46.50 | 1.000 | 0.931 |

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

Mallard repro, Prothioconazole, MRID 46246044
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 |
|---|---|---|---|---|
| 0.823 | <.001 | 5.636 | 0.002 | USE NON-PARAMETRIC TESTS |

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BASIC SUMMARY STATISTICS

| Level | N | Mean | StdDev | StdErr | Coef of Var | 95% Conf. | Interval |
|---|---|---|---|---|---|---|---|
| Ctrl | 15 | 0.93 | 1.33 | 0.34 | 142.98 | 0.19, | 1.67 |
| Dose1 | 15 | 0.33 | 0.49 | 0.13 | 146.39 | 0.06, | 0.60 |
| Dose2 | 15 | 0.67 | 1.05 | 0.27 | 156.98 | 0.09, | 1.25 |
| Dose3 | 16 | 0.19 | 0.54 | 0.14 | 290.08 | 0.00, | 0.48 |

| Level | Median | Min | Max | %of Control(means) | %Reduction(means) |
|---|---|---|---|---|---|
| Ctrl | 0.00 | 0.00 | 4.00 | . | . |
| Dose1 | 0.00 | 0.00 | 1.00 | 35.71 | 64.29 |
| Dose2 | 0.00 | 0.00 | 3.00 | 71.43 | 28.57 |
| Dose3 | 0.00 | 0.00 | 2.00 | 20.09 | 79.91 |

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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 | 4.62 | 0.202 |

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

| Level | Median | MannWhit(Bon adjust)p-value | Jonckheere p-value |
|---|---|---|---|
| Ctrl | 0.00 | . | . |
| Dose1 | 0.00 | 1.000 | 0.858 |
| Dose2 | 0.00 | 1.000 | 0.735 |
| Dose3 | 0.00 | 1.000 | 0.968 |

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

Mallard repro, Prothioconazole, MRID 46246044
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 |
|---|---|---|---|---|
| 0.825 | <.001 | 5.451 | 0.002 | USE NON-PARAMETRIC TESTS |

**********

BASIC SUMMARY STATISTICS

| Level | N | Mean | StdDev | StdErr | Coef of Var | 95% Conf. | Interval |
|---|---|---|---|---|---|---|---|
| Ctrl | 14 | 98.03 | 2.63 | 0.70 | 2.69 | 96.51, | 99.55 |
| Dose1 | 15 | 99.19 | 1.20 | 0.31 | 1.21 | 98.52, | 99.85 |
| Dose2 | 15 | 98.48 | 2.43 | 0.63 | 2.47 | 97.13, | 99.83 |
| Dose3 | 16 | 99.61 | 1.17 | 0.29 | 1.17 | 98.99, | 100.00 |

| Level | Median | Min | Max | %of Control(means) | %Reduction(means) |
|---|---|---|---|---|---|
| Ctrl | 99.14 | 92.31 | 100.00 | . | . |
| Dose1 | 100.00 | 97.06 | 100.00 | 101.18 | -1.18 |
| Dose2 | 100.00 | 93.33 | 100.00 | 100.46 | -0.46 |
| Dose3 | 100.00 | 95.56 | 100.00 | 101.61 | -1.61 |

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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 | 4.98 | 0.174 |

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 | 99.14 | . | . |
| Dose1 | 100.00 | 1.000 | 0.810 |
| Dose2 | 100.00 | 1.000 | 0.743 |
| Dose3 | 100.00 | 1.000 | 0.975 |

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

Mallard repro, Prothioconazole, MRID 46246044
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 |
|---|---|---|---|---|
| 0.933 | 0.002 | 1.051 | 0.377 | USE NON-PARAMETRIC TESTS |

**********
BASIC SUMMARY STATISTICS

| Level | N | Mean | StdDev | StdErr | Coef of Var | 95% Conf. Interval |
|---|---|---|---|---|---|---|
| Ctrl | 15 | 33.27 | 15.36 | 3.97 | 46.17 | 24.76, 41.77 |
| Dose1 | 15 | 41.67 | 9.23 | 2.38 | 22.16 | 36.55, 46.78 |
| Dose2 | 15 | 38.27 | 12.07 | 3.12 | 31.54 | 31.58, 44.95 |
| Dose3 | 16 | 42.69 | 9.26 | 2.31 | 21.69 | 37.75, 47.62 |

| Level | Median | Min | Max | %of Control(means) | %Reduction(means) |
|---|---|---|---|---|---|
| Ctrl | 32.00 | 0.00 | 53.00 | . | . |
| Dose1 | 42.00 | 23.00 | 62.00 | 125.25 | -25.25 |
| Dose2 | 41.00 | 14.00 | 54.00 | 115.03 | -15.03 |
| Dose3 | 43.50 | 18.00 | 57.00 | 128.32 | -28.32 |

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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 | 4.89 | 0.180 |

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 | 32.00 | . | . |
| Dose1 | 42.00 | 1.000 | 0.930 |
| Dose2 | 41.00 | 1.000 | 0.856 |
| Dose3 | 43.50 | 1.000 | 0.972 |

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

Mallard repro, Prothioconazole, MRID 46246044
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 |
|---|---|---|---|---|
| 0.981 | 0.483 | 2.850 | 0.045 | USE NON-PARAMETRIC TESTS |

