

US EPA ARCHIVE DOCUMENT

Data Evaluation Report on the Reproductive Effects of AC 243997 on Avian Species *Colinus virginianus*

PMRA Submission Number

EPA MRID Number 45119714a

Data Requirement: PMRA DATA CODE:
EPA DP Barcode: D275562
OECD Data Point:
EPA MRID: 45119714a
EPA Guideline: 71-4a

Test material: AC 243997 Technical **Purity:** 100%
Common name: Imazapyr
Chemical name: (IUPAC): 2-(4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-3-pyridinecarboxylic acid
CAS name: Not reported
CAS No.: 081334-34-1
Synonyms: AC 243997, CL 243997

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Company Code:
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CITATION: Ahmed, M.S. *et al.*, 1999. Avian Reproduction Studies on AC 243997 Technical. Unpublished studies performed by American Cyanamid Company, Princeton, NJ and Ecological Planning and Toxicology, Inc., Corvallis, OR. Laboratory Project IDs: ECO 97-147 and ~~ECO 97-146~~. Studies submitted by American Cyanamid Company, Princeton, NJ. Studies initiated March 18, 1997 and completed February 22, 1999.



2005535

EXECUTIVE SUMMARY:

The one-generation reproductive toxicity of AC 243997 Technical to groups (16 pens/treatment level) of 1 male and 1 female of 16-week-old bobwhite quail was assessed over 147 days. AC 243997 Technical was administered to the birds in the diet at measured concentrations of 0, 327, and 1670 ppm diet. Nominal concentrations were 0, 360, and 1800 ppm. There were no behavioral abnormalities or other signs of treatment-related toxicity. As a result, the LOAEC was >1670 ppm and the NOEC was 1670 ppm.

This study is scientifically sound, and fulfills the requirements for a chronic reproductive toxicity study with bobwhite quail (§71-4a). As a result, this study is classified as Core.

Results Synopsis

Test Organism Size/Age : 16-weeks old at test initiation (males, 163-219 g; females, 178-235 g)

NOAEC: 1670 mg a.i./kg

LOAEC: >1670 mg a.i./kg

Endpoint(s) Affected: none

I. MATERIALS AND METHODS

GUIDELINE FOLLOWED: The study protocol was based on procedures of the United States Environmental Protection Agency (USEPA), FIFRA Guideline §71-4a, and OECD Guidelines for Testing Chemicals, 206, "Avian Reproduction Test". Deviations from §71-4a are:

- 1) The light intensity at bird level averaged 2.4 footcandles, which is notably less than the recommended illumination of 6.0 footcandles.
- 2) Following collection and prior to incubation, eggs were stored under refrigeration; however, specific temperature and humidity levels were not reported.
- 3) The average hatching temperature and humidity, $29.6 \pm 0.7^{\circ}\text{C}$ and $55.7 \pm 3.5\%$, were less than the recommended values of 39°C and 70%, respectively.
- 4) The proportion of hatchlings per eggs set in the control group (69.4%) was slightly below the typically acceptable criterion of 70 to 98% for Bobwhite quail. This was primarily due to one control pair that laid only one viable egg which failed to hatch. If data from this pair is excluded, the average hatch as a percentage of eggs set is 75.2%.

COMPLIANCE: Signed and dated GLP, Quality Assurance, and Data Confidentiality statements were provided.

A. MATERIALS:

1. Test Material AC 243997 Technical

Description: White powder

Lot No./Batch No.: AC 10925-48

Purity: 100%

Stability of Compound

Under Test Conditions: Samples of treated feed were stored in open feed containers and in bulk closed containers for 7 and 14 days at ambient conditions. Recoveries were 86-89% after 14 days of open storage and 95-101% after 14 days of closed-container storage. Additional frozen samples were stored for 81 days prior to analysis, with recoveries of 97-101%. OECD requirements were not reported.

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

Storage conditions of test chemicals: Dry conditions at room temperature in the dark.

2. Test organism:

Table 1. Test organism.

Parameter	Details	Remarks
		Criteria
Species (common and scientific names):	Northern Bobwhite quail (<i>Colinus virginianus</i>)	<i>EPA requires: a wild waterfowl species, preferably the mallard, Anas platyrhynchos, or an upland game species, preferably the northern bobwhite, Colinus virginianus.</i>
Age at Study Initiation:	16 weeks	<i>EPA requires: birds should be approaching their first breeding season.</i>
Body Weight: (mean and range)	Males: Overall range (n=42) 163 to 219 g, with group means of 193 to 196 g. Females: Overall range (n=42) 178 to 235 g, with group means of 201 to 206 g.	Individual body weights were recorded at the beginning of the acclimation period, bi-weekly during the first 8 weeks of the treatment period, and at study termination. <i>EPA requires that body weights should be recorded at test initiation and at biweekly intervals up to week eight or up to the onset of egg laying and at termination.</i>
Source:	Stevenson Game Bird Farm Riverside, TX.	<i>EPA requires that all birds should be from the same source.</i>

B. STUDY DESIGN:

1. Experimental Conditions

a) Range-finding Study: Not performed.

b) Definitive Study

Table 2. Experimental Parameters.

Parameter	Details	Remarks
		<i>Criteria</i>
Acclimation period: Conditions (same as test or not): Feeding: Health (any mortality observed):	15 days Environmental conditions during acclimation were identical to test conditions. Water and feed were provided <i>ad libitum</i> . Birds were examined once daily during acclimation for mortality and abnormal maintenance or feeding behavior.	Aggressive interactions resulted in some wounding that led to three deaths during acclimation. An additional two females were removed from consideration, one due to blinding (from pecking) and one from low body weight (<150 g). Quail were fed Purina Game Bird Breeder Layena, and tap water from the city of Corvallis. <hr/> <i>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 <u>ad libitum</u>, and sickness, injuries or mortality be noted.</i>

Parameter	Details	Remarks
		Criteria
Test duration pre-laying exposure: egg-laying exposure: withdrawal period, if used:	11 weeks 10 weeks Reduced reproduction was not observed by the study author, so a withdrawal period was not conducted.	After 8 weeks of treatment, the light duration was gradually increased from 7 hours per day to 17 hours per day over a 1-week period. The first egg collection occurred on 9/5/97, 11 weeks after exposure initiation. <hr/> EPA requires <u>Pre-laying exposure duration</u> At least 10 weeks prior to the onset of egg-laying. <u>Exposure duration with egg-laying</u> At least 10 weeks. <u>Withdrawal period</u> If reduced reproduction is evident, a withdrawal period of up to 3 weeks should be added to the test phase.
Pen (for parental and offspring) size: construction materials: number:	Parents (one pair) were housed in 51- x 25- x 23-cm pens. Offspring (by set and group) were housed in 72- x 90- x 23-cm brooders. Parental and offspring pens were constructed of galvanized steel. 16 parental pens/treatment level	Number of pens needed for offspring housing was not specified. <hr/> <u>Pens</u> Adequate room and arranged to prevent cross contamination <u>Materials</u> Nontoxic material and nonbinding material, such as galvanized steel. <u>Number</u> At least 5 replicate pens are required for mallards housed in groups of 7. For other arrangements, at least 12 pens are required, but considerably more may be needed if birds are kept in pairs. Chicks are to be housed according to parental grouping.
Number of birds per pen (male:female)	2 birds/pen (1 male:1 female)	<hr/> 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.

