



Appendix A. Aquatic and Terrestrial Acute Toxicity Data Analysis (SAS) for Estimating Probit Dose-Response Slopes

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/*****
/*          Probit Dose-Response Analysis for Aquatic          */
/*                and                                          */
/*                Terrestrial Animals                          */
/*                SAS Program                                  */
/*****

OPTIONS NODATE;

DATA B;INPUT DOSE N RESPONSE;
CONC=DOSE;
CARDS;
0 20 0
200 20 1
280 20 4
320 20 5
420 20 15
490 20 20
;

RUN;
PROC SORT;BY CONC;
PROC PROBIT LOG10;
VAR DOSE N RESPONSE;
TITLE 'PROBIT ANALYSIS (LOG10) OF Goldfish Mortality AFTER 96-hr EXPOSURE';
RUN;

DATA C;INPUT DOSE N RESPONSE;
CONC=DOSE;
CARDS;
0 10 0
10 10 0
50 10 2
65 10 6
200 10 8
;

RUN;
PROC SORT;BY CONC;
PROC PROBIT LOG10;
VAR DOSE N RESPONSE;
TITLE 'PROBIT ANALYSIS (LOG10) OF Rainbow Trout Mortality AFTER 96-hr EXPOSURE';
RUN;

DATA D;INPUT DOSE N RESPONSE;
CONC=DOSE;
CARDS;
0 2 0
4000 4 0
6000 4 0
8000 4 1
10000 4 2
12000 4 4
;

RUN;
PROC SORT;BY CONC;
PROC PROBIT LOG10;
VAR DOSE N RESPONSE;
TITLE 'PROBIT ANALYSIS (LOG10) OF Japanese Quail (male) Acute Oral Mortality AFTER 24-
hr';
RUN;

DATA E;INPUT DOSE N RESPONSE;
```

```
CONC=DOSE;
CARDS;
0 2 0
4000 4 0
6000 4 1
8000 4 2
10000 4 4
12000 4 3
;

RUN;
PROC SORT;BY CONC;
PROC PROBIT LOG10;
VAR DOSE N RESPONSE;
TITLE 'PROBIT ANALYSIS (LOG10) OF Japanese Quail (female) Acute Oral Mortality AFTER 24-
hr';
RUN;
```

```
DATA F;INPUT DOSE N RESPONSE;
CONC=DOSE;
CARDS;
0 4 0
4000 8 0
6000 8 1
8000 8 3
10000 8 6
12000 8 7
;