**********
BASIC SUMMARY STATISTICS

| Level | N | Mean | StdDev | StdErr | Coef of Var | 95% Conf. | Interval |
|---|---|---|---|---|---|---|---|
| Ctrl | 14 | 87.42 | 5.31 | 1.42 | 6.08 | 84.35, | 90.48 |
| Dose1 | 15 | 91.06 | 2.18 | 0.56 | 2.40 | 89.85, | 92.27 |
| Dose2 | 15 | 90.38 | 5.03 | 1.30 | 5.56 | 87.60, | 93.17 |
| Dose3 | 16 | 92.33 | 3.40 | 0.85 | 3.69 | 90.52, | 94.14 |

| Level | Median | Min | Max | %of Control(means) | %Reduction(means) |
|---|---|---|---|---|---|
| Ctrl | 88.83 | 75.00 | 94.12 | . | . |
| Dose1 | 91.18 | 86.96 | 95.45 | 104.17 | -4.17 |
| Dose2 | 89.36 | 83.33 | 100.00 | 103.39 | -3.39 |
| Dose3 | 92.33 | 85.37 | 97.50 | 105.62 | -5.62 |

**********
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 | 9.15 | 0.027 |

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 | 88.83 | . | . |
| Dose1 | 91.18 | 1.000 | 0.983 |
| Dose2 | 89.36 | 1.000 | 0.844 |
| Dose3 | 92.33 | 1.000 | 0.993 |

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

Mallard repro, Prothioconazole, MRID 46246044
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 |
|---|---|---|---|---|
| 0.957 | 0.032 | 2.484 | 0.070 | USE PARAMETRIC TESTS |

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BASIC SUMMARY STATISTICS

| Level | N | Mean | StdDev | StdErr | Coef of Var | 95% Conf. | Interval |
|---|---|---|---|---|---|---|---|
| Ctrl | 15 | 29.93 | 16.91 | 4.37 | 56.49 | 20.57, | 39.30 |
| Dose1 | 15 | 37.80 | 10.74 | 2.77 | 28.41 | 31.85, | 43.75 |
| Dose2 | 15 | 34.93 | 12.73 | 3.29 | 36.44 | 27.88, | 41.98 |
| Dose3 | 16 | 40.25 | 8.14 | 2.04 | 20.23 | 35.91, | 44.59 |

| Level | Median | Min | Max | %of Control(means) | %Reduction(means) |
|---|---|---|---|---|---|
| Ctrl | 32.00 | 0.00 | 53.00 | . | . |
| Dose1 | 39.00 | 21.00 | 62.00 | 126.28 | -26.28 |
| Dose2 | 38.00 | 9.00 | 54.00 | 116.70 | -16.70 |
| Dose3 | 40.50 | 18.00 | 54.00 | 134.47 | -34.47 |

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

| Numerator df | Denominator df | F-stat | P-value |
|---|---|---|---|
| 3 | 57 | 1.93 | 0.134 |

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 | 29.93 | . | 35.80 | . | 0.320 | 0.693 | 0.110 | . | . |
| Dose1 | 37.80 | 0.995 | 35.80 | 0.948 | . | 0.922 | 0.947 | . | . |
| Dose2 | 34.93 | 0.972 | 35.80 | 0.962 | . | . | 0.639 | . | . |
| Dose3 | 40.25 | 0.999 | 35.80 | 0.970 | . | . | . | . | . |

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

Mallard repro, Prothioconazole, MRID 46246044
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 |
|---|---|---|---|---|
| 0.679 | <.001 | 2.336 | 0.084 | USE NON-PARAMETRIC TESTS |

**********

BASIC SUMMARY STATISTICS

| Level | N | Mean | StdDev | StdErr | Coef of Var | 95% Conf. Interval |
|---|---|---|---|---|---|---|
| Ctrl | 14 | 88.26 | 22.88 | 6.11 | 25.92 | 75.05, 100.00 |
| Dose1 | 15 | 90.32 | 12.56 | 3.24 | 13.91 | 83.37, 97.28 |
| Dose2 | 15 | 90.68 | 15.77 | 4.07 | 17.39 | 81.95, 99.42 |
| Dose3 | 16 | 94.99 | 7.61 | 1.90 | 8.01 | 90.93, 99.04 |

| Level | Median | Min | Max | %of Control(means) | %Reduction(means) |
|---|---|---|---|---|---|
| Ctrl | 97.30 | 18.52 | 100.00 | . | . |
| Dose1 | 95.12 | 58.33 | 100.00 | 102.34 | -2.34 |
| Dose2 | 97.73 | 55.26 | 100.00 | 102.75 | -2.75 |
| Dose3 | 96.72 | 70.37 | 100.00 | 107.62 | -7.62 |

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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 | 2.07 | 0.558 |

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 | 97.30 | . | . |
| Dose1 | 95.12 | 0.616 | 0.196 |
| Dose2 | 97.73 | 1.000 | 0.637 |
| Dose3 | 96.72 | 0.960 | 0.785 |

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

Mallard repro, Prothioconazole, MRID 46246044
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 |
|---|---|---|---|---|
| 0.962 | 0.057 | 2.563 | 0.064 | USE PARAMETRIC TESTS |

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BASIC SUMMARY STATISTICS

| Level | N | Mean | StdDev | StdErr | Coef of Var | 95% Conf. Interval |
|---|---|---|---|---|---|---|
| Ctrl | 15 | 27.33 | 16.10 | 4.16 | 58.89 | 18.42, 36.25 |
| Dose1 | 15 | 33.60 | 11.29 | 2.91 | 33.59 | 27.35, 39.85 |
| Dose2 | 15 | 31.73 | 11.77 | 3.04 | 37.10 | 25.21, 38.25 |
| Dose3 | 16 | 37.44 | 7.49 | 1.87 | 20.01 | 33.45, 41.43 |

| Level | Median | Min | Max | %of Control(means) | %Reduction(means) |
|---|---|---|---|---|---|
| Ctrl | 28.00 | 0.00 | 49.00 | . | . |
| Dose1 | 35.00 | 16.00 | 53.00 | 122.93 | -22.93 |
| Dose2 | 34.00 | 7.00 | 48.00 | 116.10 | -16.10 |
| Dose3 | 37.00 | 18.00 | 50.00 | 136.97 | -36.97 |