Parameter	Details	Remarks
		Criteria
Number of pens per group/treatment negative control: solvent control: treated:	N/A 16 pens 16 pens/treatment	Pen number is theoretical. Actual number was less due to mortality. <i>EPA requires at least 12 pens, but considerably more if birds are kept in pairs. At least 16 is strongly recommended.</i>
Test concentrations (ppm ai diet) nominal: measured:	0, 360, and 1800 ppm ai diet 0, 327, and 1670 ppm ai diet	While it is acceptable to conduct a study with two concentrations, three or more concentrations are recommended. <i>EPA requires at least two concentrations other than the control are required; three or more are recommended.</i>
Maximum labeled field residue anticipated and source of information:	360 ppm based upon application rate of 1.5 lb a.i./acre and Kenaga nomogram conversion.	<i>EPA requires that the highest test concentrations should show a significant effect or be at or above the actual or expected field residue level. The source [i.e., maximum label rate (in lb ai/A & ppm), label registration no., label date, and site should be cited]</i>
Solvent/vehicle, if used type: amount:	- Acetone and corn oil - 5.4% (v:w) and 2% (w:w), respectively	Although the acetone concentration exceeded 2% of the diet, the acetone was completely evaporated during the 15- to 20-minute mixing period. <i>EPA requires corn oil or other appropriate vehicle not more than 2% of diet by weight</i>
Was detailed description and nutrient analysis of the basal diet provided? (Yes/No)	Yes	Basal diets contained ≥20% protein, ≥2.5% fat, and ≤7% fiber. <i>EPA requires a commercial breeder feed (or its equivalent) that is appropriate for the test species.</i>

Parameter	Details	Remarks
		<i>Criteria</i>
Preparation of test diet	The test material was dissolved in acetone and mixed for 5-6 minutes, and this solution was mixed in corn oil for an additional 5-6 minutes prior to incorporation into the Layena feed. Duplicate batches were prepared and sampled independently and maintained separately. Mixed feed was placed in 1 gallon resealable bags and stored frozen.	The acetone was completely evaporated during the 15- to 20-minute mixing process. <i>A premixed containing the test substance should be mechanically mixed with basal diet. If an evaporative vehicle is used, it must be completely evaporated prior to feeding.</i>
Indicate whether stability and homogeneity of test material in diet determined (Yes/No)	Yes	
Were concentrations in diet verified by chemical analysis?	Yes, samples were collected from feed mixes during weeks 1, 2, 3, 4, 6, 8, 10, 12, 14, 16, 18, and 22 and analyzed via HPLC.	
Did chemical analysis confirm that diet was stable and homogeneous?	Yes	
Feeding and husbandry	Feeding and husbandry conditions appeared to be adequate, given guideline recommendations.	

Parameter	Details	Remarks
		Criteria
Test conditions (pre-laying) temperature: relative humidity: photoperiod:	Average temperature was 21.8 (range of 18.2-28.7 °C). Average humidity was 61.4% (range of 47.0-76.0%). 7 hr light/day up to Week 8 and 17 hr light/day thereafter.	An average of 2.4 footcandles of illumination was maintained at bird level. <i>EPA Requires</i> <i>Temperature:</i> <i>About 21°C (70°F)</i> <i>Relative humidity:</i> <i>About 55%</i> <i>Lighting</i> <i>First 8 weeks: 7 h per day.</i> <i>Thereafter: 16-17 h per day.</i> <i>At least 6 footcandles at bird level.</i>
Egg Collection and Incubation		
Egg collection and storage collection interval: storage temperature: storage humidity:	Eggs were collected daily Under refrigeration (not further specified) Not specified	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?	Not specified	
Incubation conditions temperature: humidity:	28.7 ± 0.8°C 51.5 ± 3.5%	

Parameter	Details	Remarks
		Criteria
When candling was done for fertility?	Day 11 for fertility and Day 18 for viability.	EPA requires: Quail: approx. day 11 Ducks: approx. day 14
When the eggs were transferred to the hatcher?	End of Day 20	EPA requires: Bobwhite: day 21 Mallard: day 23
Hatching conditions temperature: humidity: photoperiod:	29.6 ± 0.7°C 55.7 ± 3.5% Not reported	EPA requires: temperature of 39°C (102°F) humidity of 70%
Day the hatched eggs were removed and counted	Day 24	EPA requires Bobwhite: day 24 Mallard: day 27
Were egg shells washed and dried for at least 48 hrs before measuring?	Yes, shells were washed and air-dried for at least 48 hours.	
Egg shell thickness no. of eggs used: intervals: mode of measurement:	66 of the 99 eggs collected were measured for thickness Collections occurred on 9/18/97, 10/2/97, 10/9/97, and 11/6/97. Five points around the equatorial circumference were measured to the nearest 0.001 mm.	Eggs collected on 11/6/97 were never measured for egg shell thickness. EPA requires newly hatched eggs be collected at least once every two weeks. Thickness of the shell plus membrane should be measured to the nearest 0.01 mm; 3 - 4 measurements per shell.
Reference chemical, if used	None used	

2. Observations:

Table 3: Observations

Parameter	Details	Remarks/Criteria
Parameters measured		
Parental: (mortality, body weight, mean feed consumption)	- mortality - body weight - food consumption - signs of toxicity - necropsy	
Egg collection and subsequent development: (no. of eggs laid, no. of eggs cracked, shell thickness, no. of eggs set, no. of viable embryos, no. of live 3 week embryos, no. hatched, no. of 14-day survivors, average weight of 14-d old survivors, mortality, gross pathology, others)	- eggs laid - eggs cracked - eggs set - eggshell thickness - viable embryos - live 3-week embryos - hatchling success - normal hatchlings - hatchling body weight - 14-day-old survivors - 14-day-old survivor body weight - signs of toxicity	<i>EPA requires:</i> • Eggs laid/pen • Eggs cracked/pen • Eggs set/pen • Viable embryos/pen • Live 3-week embryos/pen • Normal hatchlings/pen • 14-day-old survivors/pen • 14-day-old survivors/pen • Weights of 14-day-old survivors (mean per pen) • Egg shell thickness • Food consumption (mean per pen) • Initial and final body weight (mean per pen)
Indicate if the test material was regurgitated	No indications of dietary regurgitation.	
Observation intervals (for various parameters)	Mortality and signs of toxicity were recorded once daily for parents and hatchlings. Parental body weights were recorded bi-weekly through the start of photostimulation (6/17/97, 7/1/97, 7/15/97, 7/29/97, and 8/12/97), and at adult termination (11/12/97). Parental food consumption was determined each Monday and Wednesday. Gross pathological examinations were performed on all decedent quail (and their penmates) and on half of the test animals from control and treatment groups that survived to study termination.	<i>Body weights and food consumption must be measured at least biweekly.</i>
Were raw data included?	Yes	

