Data Evaluation Report on the Avian Acute Dietary Toxicity of Acetamiprid to the Zebra Finch (*Taeniopygia guttata*)

EPA MRID Number 48844901

Data Requirement:	EPA MRID	48844901
	EPA Guideline	850.2200
	DP Barcode:	D402808

Test material:	Acetamiprid	**Purity:** >99.9%
Common name	Acetamiprid	
CAS No.	135410-20-7	

Primary Reviewer: Scott Glaberman, Biologist, Ph.D., Environmental Risk Branch 4, Environmental Fate and Effects Division, U.S. Environmental Protection Agency
Date: 13 September 2012

Secondary Reviewer: Thomas Steeger, Senior Advisor, Ph.D., Environmental Risk Branch 4, Environmental Fate and Effects Division, U.S. Environmental Protection Agency
Date: 02 October 2012

EPA PC Code: 099050

Date Evaluation Completed: 02 October 2012

CITATION: Ito, M. 2012. Acetamiprid Technical Grade: Dietary toxicity test in zebra finch (*Poephila guttata*). Project Number: 11-151. Unpublished study prepared by Research Institute for Animal Science in Biochemistry and Toxicology. Kanagawa, Japan. Study sponsored by Nippon Soda Co., Ltd., Chiyoda-ku, Tokyo, Japan. 45 pages.

EXECUTIVE SUMMARY:

The subacute dietary toxicity of acetamiprid to 8-week-old zebra finches (*Taeniopygia guttata* formerly *Poephila guttata*) was assessed over 8 days. Acetamiprid technical (>99.8% active ingredient) was administered to the birds in the diet at nominal concentrations of 0, 10, 30, 60, 90, and 120 mg active ingredient (ai)/kg-diet (initial measured dietary concentrations of 0, 8.9, 28, 64, 79, 110 mg ai/kg diet). The 8-day day subacute dietary LC_{50} was 57.2 mg ai/kg-diet. The 8-day NOAEC of acetamiprid based on flightlessness, convulsions, and piloerection was 10 mg ai/kg diet. According to US EPA classification, since the subacute dietary LC_{50} falls within the range of 50 to 500 mg ai/kg diet, acetamiprid would be classified as highly toxic to zebra finches on a subacute dietary exposure basis.

No mortality was observed in control groups as well as birds in the 10 and 30 mg ai/kg-diet (nominal) test groups. Seven, eight, and ten birds died in the 60, 90, and 120 mg ai/kg-diet (nominal) test groups, respectively. Flightlessness, convulsions, and piloerection were observed in one or more birds at the 30 mg/kg-diet test level and higher; drooping wings and ptosis (drooping eyelids) were observed in one or more birds at the 60 mg/kg-diet test level and higher. At the 30 mg/kg-diet test level, recovery from clinical signs of toxicity was evident during the three-day post-exposure period. In treatment groups with no mortality (*i.e.*, 10, 30 mg/kg-diet), body weight, body weight gain, and food consumption do not appear to have been affected as compared to the controls. At the 60 and 90 mg/kg-diet levels, body weight gain and food consumption were affected in some individuals during the exposure period; but, body weight gain in these individuals was higher than in controls during the post-exposure period.

This toxicity study is scientifically sound and is classified as **SUPPLEMENTAL**. Subacute dietary toxicity testing with zebra finches or other passerine species is not currently a guideline requirement. There were several deficiencies with the study including lack of clear labeling of control groups in data reporting, lack of information provided about feeding apparatus used in study, insufficient information on age of birds at test initiation, and too few concentrations with partial kills (*i.e.*, greater than 0% and less than 100% mortality). Submission of further information on control group labeling, feeding apparatus, and age of birds would help address these deficiencies. In addition, the report, *Research Institute for Animal Science in Biochemistry and Toxicology, 2011* should be provided to confirm stability of test substance in test diet. This study does provide quantitatively useful toxicity endpoint data for risk assessment.