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

| Numerator df | Denominator df | F-stat | P-value |
|---|---|---|---|
| 3 | 57 | 1.89 | 0.141 |

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 | 27.33 | . | 32.61 | . | 0.485 | 0.747 | 0.100 | . | . |
| Dose1 | 33.60 | 0.989 | 32.61 | 0.937 | . | 0.974 | 0.810 | . | . |
| Dose2 | 31.73 | 0.965 | 32.61 | 0.954 | . | . | 0.552 | . | . |
| Dose3 | 37.44 | 0.999 | 32.61 | 0.963 | . | . | . | . | . |

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

Mallard repro, Prothioconazole, MRID 46246044
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 |
|---|---|---|---|---|
| 0.633 | <.001 | 1.978 | 0.128 | USE NON-PARAMETRIC TESTS |

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BASIC SUMMARY STATISTICS

| Level | N | Mean | StdDev | StdErr | Coef of Var | 95% Conf. | Interval |
|---|---|---|---|---|---|---|---|
| Ctrl | 14 | 84.64 | 25.03 | 6.69 | 29.57 | 70.19, | 99.10 |
| Dose1 | 15 | 87.88 | 11.54 | 2.98 | 13.14 | 81.49, | 94.27 |
| Dose2 | 15 | 90.24 | 5.24 | 1.35 | 5.81 | 87.33, | 93.14 |
| Dose3 | 16 | 93.51 | 7.84 | 1.96 | 8.38 | 89.33, | 97.68 |

| Level | Median | Min | Max | %of Control(means) | %Reduction(means) |
|---|---|---|---|---|---|
| Ctrl | 92.78 | 0.00 | 100.00 | . | . |
| Dose1 | 92.86 | 64.10 | 100.00 | 103.82 | -3.82 |
| Dose2 | 92.50 | 77.78 | 96.67 | 106.61 | -6.61 |
| Dose3 | 95.06 | 69.57 | 100.00 | 110.47 | -10.47 |

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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 | 6.12 | 0.106 |

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 | 92.78 | . | . |
| Dose1 | 92.86 | 1.000 | 0.595 |
| Dose2 | 92.50 | 1.000 | 0.423 |
| Dose3 | 95.06 | 1.000 | 0.962 |

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

Mallard repro, Prothioconazole, MRID 46246044
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 |
|---|---|---|---|---|
| 0.984 | 0.633 | 0.523 | 0.668 | USE PARAMETRIC TESTS |

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BASIC SUMMARY STATISTICS

| Level | N | Mean | StdDev | StdErr | Coef of Var | 95% Conf. | Interval |
|---|---|---|---|---|---|---|---|
| Ctrl | 15 | 21.20 | 13.44 | 3.47 | 63.42 | 13.75, | 28.65 |
| Dose1 | 15 | 24.67 | 12.49 | 3.23 | 50.65 | 17.75, | 31.59 |
| Dose2 | 15 | 24.87 | 9.68 | 2.50 | 38.93 | 19.51, | 30.23 |
| Dose3 | 16 | 25.75 | 10.57 | 2.64 | 41.06 | 20.12, | 31.38 |

| Level | Median | Min | Max | %of Control(means) | %Reduction(means) |
|---|---|---|---|---|---|
| Ctrl | 23.00 | 0.00 | 44.00 | . | . |
| Dose1 | 22.00 | 10.00 | 52.00 | 116.35 | -16.35 |
| Dose2 | 27.00 | 7.00 | 38.00 | 117.30 | -17.30 |
| Dose3 | 27.50 | 4.00 | 41.00 | 121.46 | -21.46 |

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

| Numerator df | Denominator df | F-stat | P-value |
|---|---|---|---|
| 3 | 57 | 0.45 | 0.717 |

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 | 21.20 | . | 24.15 | . | 0.846 | 0.823 | 0.698 | . | . |
| Dose1 | 24.67 | 0.945 | 24.15 | 0.835 | . | 1.000 | 0.994 | . | . |
| Dose2 | 24.87 | 0.951 | 24.15 | 0.864 | . | . | 0.997 | . | . |
| Dose3 | 25.75 | 0.972 | 24.15 | 0.881 | . | . | . | . | . |

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

Mallard repro, Prothioconazole, MRID 46246044
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 |
|---|---|---|---|---|
| 0.954 | 0.025 | 0.656 | 0.582 | USE PARAMETRIC TESTS |

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BASIC SUMMARY STATISTICS

| Level | N | Mean | StdDev | StdErr | Coef of Var | 95% Conf. | Interval |
|---|---|---|---|---|---|---|---|
| Ctrl | 14 | 50.65 | 22.44 | 6.00 | 44.31 | 37.69, | 63.60 |
| Dose1 | 15 | 51.82 | 17.69 | 4.57 | 34.14 | 42.02, | 61.62 |
| Dose2 | 15 | 59.05 | 15.07 | 3.89 | 25.52 | 50.70, | 67.39 |
| Dose3 | 16 | 56.00 | 20.48 | 5.12 | 36.57 | 45.08, | 66.91 |

| Level | Median | Min | Max | %of Control(means) | %Reduction(means) |
|---|---|---|---|---|---|
| Ctrl | 54.50 | 0.00 | 77.19 | . | . |
| Dose1 | 47.83 | 25.00 | 79.31 | 102.32 | -2.32 |
| Dose2 | 61.54 | 26.83 | 86.67 | 116.59 | -16.59 |
| Dose3 | 59.79 | 8.33 | 82.61 | 110.56 | -10.56 |