II. RESULTS AND DISCUSSION:

A. MORTALITY:

Six mortalities were observed during the treatment-phase of the experiment, and necropsies were performed. On Day 22, one female from the 1670 ppm (mean-measured concentration) group was found dead with her head trapped under the wire at the front of the cage. On Day 117, one male from the control group was found dead in his cage, apparently due to physical injuries. On Day 138, one male from the 1670 ppm group was found dead in his cage, also apparently due to physical injuries. On Day 140, one female from the 327 ppm group was found dead in her cage; no cause of death was determined. On Day 142, one female from the control group was found dead; necropsy revealed a yolk sac had internally ruptured. On Day 146, one female from the 1670 ppm group was found dead in her cage; no cause of death was determined. The cage mates of these birds were euthanized and also necropsied, and no abnormalities were observed. The six cages were removed from all subsequent analyses. There were no other mortalities during the experiment, and all deaths observed were not considered to be related to treatment with AC 243997 Technical.

Table 4: Effect of AC 243997 Technical on mortality of *Colinus virginianus*.¹

Treatment (ppm ai diet) ²	Observation Period					
	Week 8		Week 16		Week 21	
	No. Dead Male	No. Dead Female	No. Dead Male	No. Dead Female	No. Dead Male	No. Dead Female
Control	0	0	0	0	1	1
327 (360)	0	0	0	0	0	1
1670 (1800)	0	1	0	1	1	2

¹ When a death was observed, the penmate (when applicable) was euthanized and also subject to a gross pathological examination; however, the penmate’s mortality was not included in this table.

² Nominal concentrations are in parentheses.

B. REPRODUCTIVE AND OTHER ENDPOINTS:

There were no overt signs of treatment-related toxicity during the study. There were a few instances of cage injury and pair aggression, two pair (one from the control group and one from the 327 ppm group) had watery feces and urea for a few days during the 12th week, and blood in the feces was observed in one cage (1670-ppm group) on 9/29/97.

No treatment-related gross pathological findings were present at necropsy of adult birds at study termination. Findings were observed in 6 of 48 animals examined, and included discolored breast tissue in one control female, a discolored spleen in one 327-ppm female, mottled and/or discolored liver in one 327-ppm female and one 1670-ppm female, and excessive amounts of fat on the heart in two female and one male from the 1670-ppm group.

No significant differences were detected for adult body weight (gender specific), adult food consumption, or any reproductive parameter. Body weights (of hatchlings and 14-day-old survivors) and survivability of offspring from treatment groups also did not significantly differ from controls.

Table 5. Reproductive and other parameters.

Parameter	Control	327 ppm ai	1670 ppm ai	NOAEC/ LOAEC
Eggs laid/pen	40.2	42.4	40.6	1670 >1670
Eggs laid/hen/day	0.6	0.6	0.6	1670 >1670
Eggs cracked	0.9	1.4	1.4	1670 >1670
Eggs cracked/eggs laid	1.9	3.5	3.2	1670 >1670
Eggs set/pen	36.9	38.7	36.6	1670 >1670
Shell thickness (mm ± SD)	0.213 ± 0.013	0.214 ± 0.018	0.216 ± 0.020	1670 >1670
Viable embryos/hen	32.7	37.3	33.7	1670 >1670
Live 3-week embryos/hen	32.4	36.9	33.5	1670 >1670
No. of hatchling/hen	27.5	27.6	26.0	1670 >1670
No. of normal hatchlings	There were no abnormally formed hatchlings observed in the study.			
Hatchling weight (g)	7.0	7.2	7.1	1670 >1670
14-day old survivors/hen	24.2	24.0	23.0	1670 >1670
14-day old survivors weight (g)	29.8	29.9	30.3	1670 >1670
Mean food consumption (g/bird/day)	16.7	17.1	17.5	1670 >1670
Weight of adult males, g at start of treatment: at start of photostimulation: at termination:	194 ± 13 208 ± 11 208 ± 17	193 ± 10 210 ± 10 208 ± 17	196 ± 13 210 ± 13 222 ± 20	1670 >1670
Weight of adult females, g at start of treatment: at start of photostimulation: at termination:	206 ± 15 216 ± 15 241 ± 34	201 ± 10 214 ± 9 235 ± 20	201 ± 14 214 ± 20 236 ± 34	1670 >1670

Parameter	Control	327 ppm ai	1670 ppm ai	NOAEC/ LOAEC
Gross pathology	No treatment-related findings.			1670 >1670

ND = Not determined

C. REPORTED STATISTICS:

Analyses were conducted using Statistica for Windows (1994). Variables included adult body weights (biweekly prior to egg laying and termination weight), feed consumption, total eggs laid per hen, percentage of eggs cracked, eggshell thickness, fertile eggs (per cage and as percent of eggs set), live 18-day-old embryos (per cage and as a percentage of fertile eggs), normal hatchlings (as percent of 18-day-old viable embryos), 14-day-old survivors per hen, 14-day-old survivors per cage and as percent of normal hatchlings, hatchling weight (day of hatch and 14 days post-hatch).

Levene’s and Kolomogrov-Smirnov tests were conducted on variables to determine homogeneity of variances and normality, respectively. Percentage data were arcsine transformed. If the data conformed to assumptions of normality of distribution, then a standard Analysis of Variance (ANOVA) was used for examination of each parameter to determine whether or not there were differences among treatments. When ANOVA detected significant differences among groups, a Least Significant Difference (LSD) test was run as a means separation procedure. If data violated ANOVA assumptions (normality, equal variances), the Kruskal-Wallis ANOVA by ranks and median test was used.

D. VERIFICATION OF STATISTICAL RESULTS:

Statistical Method: Analyses were conducted using “chicks.sas” (Ver. 3; March 2002), a SAS program provided by USEPA/OPP/EFED. 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 the LOAEC and NOAEC. Data for each endpoint were tested to determine if their distributions were normal and if their variances were homogeneous using Shapiro-Wilk’s and Levene’s tests, respectively. Data that satisfied these assumptions were subjected to Dunnett’s and William’s tests and data that did not satisfy these assumptions were subjected to the nonparametric MannWhitney-U (with a Bonferroni adjustment) and Jonckheere’s tests. See Appendix I for output of reviewer’s statistical verification and graphs for affected endpoints to support any reviewer-generated conclusions that may differ from those reported in the study.