Results Synopsis

Test Organism Size: Mean 13.9 g; Range 11.3-17.9 g
Test Organism Age: 8 weeks old (at quarantine); 12 weeks old (at test initiation)

LC_{50} (based on nominal concentrations): 57.2 mg ai/kg diet (95% C.I.: 43.0-69.7 mg ai/kg diet)
Slope: 6.6 (95% C.I.: 3.2-10)

LC_{50} (based on initial measured concentrations): 58.2 mg ai/kg diet (95% C.I.: 33.4-68.4 mg ai/kg diet
Slope: 8.3 (95% C.I.: 2.3-14)

NOAEC: 10 mg ai/kg-diet
Endpoint(s) affected: based on flightlessness, convulsions, and piloerection

I. MATERIALS AND METHODS

GUIDELINE FOLLOWED: Study report stated that OECD Test Guideline 205 (Avian Dietary Toxicity) was followed for this test. Reviewer compared study report to OCSPP Guideline 850.2200. The following deviations were noted:

- Negative and solvent control groups were not clearly labeled in the study report (only labeled "Control-1" and "Control-2"). This did not affect probit calculations since no mortalities were observed in either control group. Also, no clinical signs of toxicity were observed in either control group. However, it is not possible to distinguish between specific control versus treatment effects on body weight and food consumption data.
- Only two test concentrations resulted in mortality greater than 0% and less than 100%. The OCSPP 850.2200 guideline specifies that at least three test concentrations should cause mortality between, but not including, 0% and 100.
- Representative samples of test feed were only analyzed for test substance concentration at the beginning of the test. The OCSPP 850.2200 guideline specifies that the test substance should also be measured at the end of the test. However, the study report does cite a previous report that indicates the test substance was stable in feed for seven days (Research Institute for Animal Science in Biochemistry and Toxicology, 2011).
- Gross pathology does not appear to have been carried out on either dead or surviving birds. The OCSPP 850.2200 guideline specifies that gross pathology should be conducted on all birds that die as well as a sufficient number of survivors.
- Insufficient information was provided to precisely determine age of birds. The OCSPP 850.2200 guideline specifies that all birds should be ±1 day of age. The study report only states that birds were approximately 2 months old (8 weeks) at time of quarantine. However, the reviewer recognizes that obtaining such age-specific information for zebra finches may be unrealistic.
- Insufficient information was provided on how the feeding apparatus was set up and how consumption of treated diet was confirmed. It is not possible to determine from the information provided if there was significant food spillage and how this was accounted for in food consumption measurements.

COMPLIANCE: A signed and dated GLP, Quality Assurance, Data Confidentiality, and Animal Welfare statements were provided.

A. MATERIALS:

1. Test Material Acetamiprid (technical grade)

Description: White crystalline powder

Lot No./Batch No. : NNI-01

Purity: >99.9% (HPLC)

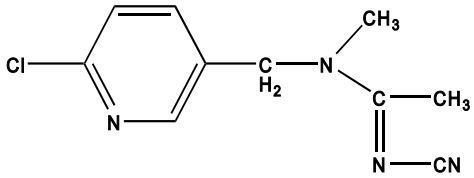
Stability of Compound Under Test Conditions: Report states that test substance was stable for 20 years when frozen (-20°C) and sealed under dark conditions.