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

| Numerator df | Denominator df | F-stat | P-value |
|---|---|---|---|
| 3 | 56 | 0.61 | 0.614 |

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 | 50.65 | . | 54.47 | . | 0.998 | 0.639 | 0.869 | . | . |
| Dose1 | 51.82 | 0.800 | 54.47 | 0.789 | . | 0.729 | 0.929 | . | . |
| Dose2 | 59.05 | 0.977 | 54.47 | 0.821 | . | . | 0.970 | . | . |
| Dose3 | 56.00 | 0.936 | 54.47 | 0.840 | . | . | . | . | . |

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

Mallard repro, Prothioconazole, MRID 46246044
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 |
|---|---|---|---|---|
| 0.953 | 0.021 | 0.616 | 0.608 | USE PARAMETRIC TESTS |

**********
BASIC SUMMARY STATISTICS

| Level | N | Mean | StdDev | StdErr | Coef of Var | 95% Conf. | Interval |
|---|---|---|---|---|---|---|---|
| Ctrl | 14 | 57.34 | 25.49 | 6.81 | 44.46 | 42.62, | 72.06 |
| Dose1 | 15 | 56.85 | 19.11 | 4.93 | 33.61 | 46.27, | 67.43 |
| Dose2 | 15 | 65.37 | 16.03 | 4.14 | 24.51 | 56.50, | 74.25 |
| Dose3 | 16 | 60.67 | 21.91 | 5.48 | 36.12 | 48.99, | 72.35 |

| Level | Median | Min | Max | %of Control(means) | %Reduction(means) |
|---|---|---|---|---|---|
| Ctrl | 61.78 | 0.00 | 91.67 | . | . |
| Dose1 | 55.00 | 27.78 | 86.79 | 99.14 | 0.86 |
| Dose2 | 70.37 | 28.95 | 86.67 | 114.01 | -14.01 |
| Dose3 | 66.31 | 8.89 | 87.23 | 105.81 | -5.81 |

**********
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 | 56 | 0.53 | 0.666 |

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 | 57.34 | . | 60.11 | . | 1.000 | 0.729 | 0.972 | . | . |
| Dose1 | 56.85 | 0.720 | 60.11 | 0.727 | . | 0.679 | 0.956 | . | . |
| Dose2 | 65.37 | 0.966 | 60.11 | 0.761 | . | . | 0.923 | . | . |
| Dose3 | 60.67 | 0.875 | 60.11 | 0.781 | . | . | . | . | . |

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

Mallard repro, Prothioconazole, MRID 46246044
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 |
|---|---|---|---|---|
| 0.961 | 0.058 | 3.527 | 0.021 | USE NON-PARAMETRIC TESTS |

**********
BASIC SUMMARY STATISTICS

| Level | N | Mean | StdDev | StdErr | Coef of Var | 95% Conf. Interval |
|---|---|---|---|---|---|---|
| Ctrl | 13 | 77.35 | 14.32 | 3.97 | 18.51 | 68.70, 86.00 |
| Dose1 | 15 | 70.63 | 15.75 | 4.07 | 22.30 | 61.91, 79.36 |
| Dose2 | 15 | 79.40 | 11.60 | 3.00 | 14.61 | 72.98, 85.83 |
| Dose3 | 16 | 68.51 | 23.86 | 5.97 | 34.83 | 55.79, 81.22 |

| Level | Median | Min | Max | %of Control(means) | %Reduction(means) |
|---|---|---|---|---|---|
| Ctrl | 79.17 | 50.00 | 100.00 | . | . |
| Dose1 | 67.44 | 45.45 | 98.11 | 91.32 | 8.68 |
| Dose2 | 80.43 | 57.89 | 100.00 | 102.66 | -2.66 |
| Dose3 | 79.34 | 10.26 | 93.18 | 88.57 | 11.43 |

**********
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 | 2.71 | 0.438 |

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 | 79.17 | . | . |
| Dose1 | 67.44 | 0.336 | 0.102 |
| Dose2 | 80.43 | 1.000 | 0.688 |
| Dose3 | 79.34 | 1.000 | 0.454 |

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

Mallard repro, Prothioconazole, MRID 46246044
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 |
|---|---|---|---|---|
| 0.985 | 0.662 | 0.789 | 0.505 | USE PARAMETRIC TESTS |

**********
BASIC SUMMARY STATISTICS

| Level | N | Mean | StdDev | StdErr | Coef of Var | 95% Conf. Interval |
|---|---|---|---|---|---|---|
| Ctrl | 15 | 19.87 | 12.78 | 3.30 | 64.34 | 12.79, 26.95 |
| Dose1 | 15 | 22.47 | 12.57 | 3.25 | 55.95 | 15.51, 29.43 |
| Dose2 | 15 | 22.53 | 9.39 | 2.42 | 41.66 | 17.33, 27.73 |
| Dose3 | 16 | 22.50 | 10.09 | 2.52 | 44.86 | 17.12, 27.88 |

| Level | Median | Min | Max | %of Control(means) | %Reduction(means) |
|---|---|---|---|---|---|
| Ctrl | 23.00 | 0.00 | 41.00 | . | . |
| Dose1 | 19.00 | 9.00 | 50.00 | 113.09 | -13.09 |
| Dose2 | 24.00 | 6.00 | 35.00 | 113.42 | -13.42 |
| Dose3 | 22.50 | 3.00 | 40.00 | 113.26 | -13.26 |