NOAEC: 1670 ppm ai
 LOAEC: >1670 ppm ai
 Endpoint(s) Affected: none

E. STUDY DEFICIENCIES:

There were also several deviations from US EPA guideline recommendations, including the number of treatment levels (three or four is recommended), and environmental conditions during the adult phase and hatching.

F. REVIEWER'S COMMENTS:

The reviewer's conclusions agreed from those of the study authors. The study authors did not detect any treatment related effects of AC 243997 on any adult or reproductive parameters. This study satisfies the guideline requirements for an avian reproductive toxicity study with bobwhite quail and it is classified as Core.

The dietary concentrations were chosen based on the application rate of 1.5 lb a.i./acre. The study authors reported that according to the Kenaga nomogram, this correlates to a maximum field residue of 360 ppm in short grass. Therefore, the highest nominal concentration tested, 1800 ppm, provided a 5-fold margin of safety.

G. CONCLUSIONS:

This study is scientifically sound, and fulfills the requirements for a chronic reproductive toxicity study with bobwhite quail (§71-4a). As a result, this study is classified as Core.

NOAEC: 1670 ppm ai

LOAEC: >1670 ppm ai

Endpoint(s) Affected: none

III. REFERENCES:

Institute of Laboratory Animal Resources, Commission on Life Sciences. 1985. *Guide for the care and use of laboratory animals*. U.S. Department of Health and Human Services, Public Health Service, National Institute of Health. 83 pp.

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

Sokal, R.R. and F.J. Rohlf. 1969. *Biometry*. W.H. Freeman, San Francisco.

Statistica for Windows, Copyright 1994, Statsoft, Inc., Tulsa, OK.

U.S. Environ. Protection Agency. 1988. *Pesticide Assessment Guidelines, Subdivision E, Hazard Evaluation: Wildlife and Aquatic Organisms. Series 71: Avian and Mammalian Testing*. pp. 46-53.

APPENDIX I. OUTPUT OF REVIEWER'S STATISTICAL VERIFICATION:

Bobwhite quail reproduction, Imazapyr, MRID 45119714

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	.	.	.	.	.	.	.	.	.	.	.	.
2	Ctrl	30	1	96.67	27	90.00	23	85.19	23	100.00	12	40.00	44.44
3	Ctrl	44	0	100.00	40	90.91	37	92.50	37	100.00	28	63.64	70.00
4	Ctrl	45	2	95.56	41	91.11	35	85.37	35	100.00	28	62.22	68.29
5	Ctrl	54	2	96.30	48	88.89	42	87.50	42	100.00	40	74.07	83.33
6	Ctrl	39	0	100.00	37	94.87	31	83.78	31	100.00	25	64.10	67.57
7	Ctrl	53	3	94.34	47	88.68	21	44.68	20	95.24	20	37.74	42.55
8	Ctrl	56	2	96.43	51	91.07	49	96.08	47	95.92	34	60.71	66.67
9	Ctrl	1	0	100.00	1	100.00	1	100.00	1	100.00	0	0.00	0.00
10	Ctrl	38	1	97.37	36	94.74	36	100.00	36	100.00	31	81.58	86.11
11	Ctrl	37	0	100.00	34	91.89	34	100.00	33	97.06	32	86.49	94.12
12	Ctrl	57	1	98.25	53	92.98	51	96.23	51	100.00	45	78.95	84.91
13	Ctrl	38	0	100.00	35	92.11	35	100.00	35	100.00	33	86.84	94.29
14	Ctrl	31	0	100.00	30	96.77	30	100.00	30	100.00	30	96.77	100.00
15	Dose1	56	0	100.00	52	92.86	52	100.00	52	100.00	30	53.57	57.69
16	Dose1	51	5	90.20	42	82.35	42	100.00	41	97.62	34	66.67	80.95
17	Dose1	38	2	94.74	37	97.37	35	94.59	33	94.29	21	55.26	56.76
18	Dose1	62	0	100.00	58	93.55	57	98.28	57	100.00	41	66.13	70.69
19	Dose1	32	2	93.75	28	87.50	25	89.29	24	96.00	19	59.38	67.86
20	Dose1	43	2	95.35	38	88.37	38	100.00	38	100.00	31	72.09	81.58
21	Dose1	47	3	93.62	43	91.49	36	83.72	34	94.44	20	42.55	46.51
22	Dose1	56	0	100.00	52	92.86	52	100.00	52	100.00	43	76.79	82.69
23	Dose1	.	.	.	.	.	.	.	.	.	.	.	.
24	Dose1	38	1	97.37	34	89.47	34	100.00	34	100.00	25	65.79	73.53
25	Dose1	48	0	100.00	45	93.75	45	100.00	45	100.00	40	83.33	88.89
26	Dose1	15	0	100.00	15	100.00	13	86.67	13	100.00	11	73.33	73.33
27	Dose1	43	2	95.35	38	88.37	38	100.00	38	100.00	33	76.74	86.84
28	Dose1	34	3	91.18	30	88.24	30	100.00	30	100.00	17	50.00	56.67
29	Dose1	30	0	100.00	30	100.00	25	83.33	25	100.00	21	70.00	70.00
30	Dose2	36	1	97.22	33	91.67	32	96.97	32	100.00	21	58.33	63.64
31	Dose2	52	0	100.00	48	92.31	48	100.00	48	100.00	35	67.31	72.92
32	Dose2	37	0	100.00	35	94.59	34	97.14	34	100.00	32	86.49	91.43
33	Dose2	24	1	95.83	19	79.17	17	89.47	17	100.00	9	37.50	47.37
34	Dose2	52	2	96.15	46	88.46	40	86.96	40	100.00	33	63.46	71.74
35	Dose2	55	2	96.36	50	90.91	49	98.00	48	97.96	31	56.36	62.00
36	Dose2	.	.	.	.	.	.	.	.	.	.	.	.
37	Dose2	40	1	97.50	37	92.50	35	94.59	35	100.00	22	55.00	59.46
38	Dose2	37	2	94.59	33	89.19	32	96.97	32	100.00	30	81.08	90.91
39	Dose2	45	4	91.11	40	88.89	26	65.00	26	100.00	21	46.67	52.50
40	Dose2	44	1	97.73	40	90.91	38	95.00	38	100.00	33	75.00	82.50
41	Dose2	58	3	94.83	51	87.93	46	90.20	45	97.83	43	74.14	84.31
42	Dose2	7	0	100.00	7	100.00	7	100.00	7	100.00	2	28.57	28.57

Data Evaluation Report on the Reproductive Effects of AC 243997 on Avian Species *Colinus virginianus*