Storage Conditions of Test Chemicals: Frozen (-20°C); dark; sealed

Physiochemical Properties

Of Acetamiprid: Not reported

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

Parameter	Value	Source	Comments
PC Code	099050	None	None
CAS Number	135410-20-7	(USNLM, 2009)	None
Structure			None
Chemical Name	N^1-[(6-chloro-3-pyridyl)methyl]-N^2-cyano-N^1-methylacetamidine	MRID 44651803	None
Molecular Weight	222.68	MRID 44651803	None
Water Solubility	4250 mg/L (25°C)	MRID 44651811	None
Vapor Pressure	$<1 \times 10^{-8}$ Torr at 25°C	MRID: 46235701	Nonvolatile from dry non-adsorbing surfaces (USEPA, 2010)
	7.50×10^{-10} Torr at 25°C 1×10^{-4} mPa at 25°C	(AERU, 2009)	
Henry's Law constant	5.2×10^{-14} atm-m^3/mol at 25°C (estimated)	(Estimated from vapor pressure and water solubility at pH 7 and 20°C)	Calculated with vapor pressure reported by AERU (2009).
Dissociation Constant (pKa)	0.7 at 25°C	(USEPA, 2002)	None
Log K_{OW}	0.8 at 25°C	MRID 44651883	Not likely to bioconcentrate (USEPA, 2010)
Air-water partition coefficient (K_{AW})	2.11×10^{-12} (log K_{AW} = -11.68)	Calculated[1]	Non-volatile from water (USEPA, 2010)
Octanol-air partition coefficient (K_{OA})	3.0×10^{12} (log K_{OA} = 12.5)	Calculated[1]	Not likely to biomagnify in terrestrial food chains[2] (Gobas *et al.*, 2003; USEPA, 2009c)
$C_{water+soil}/C_{air}$	2.63×10^{11} to 2.02×10^{12}	Calculated[1]	Non-volatile from moist soil (USEPA, 2010)

[1]All estimated values were estimated according to "*Guidance for Reporting on the Environmental Fate and Transport of the Stressors of Concern in Problem Formulations for Registration Review, Registration Review Risk Assessments, Listed Species Litigation Assessments, New Chemical Risk Assessments, and Other Relevant Risk Assessments*" (USEPA, 2010).

[2] A recent FIFRA Scientific Advisory Panel (SAP) reported, "Gobas *et al* (2003) concluded that chemicals with a log K_{OA} >5 can biomagnify in terrestrial food chains if log K_{OW} >2 and the rate of chemical transformation is low. However, further proof is needed before accepting these limits without reservations" (USEPA, 2009c). This was also supported by Armitage and Gobas's work completed in 2007 (Armitage and Gobas, 2007).

2. Test organism:

Species (common and scientific names):
Zebra finch; *Taeniopygia guttata* (formerly *Poephila guttata*)

Age at study initiation: Approximately 12 weeks. Received at 8 weeks old; 14-day quarantine; additional 16-day acclimation period

Weight at study initiation (mean and range): Mean 13.9 g; Range 11.3-17.9 g

Source: SKR Co. Ltd. (Kanagawa, Japan)

B. STUDY DESIGN:

1. Experimental Conditions

a. Range-finding Study: A range-finding study was conducted. Three treatment groups (3, 12, 60 mg/kg-diet) and control containing three individuals each were exposed to acetamiprid for four days, followed by a three day recovery period. Only one mortality occurred during the test at the 60 mg/kg-diet level on day four of the exposure period. No information was provided on sublethal effects or on whether the control was a negative or solvent control.

b. Definitive Study:

Table 1: Experimental Parameters

Parameter	Details	Remarks
		Criteria
Acclimation		
Period:	14-day quarantine plus 16 day acclimation	
Conditions: (same as test or not)	Same	
Feeding:	Not reported	
Health: (any mortality observed)	One female birds was injured in eye during quarantine period; otherwise no mortality or signs of disease. *Escherichia coli* was detected in the diet during acclimation period, but the report states that there was no effect on general condition of birds during quarantine and acclimation periods.	
Pen size and construction materials	46.5 W x 46.5 D x 56.5 H cm	10 birds kept in single pen during acclimation period and 5 birds kept in pen during test