**********
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 | 0.21 | 0.892 |

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 | 19.87 | . | 21.85 | . | 0.922 | 0.916 | 0.915 | . | . |
| Dose1 | 22.47 | 0.917 | 21.85 | 0.770 | . | 1.000 | 1.000 | . | . |
| Dose2 | 22.53 | 0.920 | 21.85 | 0.803 | . | . | 1.000 | . | . |
| Dose3 | 22.50 | 0.921 | 21.85 | 0.823 | . | . | . | . | . |

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

Mallard repro, Prothioconazole, MRID 46246044
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 |
|---|---|---|---|---|
| 0.972 | 0.179 | 0.366 | 0.778 | USE PARAMETRIC TESTS |

**********

BASIC SUMMARY STATISTICS

| Level | N | Mean | StdDev | StdErr | Coef of Var | 95% Conf. | Interval |
|---|---|---|---|---|---|---|---|
| Ctrl | 14 | 53.61 | 24.36 | 6.51 | 45.44 | 39.55, | 67.68 |
| Dose1 | 15 | 51.37 | 19.46 | 5.02 | 37.87 | 40.60, | 62.15 |
| Dose2 | 15 | 58.79 | 16.17 | 4.17 | 27.50 | 49.84, | 67.75 |
| Dose3 | 16 | 52.98 | 20.37 | 5.09 | 38.44 | 42.13, | 63.83 |

| Level | Median | Min | Max | %of Control(means) | %Reduction(means) |
|---|---|---|---|---|---|
| Ctrl | 59.50 | 0.00 | 85.42 | . | . |
| Dose1 | 43.18 | 27.78 | 84.91 | 95.82 | 4.18 |
| Dose2 | 61.11 | 28.95 | 80.56 | 109.66 | -9.66 |
| Dose3 | 50.58 | 6.67 | 85.11 | 98.82 | 1.18 |

**********

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 | 56 | 0.38 | 0.769 |

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 | 53.61 | . | 54.61 | . | 0.991 | 0.901 | 1.000 | . | . |
| Dose1 | 51.37 | 0.625 | 54.61 | 0.639 | . | 0.747 | 0.996 | . | . |
| Dose2 | 58.79 | 0.924 | 54.61 | 0.674 | . | . | 0.854 | . | . |
| Dose3 | 52.98 | 0.712 | 52.98 | 0.598 | . | . | . | . | . |

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

Mallard repro, Prothioconazole, MRID 46246044
ANALYSIS RESULTS FOR VARIABLE HS_NH ( HatchingSurvival/NumberHatched (%) )

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

| Shapiro-Wilks Test Stat | Shapiro-Wilks P-value | Levenes Test Stat | Levenes P-value | Conclusion |
|---|---|---|---|---|
| 0.890 | <.001 | 2.096 | 0.111 | USE NON-PARAMETRIC TESTS |

**********

BASIC SUMMARY STATISTICS

| Level | N | Mean | StdDev | StdErr | Coef of Var | 95% Conf. | Interval |
|---|---|---|---|---|---|---|---|
| Ctrl | 13 | 93.49 | 6.88 | 1.91 | 7.36 | 89.33, | 97.65 |
| Dose1 | 15 | 90.19 | 10.12 | 2.61 | 11.22 | 84.59, | 95.79 |
| Dose2 | 15 | 89.91 | 8.39 | 2.17 | 9.33 | 85.27, | 94.56 |
| Dose3 | 16 | 86.84 | 12.74 | 3.19 | 14.67 | 80.05, | 93.63 |

| Level | Median | Min | Max | %of Control(means) | %Reduction(means) |
|---|---|---|---|---|---|
| Ctrl | 94.59 | 76.92 | 100.00 | . | . |
| Dose1 | 90.91 | 66.67 | 100.00 | 96.47 | 3.53 |
| Dose2 | 91.67 | 66.67 | 100.00 | 96.18 | 3.82 |
| Dose3 | 91.55 | 57.89 | 100.00 | 92.89 | 7.11 |

**********

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 | 2.51 | 0.474 |

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 | 94.59 | . | . |
| Dose1 | 90.91 | 0.717 | 0.229 |
| Dose2 | 91.67 | 0.286 | 0.105 |
| Dose3 | 91.55 | 0.254 | 0.069 |

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

Mallard repro, Prothioconazole, MRID 46246044
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 |
|---|---|---|---|---|
| 0.970 | 0.169 | 0.659 | 0.581 | USE PARAMETRIC TESTS |

**********

BASIC SUMMARY STATISTICS

| Level | N | Mean | StdDev | StdErr | Coef of Var | 95% Conf.Interval |
|---|---|---|---|---|---|---|
| Ctrl | 14 | 0.37 | 0.01 | 0.00 | 3.96 | 0.36, 0.38 |
| Dose1 | 15 | 0.37 | 0.01 | 0.00 | 3.82 | 0.36, 0.38 |
| Dose2 | 12 | 0.37 | 0.01 | 0.00 | 3.21 | 0.36, 0.38 |
| Dose3 | 16 | 0.37 | 0.02 | 0.00 | 4.12 | 0.36, 0.38 |

| Level | Median | Min | Max | %of Control(means) | %Reduction(means) |
|---|---|---|---|---|---|
| Ctrl | 0.37 | 0.35 | 0.40 | . | . |
| Dose1 | 0.37 | 0.35 | 0.40 | 100.39 | -0.39 |
| Dose2 | 0.37 | 0.35 | 0.39 | 100.84 | -0.84 |
| Dose3 | 0.38 | 0.35 | 0.40 | 101.24 | -1.24 |

**********

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 | 53 | 0.29 | 0.834 |

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 | 0.37 | . | 0.37 | . | 0.993 | 0.945 | 0.817 | . | . |
| Dose1 | 0.37 | 0.836 | 0.37 | 0.755 | . | 0.990 | 0.928 | . | . |
| Dose2 | 0.37 | 0.904 | 0.37 | 0.780 | . | . | 0.993 | . | . |
| Dose3 | 0.37 | 0.952 | 0.37 | 0.808 | . | . | . | . | . |