PMRA Submission Number

EPA MRID Number 45119714a

Bobwhite quail reproduction, Imazapyr, MRID 45119714

PRINTOUT OF RAW DATA (continued)

Obs	TRT	NH_LE	HS	HS_ES	HS_NH	THICK	HATWT	SURVWT	FOOD	WTGAINM	WTGAINF
1	Ctrl	.	.	.	.	.	.	.	.	-5	30
2	Ctrl	52.17	11	40.74	91.67	0.22	6	28	17	47	65
3	Ctrl	75.68	28	70.00	100.00	0.20	8	28	16	14	39
4	Ctrl	80.00	23	56.10	82.14	0.19	7	30	18	36	35
5	Ctrl	95.24	35	72.92	87.50	0.23	7	29	18	11	50
6	Ctrl	80.65	21	56.76	84.00	0.22	7	29	16	16	15
7	Ctrl	100.00	13	27.66	65.00	0.24	7	33	18	-4	64
8	Ctrl	72.34	30	58.82	88.24	0.23	7	27	18	10	43
9	Ctrl	0.00	0	0.00	.	0.23	.	.	15	13	-49
10	Ctrl	86.11	26	72.22	83.87	0.21	7	29	16	7	24
11	Ctrl	96.97	29	85.29	90.63	0.21	7	30	16	22	44
12	Ctrl	88.24	42	79.25	93.33	0.20	7	32	17	32	38
13	Ctrl	94.29	32	91.43	96.97	0.20	7	31	15	13	58
14	Ctrl	100.00	25	83.33	83.33	0.20	7	31	17	-6	30
15	Dose1	57.69	26	50.00	86.67	0.23	7	32	16	10	53
16	Dose1	82.93	28	66.67	82.35	0.21	8	33	18	.	40
17	Dose1	63.64	20	54.05	95.24	.	7	31	16	14	29
18	Dose1	71.93	36	62.07	87.80	0.23	6	29	17	22	47
19	Dose1	79.17	18	64.29	94.74	0.19	7	28	15	16	31
20	Dose1	81.58	25	65.79	80.65	0.23	8	31	17	15	29
21	Dose1	58.82	17	39.53	85.00	0.22	8	26	20	0	49
22	Dose1	82.69	41	78.85	95.35	0.24	7	33	19	7	56
23	Dose1	.	.	.	.	.	.	.	16	18	44
24	Dose1	73.53	22	64.71	88.00	0.22	7	31	16	-4	38
25	Dose1	88.89	36	80.00	90.00	0.20	7	29	17	9	27
26	Dose1	84.62	10	66.67	90.91	.	7	30	19	16	24
27	Dose1	86.84	28	73.68	84.85	0.21	7	28	18	35	31
28	Dose1	56.67	12	40.00	70.59	0.18	7	30	17	61	-7
29	Dose1	84.00	17	56.67	80.95	.	7	28	15	1	22
30	Dose2	65.63	16	48.48	76.19	0.24	7	27	16	10	32
31	Dose2	72.92	29	60.42	82.86	0.24	7	28	17	11	8
32	Dose2	94.12	31	88.57	96.88	0.18	6	29	16	24	25
33	Dose2	52.94	7	36.84	77.78	0.20	7	30	16	-4	51
34	Dose2	82.50	30	65.22	90.91	0.20	7	35	19	52	46
35	Dose2	64.58	31	62.00	100.00	0.23	7	32	18	13	42
36	Dose2	.	.	.	.	.	.	.	.	36	6
37	Dose2	62.86	20	54.05	90.91	0.21	7	29	20	16	33
38	Dose2	93.75	27	81.82	90.00	0.23	8	32	18	22	56
39	Dose2	80.77	21	52.50	100.00	0.22	8	31	18	59	96
40	Dose2	86.84	23	57.50	69.70	0.23	7	29	17	31	60
41	Dose2	95.56	39	76.47	90.70	0.21	7	32	18	30	33
42	Dose2	28.57	2	28.57	100.00	.	7	30	17	34	-29

Data Evaluation Report on the Reproductive Effects of AC 243997 on Avian Species *Colinus virginianus*

PMRA Submission Number

EPA MRID Number 45119714a

Bobwhite quail reproduction, Imazapyr, MRID 45119714

ANALYSIS RESULTS FOR VARIABLE EL (Eggs Laid)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS

Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01

Levenes test for homogeneity of variance (absolute residuals) -- alpha-level=0.05

Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks	Shapiro-Wilks	Levenes	Levenes	Conclusion
Test Stat	P-value	Test Stat	P-value	
0.922	0.010	0.037	0.964	USE PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	13	40.23	14.92	4.14	37.08	31.22,	49.25
Dose1	14	42.36	12.41	3.32	29.31	35.19,	49.52
Dose2	12	40.58	14.31	4.13	35.26	31.49,	49.68

Level	Median	Min	Max	%of Control (means)	%Reduction (means)
Ctrl	39.00	1.00	57.00	.	.
Dose1	43.00	15.00	62.00	105.29	-5.29
Dose2	42.00	7.00	58.00	100.88	-0.88

PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Analysis of Variance (ANOVA) - overall F-test

Numerator df	Denominator df	F-stat	P-value
2	36	0.09	0.913

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	40.23	.	41.33	.	0.917	0.998	.	.	.
Dose1	42.36	0.806	41.33	0.669	.	0.944	.	.	.
Dose2	40.58	0.692	40.58	0.645	.	.	.	.	.

SUMMARY

	NOEC	LOEC
Dunnett	Dose2	>highest dose
Williams	Dose2	>highest dose

Data Evaluation Report on the Reproductive Effects of AC 243997 on Avian Species *Colinus virginianus*

PMRA Submission Number

EPA MRID Number 45119714a

Bobwhite quail reproduction, Imazapyr, MRID 45119714
 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
0.911	0.005	1.413	0.257	USE NON-PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	13	0.92	1.04	0.29	112.42	0.30,	1.55
Dose1	14	1.43	1.55	0.42	108.84	0.53,	2.33
Dose2	12	1.42	1.24	0.36	87.54	0.63,	2.20

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	1.00	0.00	3.00	.	.
Dose1	1.50	0.00	5.00	154.76	-54.76
Dose2	1.00	0.00	4.00	153.47	-53.47

NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Kruskal-Wallis test - equality among treatment groups
 Degrees of Freedom TestStat P-value
 2 1.07 0.586

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

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	1.00	.	.
Dose1	1.50	0.478	0.228
Dose2	1.00	1.000	0.169

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose2	>highest dose
Jonckheere	Dose2	>highest dose

Data Evaluation Report on the Reproductive Effects of AC 243997 on Avian Species *Colinus virginianus*
PMRA Submission Number **EPA MRID Number 45119714a**