Parameter	Details	Remarks
		Criteria
		Recommended pen size is about 35 x 100 x 24 cm
Test duration	8 days (5 days exposure; 3 days post-exposure)	
		Recommended test duration is 5 days with treated feed and at least 3 days observation with "clean" feed.
Test concentrations nominal: measured:	10, 30 , 60, 90, 120 mg ai/kg-diet 8.9, 28, 64, 79, 110 mg ai/kg-diet	Measured concentrations are based on feed sampled from mixers before feeding. No test substance measurements were taken at end of test.
		Five or six test concentrations should be used in a geometric scale, unless the LC_{50} > 5000 mg ai/kg diet.
Solvent/vehicle, if used type: amount:	Acetone One percent of diet by weight	Study reports that acetone was completely eliminated from the test diets.
		Recommended solvents include distilled water, corn oil, propylene glycol, 1% carboxymethylcellulose, or gum arabic. The solvent should not be more than 2%.
Diet preparation and feeding	See solvent remarks above	
		The control group should be tested with a diet containing the maximum amount of vehicle used in treated diets.
Feed withholding period	Not reported	
Stability and homogeneity of test material in the diet determined	Yes	Study report cites another document to support that test substance is stable in prepared diet under animal room conditions for seven days (Research Institute for Animal Science in Biochemistry and Toxicology, 2011)
Number of birds per replicate/groups for negative control:	10	The solvent and negative control groups were not clearly identified

Parameter	Details	Remarks
		Criteria
for vehicle control: for treated:	10 10	in the study report.
		The recommended number of birds per replicate is a minimum of ten.
Number of replicates/group (if used) for negative control: for vehicle control: for treated:	10 birds per test level were divided into two pens: one pen containing 5 male birds, and the other pen containing five female birds.	
Test conditions temperature: relative humidity(%): photoperiod:	Measured: 19.0-25.1°C Measured: 50.2-70.0% 12 hours light	Temperature and humidity measured daily. Study report also states that temperature was maintained at a gradient between 17 and 27°C For passerine birds, a photoperiod of 8 h light and 16 h dark is recommended in order to prevent birds from coming into reproductive condition.
Reference chemical, if used	None	

Note: Little information was provided on how the feeding apparatus was set up and how consumption of treated diet was confirmed. It is not possible to determine from the information provided if there was significant food spillage and how this was accounted for in food consumption measurements.

2. Observations:

Table 2: Observations

Parameters	Details	Remarks
Parameters measured (mortality/body weight/ mean feed consumption/ others)	-Body weight (and body weight gain) -Food consumption -Mortality -Clinical observations (flightlessness, convulsions, recumbency, depression, drooping wing, ptosis, piloerection)	
Indicate if the test material was regurgitated	No instances of regurgitation were reported. However, the report does not state whether	

Parameters	Details	Remarks
	birds were being observed for instances of regurgitation.	
Treatments on which necropsies were performed	Not performed	
Observation intervals	-Clinical condition and mortality were observed twice (morning and afternoon) on Day 1 and once daily thereafter. -Body weights were measured just before test substance administration (Day 0), Day 5, and end of recovery period (Day 8)	
Were raw data included?	Yes	

II. <u>RESULTS AND DISCUSSION</u>:

A. MORTALITY:

No mortality was observed in control groups as well as birds in the 10 and 30 mg ai/kg-diet (nominal) test groups. Seven, eight, and ten birds died in the 60, 90, and 120 mg ai/kg-diet (nominal) test groups, respectively. The LC_{50} calculated by the study author was 57 mg ai/kg-diet (95% CI: 43-70 mg ai/kg-diet); no slope value was given. Although measured values of the test substance in feed was reported for each test group, the LC_{50} calculation was based on nominal test substance concentrations. A dose-response mortality pattern was observed in this test. The study report stated that there was no significant difference in mortality rates based on gender.

Table 3: Effect of Acetamiprid on Mortality of Zebra Finches

Treatment (mg ai/kg-diet) Nominal (Measured)	No. of birds per treatment	Cumulative mortality						
		Day 1	Day 2	Day 3	Day 4	Day 5	Days 6-8	Total
Control 1†	10	0	0	0	0	0	0	0
Control 2†	10	0	0	0	0	0	0	0
10 (8.9)	10	0	0	0	0	0	0	0
30 (28)	10	0	0	0	0	0	0	0
60 (64)	10	3	0	3	0	1	0	7
90 (79)	10	3	1	0	4	0	0	8
120 (110)	10	3	7	--	--	--	--	10
NOAEC	30 mg ai/kg-diet							
LC_{50}	57 mg ai/kg-bw* (95% CI: 43-70 mg ai/kg-bw)							