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

Mallard repro, Prothioconazole, MRID 46246044
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 |
|---|---|---|---|---|
| 0.982 | 0.510 | 0.192 | 0.901 | USE PARAMETRIC TESTS |

**********

BASIC SUMMARY STATISTICS

| Level | N | Mean | StdDev | StdErr | Coef of Var | 95% Conf.Interval |
|---|---|---|---|---|---|---|
| Ctrl | 13 | 36.52 | 2.43 | 0.67 | 6.65 | 35.05, 37.98 |
| Dose1 | 15 | 37.34 | 2.41 | 0.62 | 6.44 | 36.01, 38.67 |
| Dose2 | 15 | 36.61 | 2.72 | 0.70 | 7.42 | 35.11, 38.12 |
| Dose3 | 16 | 37.27 | 2.22 | 0.56 | 5.97 | 36.08, 38.45 |

| Level | Median | Min | Max | %of Control(means) | %Reduction(means) |
|---|---|---|---|---|---|
| Ctrl | 36.80 | 31.90 | 41.10 | . | . |
| Dose1 | 37.10 | 33.60 | 41.20 | 102.26 | -2.26 |
| Dose2 | 36.90 | 31.30 | 41.00 | 100.27 | -0.27 |
| Dose3 | 37.35 | 33.00 | 40.50 | 102.06 | -2.06 |

**********

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 | 55 | 0.45 | 0.719 |

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 | 36.52 | . | 36.96 | . | 0.810 | 1.000 | 0.843 | . | . |
| Dose1 | 37.34 | 0.949 | 36.96 | 0.769 | . | 0.848 | 1.000 | . | . |
| Dose2 | 36.61 | 0.776 | 36.95 | 0.799 | . | . | 0.878 | . | . |
| Dose3 | 37.27 | 0.941 | 36.95 | 0.819 | . | . | . | . | . |

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

Mallard repro, Prothioconazole, MRID 46246044
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 |
|---|---|---|---|---|
| 0.972 | 0.194 | 1.526 | 0.218 | USE PARAMETRIC TESTS |

**********

BASIC SUMMARY STATISTICS

| Level | N | Mean | StdDev | StdErr | Coef of Var | 95% Conf. Interval |
|---|---|---|---|---|---|---|
| Ctrl | 13 | 147.92 | 16.51 | 4.58 | 11.16 | 137.95, 157.90 |
| Dose1 | 15 | 144.53 | 13.30 | 3.43 | 9.20 | 137.17, 151.90 |
| Dose2 | 15 | 142.07 | 16.03 | 4.14 | 11.29 | 133.19, 150.95 |
| Dose3 | 16 | 147.50 | 10.74 | 2.68 | 7.28 | 141.78, 153.22 |

| Level | Median | Min | Max | %of Control(means) | %Reduction(means) |
|---|---|---|---|---|---|
| Ctrl | 146.00 | 125.00 | 183.00 | . | . |
| Dose1 | 143.00 | 130.00 | 175.00 | 97.71 | 2.29 |
| Dose2 | 143.00 | 117.00 | 172.00 | 96.04 | 3.96 |
| Dose3 | 147.50 | 125.00 | 167.00 | 99.71 | 0.29 |

**********

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 | 55 | 0.55 | 0.652 |

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 | 147.92 | . | 147.92 | . | 0.922 | 0.698 | 1.000 | . | . |
| Dose1 | 144.53 | 0.473 | 144.76 | 0.334 | . | 0.964 | 0.937 | . | . |
| Dose2 | 142.07 | 0.283 | 144.76 | 0.357 | . | . | 0.712 | . | . |
| Dose3 | 147.50 | 0.709 | 144.76 | 0.366 | . | . | . | . | . |

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

Mallard repro, Prothioconazole, MRID 46246044
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 |
|---|---|---|---|---|
| 0.992 | 0.954 | 1.196 | 0.319 | USE PARAMETRIC TESTS |

**********

BASIC SUMMARY STATISTICS

| Level | N | Mean | StdDev | StdErr | Coef of Var | 95% Conf. | Interval |
|---|---|---|---|---|---|---|---|
| Ctrl | 15 | 115.27 | 23.01 | 5.94 | 19.96 | 102.52, | 128.01 |
| Dose1 | 15 | 106.80 | 14.19 | 3.66 | 13.29 | 98.94, | 114.66 |
| Dose2 | 15 | 116.53 | 15.22 | 3.93 | 13.06 | 108.10, | 124.96 |
| Dose3 | 16 | 126.06 | 20.09 | 5.02 | 15.93 | 115.36, | 136.77 |

| Level | Median | Min | Max | %of Control(means) | %Reduction(means) |
|---|---|---|---|---|---|
| Ctrl | 117.00 | 73.00 | 161.00 | . | . |
| Dose1 | 105.00 | 85.00 | 138.00 | 92.65 | 7.35 |
| Dose2 | 121.00 | 83.00 | 140.00 | 101.10 | -1.10 |
| Dose3 | 127.00 | 89.00 | 161.00 | 109.37 | -9.37 |

**********

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 | 2.82 | 0.047 |

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 | 115.27 | . | 116.33 | . | 0.596 | 0.998 | 0.374 | . | . |
| Dose1 | 106.80 | 0.231 | 116.33 | 0.649 | . | 0.480 | 0.027 | . | . |
| Dose2 | 116.53 | 0.811 | 116.33 | 0.684 | . | . | 0.485 | . | . |
| Dose3 | 126.06 | 0.994 | 116.33 | 0.704 | . | . | . | . | . |