Bobwhite quail reproduction, Imazapyr, MRID 45119714
 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
0.932	0.021	3.488	0.041	USE NON-PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	13	98.07	2.06	0.57	2.10	96.82,	99.31
Dose1	14	96.54	3.55	0.95	3.68	94.49,	98.59
Dose2	12	96.78	2.61	0.75	2.70	95.12,	98.44

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	98.25	94.34	100.00	.	.
Dose1	96.36	90.20	100.00	98.44	1.56
Dose2	96.79	91.11	100.00	98.68	1.32

NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
2	1.87	0.393

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

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	98.25	.	.
Dose1	96.36	0.274	0.126
Dose2	96.79	0.243	0.135

SUMMARY

	NOEC	LOEC
MannWhit (Bonf adjust)	Dose2	>highest dose
Jonckheere	Dose2	>highest dose

Data Evaluation Report on the Reproductive Effects of AC 243997 on Avian Species *Colinus virginianus*

PMRA Submission Number

EPA MRID Number 45119714a

Bobwhite quail reproduction, Imazapyr, MRID 45119714
 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
0.929	0.016	0.029	0.971	USE PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	13	36.92	13.41	3.72	36.31	28.82,	45.02
Dose1	14	38.71	11.26	3.01	29.09	32.21,	45.22
Dose2	12	36.58	12.94	3.74	35.38	28.36,	44.81

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	37.00	1.00	53.00	.	.
Dose1	38.00	15.00	58.00	104.85	-4.85
Dose2	38.50	7.00	51.00	99.08	0.92

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
2	36	0.11	0.895

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	36.92	.	37.85	.	0.927	0.997	.	.	.
Dose1	38.71	0.798	37.85	0.663	.	0.902	.	.	.
Dose2	36.58	0.640	36.58	0.588	.	.	.	.	.

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

Data Evaluation Report on the Reproductive Effects of AC 243997 on Avian Species *Colinus virginianus*

PMRA Submission Number

EPA MRID Number 45119714a

Bobwhite quail reproduction, Imazapyr, MRID 45119714
 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
0.958	0.147	0.804	0.455	USE PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	13	92.62	3.24	0.90	3.50	90.66,	94.58
Dose1	14	91.87	4.99	1.33	5.43	88.99,	94.75
Dose2	12	90.54	4.86	1.40	5.36	87.46,	93.63

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	91.89	88.68	100.00	.	.
Dose1	92.17	82.35	100.00	99.19	0.81
Dose2	90.91	79.17	100.00	97.76	2.24

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
2	36	0.69	0.506

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	Dose1	Dose2	Tukey p-values		
							Dose3	Dose4	Dose5
Ctrl	92.62	.	92.62	.	0.900	0.480	.	.	.
Dose1	91.87	0.483	91.87	0.395	.	0.730	.	.	.
Dose2	90.54	0.206	90.54	0.159	.	.	.	.	.

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

Bobwhite quail reproduction, Imazapyr, MRID 45119714
 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
0.953	0.103	0.002	0.998	USE PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	13	32.69	12.83	3.56	39.24	24.94,	40.44
Dose1	14	37.29	11.98	3.20	32.14	30.37,	44.20
Dose2	12	33.67	12.46	3.60	37.00	25.75,	41.58

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	35.00	1.00	51.00	.	.
Dose1	37.00	13.00	57.00	114.05	-14.05
Dose2	34.50	7.00	49.00	102.98	-2.98

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
2	36	0.51	0.602

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	Dose1	Dose2	Tukey p-values		
					Dose3	Dose4	Dose5		
Ctrl	32.69	.	35.07	.	0.606	0.979	.	.	.
Dose1	37.29	0.930	35.07	0.775	.	0.741	.	.	.
Dose2	33.67	0.741	33.67	0.700	.	.	.	.	.

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

Data Evaluation Report on the Reproductive Effects of AC 243997 on Avian Species *Colinus virginianus*

PMRA Submission Number

EPA MRID Number 45119714a

Bobwhite quail reproduction, Imazapyr, MRID 45119714
 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
0.736	<.001	1.124	0.336	USE NON-PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	13	90.10	15.07	4.18	16.73	80.99,	99.21
Dose1	14	95.42	6.64	1.78	6.96	91.58,	99.26
Dose2	12	92.53	9.61	2.77	10.39	86.42,	98.63

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	96.08	44.68	100.00	.	.
Dose1	100.00	83.33	100.00	105.90	-5.90
Dose2	95.98	65.00	100.00	102.69	-2.69

NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Kruskal-Wallis test - equality among treatment groups
 Degrees of Freedom TestStat P-value
 2 1.57 0.456

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

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	96.08	.	.
Dose1	100.00	1.000	0.823
Dose2	95.98	0.935	0.463

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose2	>highest dose
Jonckheere	Dose2	>highest dose

Bobwhite quail reproduction, Imazapyr, MRID 45119714
 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
0.957	0.145	0.015	0.985	USE PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef. of Var	95% Conf.Interval	
Ctrl	13	32.38	12.70	3.52	39.21	24.71,	40.06
Dose1	14	36.86	12.10	3.23	32.83	29.87,	43.84
Dose2	12	33.50	12.26	3.54	36.59	25.71,	41.29

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	35.00	1.00	51.00	.	.
Dose1	36.00	13.00	57.00	113.81	-13.81
Dose2	34.50	7.00	48.00	103.44	-3.44

PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Analysis of Variance (ANOVA) - overall F-test

Numerator df	Denominator df	F-stat	P-value
2	36	0.48	0.622

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	Dose1	Dose2	Tukey p-values		
							Dose3	Dose4	Dose5
Ctrl	32.38	.	34.70	.	0.619	0.972	.	.	.
Dose1	36.86	0.927	34.70	0.772	.	0.770	.	.	.
Dose2	33.50	0.751	33.50	0.711	.	.	.	.	.