*Equivalent to 14 mg ai/kg-bw according to study report

† Note: insufficient information was provided to determine the identity of the negative versus solvent control groups

B. SUB-LETHAL TOXICITY ENDPOINTS:

Within five hours of test initiation, flightlessness, convulsions, and piloerection were observed in one or more birds at the 30 mg/kg-diet test level and higher; drooping wings and ptosis were observed in one or more birds at the 60 mg/kg-diet test level and higher. At the 30 mg/kg-diet test level, recovery from clinical signs of toxicity was evident during the three-day post-exposure period. In addition, at 60 and 90 mg/kg-diet, all surviving individuals did not display any clinical signs of toxicity by the end of the recovery period, including individuals that did shown signs of toxicity earlier in the study. No clinical signs of toxicity were observed in control birds.

In treatment groups with no mortality (*i.e.*, 10, 30 mg/kg-diet), body weight, body weight gain, and food consumption do not appear to have been affected as compared to the controls (**Tables 4** and **5**). At the 60 mg/kg-diet level, body weight gain and food consumption appear to have been affected during the exposure period; however, body weight gain was higher in this group as compared to controls during the post-exposure period. At the 90 mg/kg-diet test level, body weight gain and food consumption appear to have been affected in the single surviving male during the exposure period, but body weight gain increased relative to controls during the post-exposure period.

The study report stated that there was no significant difference in sublethal effects based on gender.

Table 4: Effect of Acetamiprid on Body Weight and Body Weight Gain in Zebra Finches

Treatment (mg a.i./kg diet)	Sex	Mean Body Weight (g)			Mean Body Weight Gain (g)	
		Day 0	Day 5	Day 8	Day 0-5	Day 5-8
Control 1†	Male	13.9±1.6	14.2±1.7	14.1±1.7	0.3±0.2	0.0±0.2
	Female	13.7±1.0	13.8±0.9	14.4±1.1	0.1±0.2	0.6±0.2
Control 2†	Male	13.9±1.5	14.1±1.5	14.2±1.5	0.2±0.1	0.1±0.1
	Female	14.4±2.2	14.4±2.0	14.6±1.8	-0.1±0.5	0.3±0.2
10 (8.9)	Male	13.8±1.7	13.9±1.9	13.9±1.8	0.1±0.3	0.1±0.2
	Female	13.6±1.5	13.7±1.3	14.2±1.2	0.1±0.5	0.5±0.1
30 (28)	Male	13.8±1.8	14.0±1.9	13.9±2.0	0.2±0.3	-0.1±0.2
	Female	13.9±1.4	13.7±1.8	14.0±1.4	-0.2±0.5	0.3±0.4
60 (64)	Male	13.8±1.9	13.5*	13.7*	0.1*	0.2*
	Female	15.1±2.7	14.0±2.6	15.2±3.5	-1.6±0.8	1.2±0.8
90 (79)	Male	13.5±1.8	12.5*	13.5*	-1.3*	1.0*
	Female	13.9±1.2	15.8*	16.6*	0.2*	0.8*
120 (110)	Male	14±2.4	--	--	--	--
	Female	13.8±1.5	--	--	--	--

***** SD not reported because only one bird was left alive at test interval

† Note: insufficient information was provided to determine the identity of the negative versus solvent control groups

Table 5: Effect of Acetamiprid on Food Consumption in Zebra Finches

Treatment (mg a.i./kg diet)	Sex	Mean Food Consumption (g)	
		Days 1-5 (Exposure Period)	Days 6-8 (Recovery Period)
Control 1†	Male	3.6±0.3	3.3±0.3
	Female	3.5±0.2	3.6±0.2
Control 2†	Male	3.4±0.2	3.5±0.4
	Female	3.6±0.3	3.6±0.2
10 (8.9)	Male	3.5±0.2	3.6±0.2
	Female	3.3±0.4	3.7±0.1
30 (28)	Male	3.1±0.2	3.3±0.2
	Female	3.0±0.3	3.5±0.2
60 (64)	Male	2.1±0.8	3.8±0.3
	Female	1.9±0.5	3.9±0.4
90 (79)	Male	1.6±0.8	3.5±0.1
	Female	2.2±1.2	4.6±0.7
120 (110)	Male	0.7±0.6	--
	Female	0.5±0.5	--