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

Mallard repro, Prothioconazole, MRID 46246044
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 |
|---|---|---|---|---|
| 0.969 | 0.125 | 1.115 | 0.350 | USE PARAMETRIC TESTS |

**********

BASIC SUMMARY STATISTICS

| Level | N | Mean | StdDev | StdErr | Coef of Var | 95% Conf. Interval |
|---|---|---|---|---|---|---|
| Ctrl | 15 | 59.13 | 88.40 | 22.82 | 149.49 | 10.18, 108.09 |
| Dose1 | 15 | 75.40 | 58.32 | 15.06 | 77.34 | 43.11, 107.69 |
| Dose2 | 15 | 76.13 | 98.47 | 25.42 | 129.33 | 21.60, 130.66 |
| Dose3 | 16 | 72.56 | 89.52 | 22.38 | 123.37 | 24.86, 120.27 |

| Level | Median | Min | Max | %of Control(means) | %Reduction(means) |
|---|---|---|---|---|---|
| Ctrl | 68.00 | -63.00 | 220.00 | . | . |
| Dose1 | 91.00 | -6.00 | 194.00 | 127.51 | -27.51 |
| Dose2 | 54.00 | -55.00 | 280.00 | 128.75 | -28.75 |
| Dose3 | 72.50 | -66.00 | 222.00 | 122.71 | -22.71 |

**********

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 | 57 | 0.13 | 0.942 |

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 | 59.13 | . | 70.84 | . | 0.953 | 0.947 | 0.971 | . | . |
| Dose1 | 75.40 | 0.897 | 70.84 | 0.734 | . | 1.000 | 1.000 | . | . |
| Dose2 | 76.13 | 0.902 | 70.84 | 0.768 | . | . | 0.999 | . | . |
| Dose3 | 72.56 | 0.879 | 70.84 | 0.788 | . | . | . | . | . |

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

Mallard repro, Prothioconazole, MRID 46246044
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 |
|---|---|---|---|---|
| 0.978 | 0.343 | 0.432 | 0.731 | USE PARAMETRIC TESTS |

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BASIC SUMMARY STATISTICS

| Level | N | Mean | StdDev | StdErr | Coef of Var | 95% Conf. | Interval |
|---|---|---|---|---|---|---|---|
| Ctrl | 15 | 143.80 | 98.77 | 25.50 | 68.69 | 89.10, | 198.50 |
| Dose1 | 15 | 156.73 | 131.48 | 33.95 | 83.89 | 83.92, | 229.55 |
| Dose2 | 15 | 93.60 | 96.48 | 24.91 | 103.07 | 40.17, | 147.03 |
| Dose3 | 16 | 125.75 | 104.23 | 26.06 | 82.88 | 70.21, | 181.29 |

| Level | Median | Min | Max | %of Control(means) | %Reduction(means) |
|---|---|---|---|---|---|
| Ctrl | 163.00 | -26.00 | 287.00 | . | . |
| Dose1 | 156.00 | -140.00 | 421.00 | 108.99 | -8.99 |
| Dose2 | 109.00 | -95.00 | 210.00 | 65.09 | 34.91 |
| Dose3 | 121.50 | -22.00 | 273.00 | 87.45 | 12.55 |

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

| Numerator df | Denominator df | F-stat | P-value |
|---|---|---|---|
| 3 | 57 | 0.95 | 0.421 |

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 | 143.80 | . | 150.27 | . | 0.988 | 0.588 | 0.967 | . | . |
| Dose1 | 156.73 | 0.851 | 150.27 | 0.652 | . | 0.391 | 0.857 | . | . |
| Dose2 | 93.60 | 0.227 | 110.19 | 0.256 | . | . | 0.843 | . | . |
| Dose3 | 125.75 | 0.558 | 110.19 | 0.260 | . | . | . | . | . |

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

**EAD Assessment of USEPA DER**

Reviewer: Émilie Larivière (#1269); PMRA Date: October 14, 2005

**PMRA Submission Number:** 2004-0843

**Study Type:** Avian Reproduction - Mallard Duck

Frieling, W.J.A.M. 2000. Reproduction Study in Mallard Duck with JAU 6476 (By Dietary Admixture). Unpublished study performed by NOTOX B.V., DD's-Hertogenbosch, The Netherlands. Laboratory Project No. 259919. Study sponsored by Bayer AG, Leverkusen, Germany. Study initiated September September 23, 1999 and completed November 7, 2000.

PMRA DATA CODE: 9.6.3.2
EPA DP Barcode: D303488
OECD Data Point: IIA 8.1.4
EPA MRID: 46246044
EPA Guideline: §71-4b

**Reviewing Agency:** US EPA

**EAD Executive Summary:**

The one-generation reproductive toxicity of JAU 6476 Technical (prothioconazole; purity 98.7 and 96.1%) to groups (16 pens/treatment level) of 1 male and 1 female of 7-month old mallard ducks (*Anas platyrhynchos*) was assessed over approximately 21 weeks. The study followed OECD Guideline 206 and U.S. EPA CFR 40, Part 797.2130 (1991), §71-4 (1982) and OPPTS, Series 850.2300 (*draft*, 1996) and was in compliance with OECD Principles of GLP. Prothioconazole was administered to the birds in the diet at mean measured concentrations of <LOD (negative control), 248, 698, and 1978 mg a.i./kg diet. Nominal concentrations were 0, 245, 700, and 2000 mg a.i./kg diet.

There were no significant treatment-related effects on any adult parameter. In addition, no treatment-related effects were observed on egg production or quality, fertility, early embryonic development, hatching success, or clinical effects or body weights of chicks during the 14-day observation period.