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

Data Evaluation Report on the Reproductive Effects of AC 243997 on Avian Species *Colinus virginianus*

PMRA Submission Number

EPA MRID Number 45119714a

Bobwhite quail reproduction, Imazapyr, MRID 45119714
 ANALYSIS RESULTS FOR VARIABLE LE_VE (LiveEmbryo/ViableEmbryo (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS

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

Shapiro-Wilks	Shapiro-Wilks	Levenes	Levenes	Conclusion
Test Stat	P-value	Test Stat	P-value	
0.723	<.001	5.349	0.009	USE NON-PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	13	99.09	1.76	0.49	1.78	98.03, 100.00
Dose1	14	98.74	2.20	0.59	2.23	97.47, 100.00
Dose2	12	99.65	0.82	0.24	0.82	99.13, 100.00

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	100.00	95.24	100.00	.	.
Dose1	100.00	94.29	100.00	99.64	0.36
Dose2	100.00	97.83	100.00	100.56	-0.56

NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Kruskal-Wallis test - equality among treatment groups
 Degrees of Freedom TestStat P-value
 2 0.98 0.614

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

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	100.00	.	.
Dose1	100.00	1.000	0.353
Dose2	100.00	1.000	0.712

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose2	>highest dose
Jonckheere	Dose2	>highest dose

Bobwhite quail reproduction, Imazapyr, MRID 45119714
 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
0.959	0.171	0.078	0.925	USE PARAMETRIC TESTS

 BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	13	27.54	11.67	3.24	42.36	20.49,	34.59
Dose1	14	27.57	9.89	2.64	35.87	21.86,	33.28
Dose2	12	26.00	11.58	3.34	44.55	18.64,	33.36

Level	Median	Min	Max	%of Control (means)	%Reduction (means)
Ctrl	30.00	0.00	45.00	.	.
Dose1	27.50	11.00	43.00	100.12	-0.12
Dose2	30.50	2.00	43.00	94.41	5.59

 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
2	36	0.08	0.921

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	Dose1	Dose2	Tukey p-values		
							Dose3	Dose4	Dose5
Ctrl	27.54	.	27.56	.	1.000	0.935	.	.	.
Dose1	27.57	0.670	27.56	0.585	.	0.930	.	.	.
Dose2	26.00	0.521	26.00	0.462	.	.	.	.	.

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

Data Evaluation Report on the Reproductive Effects of AC 243997 on Avian Species *Colinus virginianus*

PMRA Submission Number

EPA MRID Number 45119714a

Bobwhite quail reproduction, Imazapyr, MRID 45119714
 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
0.941	0.042	1.958	0.156	USE PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	13	64.09	26.00	7.21	40.57	48.37,	79.80
Dose1	14	65.12	11.60	3.10	17.81	58.42,	71.81
Dose2	12	60.83	17.43	5.03	28.65	49.75,	71.90

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	64.10	0.00	96.77	.	.
Dose1	66.40	42.55	83.33	101.61	-1.61
Dose2	60.90	28.57	86.49	94.91	5.09

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
2	36	0.17	0.842

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	64.09	.	64.62	.	0.989	0.905	.	.	.
Dose1	65.12	0.720	64.62	0.614	.	0.837	.	.	.
Dose2	60.83	0.488	60.83	0.427	.	.	.	.	.

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

Bobwhite quail reproduction, Imazapyr, MRID 45119714
 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
0.925	0.012	1.789	0.182	USE PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	13	69.41	27.47	7.62	39.57	52.81, 86.00
Dose1	14	71.00	12.79	3.42	18.01	63.61, 78.38
Dose2	12	67.28	18.90	5.46	28.10	55.27, 79.29

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	70.00	0.00	100.00	.	.
Dose1	72.01	46.51	88.89	102.30	-2.30
Dose2	67.69	28.57	91.43	96.93	3.07

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
2	36	0.11	0.899

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	Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	69.41	.	70.23	.	0.978	0.964	.	.	.
Dose1	71.00	0.743	70.23	0.627	.	0.890	.	.	.
Dose2	67.28	0.559	67.28	0.502	.	.	.	.	.

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

Bobwhite quail reproduction, Imazapyr, MRID 45119714
 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
0.838	<.001	1.167	0.323	USE NON-PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	13	78.59	27.17	7.53	34.57	62.17,	95.01
Dose1	14	75.21	11.52	3.08	15.32	68.56,	81.87
Dose2	12	73.42	19.84	5.73	27.02	60.81,	86.02

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	86.11	0.00	100.00	.	.
Dose1	80.37	56.67	88.89	95.70	4.30
Dose2	76.84	28.57	95.56	93.42	6.58

NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
2	2.23	0.327

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	86.11	.	.
Dose1	80.37	0.178	0.080
Dose2	76.84	0.276	0.106

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose2	>highest dose
Jonckheere	Dose2	>highest dose

Bobwhite quail reproduction, Imazapyr, MRID 45119714
 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
0.978	0.641	0.065	0.937	USE PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	13	24.23	11.05	3.07	45.62	17.55,	30.91
Dose1	14	24.00	9.23	2.47	38.47	18.67,	29.33
Dose2	12	23.00	10.63	3.07	46.24	16.24,	29.76

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	26.00	0.00	42.00	.	.
Dose1	23.50	10.00	41.00	99.05	0.95
Dose2	25.00	2.00	39.00	94.92	5.08

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
2	36	0.05	0.951

Dunnett - testing each trt mean signif. less than control

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

Tukey - two-sided tests, all possible comparisons, not used for NOEC or LOEC

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values				
					Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	24.23	.	24.23	.	0.998	0.952	.	.	.
Dose1	24.00	0.644	24.00	0.558	.	0.967	.	.	.
Dose2	23.00	0.542	23.00	0.484	.	.	.	.	.

SUMMARY

	NOEC	LOEC
Dunnett	Dose2	>highest dose
Williams	Dose2	>highest dose

Data Evaluation Report on the Reproductive Effects of AC 243997 on Avian Species *Colinus virginianus*

PMRA Submission Number

EPA MRID Number 45119714a

Bobwhite quail reproduction, Imazapyr, MRID 45119714

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
0.948	0.070	2.339	0.111	USE PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	13	61.12	25.80	7.16	42.21	45.53,	76.71
Dose1	14	61.64	12.52	3.35	20.31	54.41,	68.87
Dose2	12	59.37	17.44	5.03	29.37	48.29,	70.45

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	70.00	0.00	91.43	.	.
Dose1	64.50	39.53	80.00	100.86	-0.86
Dose2	58.96	28.57	88.57	97.14	2.86

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
2	36	0.05	0.953

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	Dose1	Dose2	Tukey p-values		
							Dose3	Dose4	Dose5
Ctrl	61.12	.	61.39	.	0.997	0.972	.	.	.
Dose1	61.64	0.694	61.39	0.599	.	0.952	.	.	.
Dose2	59.37	0.573	59.37	0.517	.	.	.	.	.

SUMMARY

	NOEC	LOEC
Dunnett	Dose2	>highest dose
Williams	Dose2	>highest dose

Bobwhite quail reproduction, Imazapyr, MRID 45119714
 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
0.945	0.062	1.073	0.353	USE PARAMETRIC TESTS

 BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	12	87.22	8.97	2.59	10.28	81.53,	92.92
Dose1	14	86.65	6.78	1.81	7.83	82.73,	90.57
Dose2	12	88.83	10.16	2.93	11.44	82.37,	95.28

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	87.87	65.00	100.00	.	.
Dose1	87.24	70.59	95.35	99.34	0.66
Dose2	90.80	69.70	100.00	101.84	-1.84

 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
2	35	0.21	0.808

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	87.22	.	87.52	.	0.984	0.893	.	.	.
Dose1	86.65	0.594	87.52	0.620	.	0.799	.	.	.
Dose2	88.83	0.819	87.52	0.653	.	.	.	.	.