RUN;
PROC SORT;BY CONC;
PROC PROBIT LOG10;
VAR DOSE N RESPONSE;
TITLE 'PROBIT ANALYSIS (LOG10) OF Japanese Quail (male and female) Acute Oral Mortality
AFTER 24-hr';
RUN;
```

PROBIT ANALYSIS (LOG10) OF Goldfish Mortality AFTER 96-hr EXPOSURE

1

Probit Procedure

Iteration History for Parameter Estimates

Iter	Ridge	Loglikelihood	Intercept	Log10(DOSE)
0	0	-69.314718	0	0
1	0	-41.995619	-15.95340497	6.2975835112
2	0	-39.606283	-22.36506704	8.8131791104
3	0	-39.514126	-23.93759683	9.428547935
4	0	-39.513927	-24.01541278	9.4590207712
5	0	-39.513927	-24.01558665	9.4590889426
6	0	-39.513927	-24.01558665	9.4590889426

Model Information

Data Set WORK.B
 Events Variable RESPONSE
 Trials Variable N
 Number of Observations 5
 Number of Events 45
 Number of Trials 100
 Name of Distribution Normal
 Log Likelihood -39.51392742

Number of Observations Read 6
 Number of Observations Used 5
 Number of Events 45
 Number of Trials 100

Parameter Information

Parameter Effect
 Intercept Intercept
 DOSE DOSE

Last Evaluation of the Negative of the Gradient

Intercept Log10(DOSE)
 1.947615E-10 3.549641E-10

PROBIT ANALYSIS (LOG10) OF Goldfish Mortality AFTER 96-hr EXPOSURE

2

Probit Procedure

Last Evaluation of the Negative of the Hessian

Intercept Log10(DOSE)
 Intercept 39.146373534 99.167311018
 Log10(DOSE) 99.167311018 251.62465474

Algorithm converged.

Goodness-of-Fit Tests

Statistic Value DF Pr > ChiSq

Pearson Chi-Square	5.5170	3	0.1376
L.R. Chi-Square	6.0843	3	0.1076

Response-Covariate Profile

Response Levels	2
Number of Covariate Values	5

Since the chi-square is small ($p > 0.1000$), fiducial limits will be calculated using a t value of 1.96.

Type III Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
Log10(DOSE)	1	36.6551	<.0001

Analysis of Parameter Estimates

Parameter	DF	Estimate	Standard Error	95% Confidence Limits	Chi-Square	Pr > ChiSq
Intercept	1	-24.0156	3.9611	-31.7791 -16.2520	36.76	<.0001
Log10(DOSE)	1	9.4591	1.5624	6.3969 12.5213	36.66	<.0001

Estimated Covariance Matrix

	Intercept	Log10(DOSE)
Intercept	15.690110	-6.183599
Log10(DOSE)	-6.183599	2.440981

PROBIT ANALYSIS (LOG10) OF Goldfish Mortality AFTER 96-hr EXPOSURE

3

Probit Procedure

Probit Model in Terms of Tolerance Distribution

MU	SIGMA
2.53889003	0.10571843

Estimated Covariance Matrix for Tolerance Parameters

	MU	SIGMA
MU	0.000286	0.000016
SIGMA	0.000016	0.000305

PROBIT ANALYSIS (LOG10) OF Goldfish Mortality AFTER 96-hr EXPOSURE

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Probit Procedure

Probit Analysis on Log10(DOSE)

Probability	Log10(DOSE)	95% Fiducial Limits	
0.01	2.29295	2.17114	2.35850
0.02	2.32177	2.21291	2.38112
0.03	2.34006	2.23930	2.39558
0.04	2.35381	2.25908	2.40653
0.05	2.36500	2.27511	2.41549

0.06	2.37452	2.28871	2.42317
0.07	2.38287	2.30060	2.42994
0.08	2.39035	2.31121	2.43603
0.09	2.39715	2.32082	2.44161
0.10	2.40341	2.32964	2.44677
0.15	2.42932	2.36580	2.46851
0.20	2.44992	2.39397	2.48635
0.25	2.46758	2.41760	2.50219
0.30	2.48345	2.43826	2.51698
0.35	2.49815	2.45682	2.53128
0.40	2.51211	2.47381	2.54546
0.45	2.52561	2.48960	2.55982
0.50	2.53889	2.50449	2.57461
0.55	2.55217	2.51873	2.59006
0.60	2.56567	2.53256	2.60638
0.65	2.57963	2.54624	2.62387
0.70	2.59433	2.56009	2.64287
0.75	2.61020	2.57449	2.66392
0.80	2.62786	2.58999	2.68789
0.85	2.64846	2.60753	2.71636
0.90	2.67437	2.62901	2.75278
0.91	2.68063	2.63412	2.76165
0.92	2.68743	2.63965	2.77132
0.93	2.69491	2.64569	2.78197
0.94	2.70326	2.65241	2.79391
0.95	2.71278	2.66004	2.80756
0.96	2.72397	2.66895	2.82364
0.97	2.73772	2.67985	2.84347
0.98	2.75601	2.69425	2.86992
0.99	2.78483	2.71680	2.91176

PROBIT ANALYSIS (LOG10) OF Goldfish Mortality AFTER 96-hr EXPOSURE

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Probit Procedure

Probit Analysis on DOSE

Probability	DOSE	95% Fiducial Limits	
0.01	196.31442	148.29992	228.29798
0.02	209.78331	163.27140	240.50156
0.03	218.80412	173.49985	248.64466
0.04	225.84488	181.58402	254.99442
0.05	231.73877	188.41288	260.31202
0.06	236.87641	194.40692	264.95313
0.07	241.47475	199.80118	269.11479