Study author reported results indicated that late embryo survival (after 21 days) was affected by treatment at the 1978 mg a.i./kg diet level, based on a statistically-significant reduction in the percentage of post 21-day embryonic deaths of fertile eggs (28.9 versus 20.9% for the control group). Chick survival was also affected at the 1978 mg a.i./kg diet level, based on a statistically-

significant reduction in the percentage of 14-day old survivors of normal hatchlings (87.4 versus 92.9% for the control group). However, re-analysis of the data by the EPA reviewer indicate that these results may be inaccurate since they were based on parametric analyses without meeting the necessary assumptions. EAD-reviewer parametric statistical analyses using arcsin square root transformed data showed no significant differences between treatments. EPA and EAD reviewer-calculated statistics indicate no significant effects of prothioconazole on hatchling survival at any treatment level. The NOEC is therefore set at 1978 mg a.i./kg diet.

**Results Synopsis**

Test Organism Size/Age: Approximately 7 months old at test initiation (834-1301 g)

NOEC: 1978 mg a.i./kg diet
LOEC: > 1978 mg a.i./kg diet
Endpoint(s) Affected: None.

**Evaluator Comments:**

1. The appropriate PMRA information (PMRA Submission Number, PMRA Data Code, PMRA company code, PMRA active ingredient code, PMRA use site category, OECD data point, name of PMRA secondary reviewer) was added to the EPA-DER as well as information on the chemical name (IUPAC name and synonym) available from the PMRA Chemistry review.

2. The validity criteria according to OECD Guideline 206 and U.S. EPA OPPTS 850.2300 are met. Mortality in the controls was less than 10%; the average number of 14-day old survivors per hen in the controls was 19.8, greater than the criteria of 14 of the OECD and 10 of the U.S. EPA guidelines; the average eggshell thickness for the control group was greater than 0.34 mm.

3. The maximum expected field residue level was not provided, however, the highest level tested was at an appropriate level to approximate field exposure for this species based on currently proposed uses. In addition, OECD Guideline 206 recommends a maximum test concentration of 1000 ppm.

4.The EAD reviewer verified the statistical analyses for the survival of 14 day hatchlings related to the number of eggs hatched, as well as for the post 21 day embryonic death of fertile eggs and obtained no significant differences between treatments, contrary to the results of the study author. These data were arcsin square root transformed prior to running an ANOVA. Data from dead birds were not included in the analyses. Assumptions of homogeneity of variance and normality were met. The lack of significant differences is also supported by results for other incubation parameters (fertile eggs, early and late embryonic death) which were more favourable at the 1978

mg a.i./kg level compared to the other levels, including the control group. The EAD reviewer agrees with the EPA reviewer that the NOEC should be set at 1978 mg a.i./kg diet. The EAD reviewer reviewed the data for the other endpoints and did not feel that redoing other statistical analyses was warranted.

5. The EAD reviewer agrees with the conclusions of the EPA reviewer.

**Study Acceptability:** This study is scientifically sound, fulfills guideline requirements for the reproductive toxicity of prothioconazole to Mallard duck, and is classified as ACCEPTABLE.

## Statistical analyses of the EAD reviewer.

**Arcsin transformed data**

**post 21 d death of fertile eggs (%) (data from dead birds removed)**

One Way Analysis of Variance Friday, October 14, 2005, 13:48:06

Data source: Data 1 in Notebook

Normality Test: Passed (P > 0.200)

Equal Variance Test: Passed (P = 0.734)

| Group Name | N | Missing | Mean | Std Dev | SEM |
|---|---|---|---|---|---|
| control | 14 | 0 | 23.219 | 12.964 | 3.465 |
| 245 mg/kg | 15 | 0 | 28.181 | 10.865 | 2.805 |
| 700 mg/kg | 15 | 0 | 23.945 | 9.571 | 2.471 |
| 2000 mg/kg | 16 | 0 | 31.630 | 14.390 | 3.597 |

| Source of Variation | DF | SS | MS | F | P |
|---|---|---|---|---|---|
| Between Groups | 3 | 703.229 | 234.410 | 1.596 | 0.201 |
| Residual | 56 | 8225.942 | 146.892 | | |
| Total | 59 | 8929.172 | | | |

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.201).

Power of performed test with alpha = 0.050: 0.161

The power of the performed test (0.161) is below the desired power of 0.800.
You should interpret the negative findings cautiously.

**Arcsin transformed data**
**14 day survivors of fertile eggs (%) (data from dead birds removed)**

One Way Analysis of Variance Friday, October 14, 2005, 13:49:05

Data source: Data 1 in Notebook

Normality Test: Passed (P > 0.200)

Equal Variance Test: Passed (P = 0.684)

| Group Name | N | Missing | Mean | Std Dev | SEM |
|---|---|---|---|---|---|
| control | 14 | 1 | 78.160 | 9.534 | 2.644 |
| 245 mg/kg | 15 | 0 | 74.531 | 10.721 | 2.768 |

| | | | | | |
|---|---|---|---|---|---|
| 700 mg/kg | 15 | 0 | 73.389 | 9.032 | 2.332 |
| 2000 mg/kg | 16 | 0 | 71.447 | 11.819 | 2.955 |

| Source of Variation | DF | SS | MS | F | P |
|---|---|---|---|---|---|
| Between Groups | 3 | 336.633 | 112.211 | 1.039 | 0.382 |
| Residual | 55 | 5937.394 | 107.953 | | |
| Total | 58 | 6274.027 | | | |

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.382).

Power of performed test with alpha = 0.050: 0.056

The power of the performed test (0.056) is below the desired power of 0.800.
You should interpret the negative findings cautiously.