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

Bobwhite quail reproduction, Imazapyr, MRID 45119714
 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	Shapiro-Wilks	Levenes	Levenes	Conclusion
Test Stat	P-value	Test Stat	P-value	
0.956	0.176	0.976	0.388	USE PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	13	0.21	0.01	0.00	6.33	0.21,	0.22
Dose1	11	0.21	0.02	0.01	8.19	0.20,	0.23
Dose2	11	0.22	0.02	0.01	9.04	0.20,	0.23

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	0.21	0.19	0.24	.	.
Dose1	0.22	0.18	0.24	100.13	-0.13
Dose2	0.22	0.18	0.24	101.15	-1.15

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
2	32	0.07	0.930

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

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values				
					Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	0.21	.	0.21	.	0.999	0.932	.	.	.
Dose1	0.21	0.690	0.21	0.636	.	0.950	.	.	.
Dose2	0.22	0.801	0.21	0.671	.	.	.	.	.

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

Data Evaluation Report on the Reproductive Effects of AC 243997 on Avian Species *Colinus virginianus*

PMRA Submission Number

EPA MRID Number 45119714a

Bobwhite quail reproduction, Imazapyr, MRID 45119714
 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
0.978	0.644	0.194	0.825	USE PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	12	6.96	0.41	0.12	5.83	6.70,	7.22
Dose1	14	7.17	0.49	0.13	6.77	6.89,	7.45
Dose2	12	7.06	0.48	0.14	6.85	6.75,	7.37

Level	Median	Min	Max	%of Control (means)	%Reduction (means)
Ctrl	7.00	6.00	7.50	.	.
Dose1	7.10	6.40	8.10	103.06	-3.06
Dose2	7.00	6.20	8.10	101.44	-1.44

PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Analysis of Variance (ANOVA) - overall F-test

Numerator df	Denominator df	F-stat	P-value
2	35	0.69	0.506

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	6.96	.	7.07	.	0.476	0.857	.	.	.
Dose1	7.17	0.954	7.07	0.817	.	0.808	.	.	.
Dose2	7.06	0.841	7.06	0.818	.	.	.	.	.

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

Data Evaluation Report on the Reproductive Effects of AC 243997 on Avian Species *Colinus virginianus*

PMRA Submission Number

EPA MRID Number 45119714a

Bobwhite quail reproduction, Imazapyr, MRID 45119714
 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
0.985	0.879	0.360	0.700	USE PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	12	29.81	1.76	0.51	5.89	28.69,	30.92
Dose1	14	29.86	1.92	0.51	6.42	28.75,	30.96
Dose2	12	30.30	2.20	0.64	7.27	28.90,	31.70

Level	Median	Min	Max	%of Control (means)	%Reduction (means)
Ctrl	29.70	27.40	33.40	.	.
Dose1	30.00	26.20	32.60	100.16	-0.16
Dose2	29.75	27.00	35.10	101.65	-1.65

PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Analysis of Variance (ANOVA) - overall F-test

Numerator df	Denominator df	F-stat	P-value
2	35	0.23	0.794

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

Level	Mean	Dunnnett p-value	Isotonic mean	Williams p-value	Dose1	Dose2	Tukey p-values		
							Dose3	Dose4	Dose5
Ctrl	29.81	.	29.98	.	0.998	0.814	.	.	.
Dose1	29.86	0.688	29.98	0.676	.	0.835	.	.	.
Dose2	30.30	0.861	29.98	0.708	.	.	.	.	.

SUMMARY	NOEC	LOEC
Dunnnett	Dose2	>highest dose
Williams	Dose2	>highest dose

Data Evaluation Report on the Reproductive Effects of AC 243997 on Avian Species *Colinus virginianus*

PMRA Submission Number

EPA MRID Number 45119714a

Bobwhite quail reproduction, Imazapyr, MRID 45119714
 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
0.971	0.389	0.323	0.726	USE PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	13	16.69	1.11	0.31	6.65	16.02,	17.36
Dose1	15	17.07	1.49	0.38	8.71	16.24,	17.89
Dose2	12	17.50	1.24	0.36	7.10	16.71,	18.29

Level	Median	Min	Max	%of Control (means)	%Reduction (means)
Ctrl	17.00	15.00	18.00	.	.
Dose1	17.00	15.00	20.00	102.24	-2.24
Dose2	17.50	16.00	20.00	104.84	-4.84

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
2	37	1.20	0.312

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	Dose1	Dose2	Tukey p-values		
							Dose3	Dose4	Dose5
Ctrl	16.69	.	17.08	.	0.730	0.280	.	.	.
Dose1	17.07	0.894	17.08	0.855	.	0.669	.	.	.
Dose2	17.50	0.982	17.08	0.873	.	.	.	.	.

SUMMARY

	NOEC	LOEC
Dunnett	Dose2	>highest dose
Williams	Dose2	>highest dose

Bobwhite quail reproduction, Imazapyr, MRID 45119714
 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
0.947	0.057	0.268	0.766	USE PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	14	14.71	15.49	4.14	105.27	5.77,	23.66
Dose1	14	15.71	16.35	4.37	104.07	6.27,	25.16
Dose2	13	25.69	17.41	4.83	67.78	15.17,	36.22

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	13.00	-6.00	47.00	.	.
Dose1	14.50	-4.00	61.00	106.80	-6.80
Dose2	24.00	-4.00	59.00	174.61	-74.61

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
2	38	1.82	0.175

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	Dose1	Dose2	Tukey p-values		
							Dose3	Dose4	Dose5
Ctrl	14.71	.	18.54	.	0.986	0.205	.	.	.
Dose1	15.71	0.730	18.54	0.812	.	0.267	.	.	.
Dose2	25.69	0.989	18.54	0.839	.	.	.	.	.

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

Bobwhite quail reproduction, Imazapyr, MRID 45119714
 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
0.905	0.002	1.072	0.352	USE NON-PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	14	34.71	28.14	7.52	81.05	18.47,	50.96
Dose1	15	34.20	15.66	4.04	45.78	25.53,	42.87
Dose2	13	35.31	30.27	8.40	85.73	17.02,	53.60

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	38.50	-49.00	65.00	.	.
Dose1	31.00	-7.00	56.00	98.52	1.48
Dose2	33.00	-29.00	96.00	101.71	-1.71

NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
2	0.45	0.800

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	38.50	.	.
Dose1	31.00	0.546	0.263
Dose2	33.00	0.866	0.422

SUMMARY

	NOEC	LOEC
MannWhit (Bonf adjust)	Dose2	>highest dose
Jonckheere	Dose2	>highest dose