***** SD not reported because only one bird was left alive at test interval
† Note: insufficient information was provided to determine the identity of the negative versus solvent control groups

C. REPORTED STATISTICS:

LC_{50} Calculations:

The LC_{50} was calculated based on the mortality through the 8-day observation period using the probit method. The study author used nominal dietary concentrations of the test substance to calculate the LC_{50}.

LC_{50} (total sample): 57.2 mg ai/kg diet (95% C.I.: 43-70 mg ai/kg diet)
LC_{50} (males): 54 mg ai/kg diet (95% C.I.: 31-74 mg ai/kg diet)
LC_{50} (females): 60 mg ai/kg diet (95% C.I.: 33-81 mg ai/kg diet)

Body weight Calculations:

The body weights on Day 0, 5, 8 and the body weight gains for Day 0-5 and 5-8 were analyzed as follows. The data were analyzed by Bartlett's test for homogeneity of distribution. When homogeneity was recognized, a one-way analysis of variance (ANOVA) was performed. When a significant difference was observed, pairwise comparisons of each treatment group versus each control group were performed using Dunnett's test. If the data were not homogenous, they were analyzed using the Kruskal-Wallis test. When there was the significant difference, pairwise comparisons of each treatment group versus each control group were performed using

Bechhofer and Dunnett's test. Gender difference in mortality was analyzed by chi-square test. A probability less than 5% was considered statistically significant in all analyses.

D. VERIFICATION OF STATISTICAL RESULTS:

Probit Results:

LC_{50} (nominal): 57.2 mg ai/kg diet (95% C.I.: 43.0-69.7 mg ai/kg diet)
Slope: 6.6 (95% C.I.: 3.2-10)

LC_{50} (measured): 58.2 mg ai/kg diet (95% C.I.: 33.4-68.4 mg ai/kg diet
Slope: 8.3 (95% C.I.: 2.3-14)

The reviewer confirms the study author's LC_{50} calculations using nominal concentrations of the test material.

E. STUDY DEFICIENCIES:

- Negative and solvent control groups were not clearly labeled in the study report (only labeled "Control-1" and "Control-2"). This did not affect probit calculations since no mortalities were observed in either control group. Also, no clinical signs of toxicity were observed in either control group. However, it is not possible to distinguish between specific control versus treatment effects on body weight and food consumption data.
- Only two test concentrations resulted in mortality greater than 0% and less than 100%. The OCSPP 850.2200 guideline specifies that at least three test concentrations should cause mortality between, but not including, 0% and 100.
- Representative samples of test feed were only analyzed for test substance concentration at the beginning of the test. The OCSPP 850.2200 guideline specifies that the test substance should also be measured at the end of the test. However, the study report does cite a previous report that indicates the test substance was stable in feed for seven days (Research Institute for Animal Science in Biochemistry and Toxicology, 2011).
- Gross pathology does not appear to have been carried out on either dead or surviving birds. The OCSPP 850.2200 guideline specifies that gross pathology should be conducted on all birds that die as well as a sufficient number of survivors.
- Insufficient information was provided to precisely determine age of birds. The OCSPP 850.2200 guideline specifies that all birds should be ±1 day of age. The study report only states that birds were approximately 2 months old (8 weeks) at time of quarantine. However, the reviewer recognizes that obtaining such age-specific information for zebra finches may be unrealistic.
- Insufficient information was provided on how the feeding apparatus was set up and how consumption of treated diet was confirmed. It is not possible to determine from the information provided if there was significant food spillage and how this was accounted for in food consumption measurements.

F. REVIEWER'S COMMENTS:

No additional comments.

G. CONCLUSIONS:

This toxicity study is scientifically sound and is classified as **SUPPLEMENTAL**. Subacute dietary toxicity testing with zebra finches or other passerine species is not currently a guideline requirement. There were several deficiencies with the study including lack of clear labeling of control groups in data reporting, lack of information provided about feeding apparatus used in study, insufficient information on age of birds at test initiation, and too few concentrations with partial kills (*i.e.*, greater than 0% and less than 100% mortality). Submission of further information on control group labeling, feeding apparatus, and age of birds would help address these deficiencies. In addition, the report, *Research Institute for Animal Science in Biochemistry and Toxicology, 2011* should be provided to confirm stability of test substance in test diet. This study does provide quantitatively useful toxicity endpoint data for risk assessment.

Results Synopsis

LC_{50} (based on nominal concentrations): 57.2 mg ai/kg diet (95% C.I.: 43.0-69.7 mg ai/kg diet)
Slope: 6.6 (95% C.I.: 3.2-10)

LC_{50} (based on initial measured concentrations): 58.2 mg ai/kg diet (95% C.I.: 33.4-68.4 mg ai/kg diet
Slope: 8.3 (95% C.I.: 2.3-14)

NOAEC: 10 mg ai/kg-diet
Endpoint(s) affected: based on flightlessness, convulsions, and piloerection

III. REFERENCES:

Health, Labour and Welfare Ministry, Japan (2008) "Pesticide Evaluation Report of Acetamiprid", reported produced by Food Safety Commission.

OECD Guideline for testing of Chemicals 205"Avian Dietary Toxicity Test" (1985).

Research Institute for Animal Science in Biochemistry and Toxicology (2011). Dose-finding Test and Dietary Stability Confirmation Test of Acetamiprid in Zebra Finch.

Toxanal Output:

LC50 Calculation Using Nominal Concentrations of Acetamiprid

****

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
120	10	10	100	9.765625E-02
90	10	8	80	5.46875
60	10	7	70	17.1875
30	10	0	0	9.765625E-02
10	10	0	0	9.765625E-02

THE BINOMIAL TEST SHOWS THAT 30 AND 120 CAN BE
USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT
CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL
ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 51.21925

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
4	.1369796	52.843	39.90796	66.1522

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
6	.2607447	1	.4632311

SLOPE = 6.590726
95 PERCENT CONFIDENCE LIMITS = 3.225292 AND 9.956159

INTERCEPT=-11.58279

LC50 = 57.20557
95 PERCENT CONFIDENCE LIMITS = 43.02043 AND 69.72545

LC25 = 45.19573
95 PERCENT CONFIDENCE LIMITS = 28.47089 AND 55.69157

LC10 = 36.55806
95 PERCENT CONFIDENCE LIMITS = 18.96934 AND 47.09019

LC05 = 32.20033
95 PERCENT CONFIDENCE LIMITS = 14.77982 AND 42.87286
****

LC50 Calculation Using Measured Concentrations of Acetamiprid

****

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
110	10	10	100	9.765625E-02
79	10	8	80	5.46875
64	10	7	70	17.1875
28	10	0	0	9.765625E-02
8.9	10	0	0	9.765625E-02

THE BINOMIAL TEST SHOWS THAT 28 AND 110 CAN BE
USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT
CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL
ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 52.99366

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
3	.1551471	49.89136	37.25529	72.97521

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
10	.5203395	1	.8731019

SLOPE = 8.314175
95 PERCENT CONFIDENCE LIMITS = 2.316781 AND 14.31157

INTERCEPT=-14.67193

LC50 = 58.16855
95 PERCENT CONFIDENCE LIMITS = 33.40717 AND 68.42713

LC25 = 48.25717
95 PERCENT CONFIDENCE LIMITS = 17.77322 AND 59.02494

LC10 = 40.78889
95 PERCENT CONFIDENCE LIMITS = 9.859924 AND 52.77924

LC05 = 36.88464
95 PERCENT CONFIDENCE LIMITS = 6.906726 AND 49.52988

****