0.08	245.66771	204.74151	272.91846
0.09	249.54422	209.32515	276.44472
0.10	253.16661	213.62045	279.75002
0.15	268.73234	232.16503	294.11048
0.20	281.78324	247.72705	306.44071
0.25	293.48374	261.57817	317.82871
0.30	304.40462	274.32161	328.83959
0.35	314.88688	286.29618	339.84261
0.40	325.16708	297.71802	351.12276
0.45	335.43264	308.74521	362.92921
0.50	345.85180	319.51372	375.50225
0.55	356.59459	330.16099	389.09548
0.60	367.85231	340.84395	404.00282
0.65	379.86170	351.75647	420.59938
0.70	392.94234	363.15354	439.40975
0.75	407.56420	375.39506	461.23359
0.80	424.48750	389.03919	487.40597
0.85	445.10261	405.07183	520.43291
0.90	472.46936	425.60801	565.95428
0.91	479.32772	430.64755	577.63354
0.92	486.89127	436.16246	590.63202
0.93	495.34563	442.27751	605.30410
0.94	504.96148	449.17395	622.16958
0.95	516.15647	457.13035	642.03579
0.96	529.62663	466.60890	666.25854

0.97 546.66916 478.46641 697.38788
 0.98 570.17627 494.60049 741.17634
 0.99 609.29536 520.95495 816.13301
 PROBIT ANALYSIS (LOG10) OF Rainbow Trout Mortality AFTER 96-hr EXPOSURE

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Probit Procedure

Iteration History for Parameter Estimates

Iter	Ridge	Loglikelihood	Intercept	Log10(DOSE)
0	0	-27.725887	0	0
1	0	-18.952629	-2.934996998	1.5760271882
2	0	-17.991353	-4.275293727	2.2643848946
3	0	-17.9163	-4.781935402	2.5225911975
4	0	-17.915464	-4.843048247	2.5538073563
5	0	-17.915464	-4.843793267	2.554188815
6	0	-17.915464	-4.843793267	2.554188815

Model Information

Data Set	WORK.C
Events Variable	RESPONSE
Trials Variable	N
Number of Observations	4
Number of Events	16
Number of Trials	40
Name of Distribution	Normal
Log Likelihood	-17.9154642

Number of Observations Read	5
Number of Observations Used	4
Number of Events	16
Number of Trials	40

Parameter Information

Parameter	Effect
Intercept	Intercept
DOSE	DOSE

Last Evaluation of the Negative of the Gradient

Intercept	Log10(DOSE)
7.5792989E-8	5.7150528E-8

PROBIT ANALYSIS (LOG10) OF Rainbow Trout Mortality AFTER 96-hr EXPOSURE

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Probit Procedure

Last Evaluation of the Negative of the Hessian

	Intercept	Log10(DOSE)
Intercept	17.172022174	32.13728347
Log10(DOSE)	32.13728347	61.677958311

Algorithm converged.

Goodness-of-Fit Tests

Statistic	Value	DF	Pr > ChiSq
Pearson Chi-Square	2.2405	2	0.3262
L.R. Chi-Square	2.3546	2	0.3081

Response-Covariate Profile

Response Levels 2
Number of Covariate Values 4

Since the chi-square is small ($p > 0.1000$), fiducial limits will be calculated using a t value of 1.96.

Type III Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
Log10(DOSE)	1	10.0032	0.0016

Analysis of Parameter Estimates

Parameter	DF	Estimate	Standard Error	95% Confidence Limits		Chi-Square	Pr > ChiSq
Intercept	1	-4.8438	1.5305	-7.8435	-1.8440	10.02	0.0016
Log10(DOSE)	1	2.5542	0.8076	0.9714	4.1370	10.00	0.0016

Estimated Covariance Matrix

	Intercept	Log10(DOSE)
Intercept	2.342473	-1.220545
Log10(DOSE)	-1.220545	0.652178

PROBIT ANALYSIS (LOG10) OF Rainbow Trout Mortality AFTER 96-hr EXPOSURE

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Probit Procedure

Probit Model in Terms of Tolerance Distribution

MU	SIGMA
1.89641159	0.39151373

Estimated Covariance Matrix for Tolerance Parameters

	MU	SIGMA
MU	0.008988	0.000975
SIGMA	0.000975	0.015323

PROBIT ANALYSIS (LOG10) OF Rainbow Trout Mortality AFTER 96-hr EXPOSURE

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Probit Procedure

Probit Analysis on Log10(DOSE)

Probability	Log10(DOSE)	95% Fiducial Limits	
0.01	0.98561	-0.48860	1.35525
0.02	1.09234	-0.21200	1.42518
0.03	1.16006	-0.03709	1.47014

0.04	1.21099	0.09409	1.50434
0.05	1.25243	0.20049	1.53248
0.06	1.28770	0.29080	1.55668
0.07	1.31862	0.36976	1.57812
0.08	1.34631	0.44025	1.59753
0.09	1.37149	0.50416	1.61537
0.10	1.39467	0.56281	1.63198
0.15	1.49063	0.80322	1.70317
0.20	1.56691	0.99028	1.76375
0.25	1.63234	1.14627	1.82022
0.30	1.69110	1.28098	1.87630
0.35	1.74555	1.39923	1.93485
0.40	1.79722	1.50343	1.99841
0.45	1.84721	1.59488	2.06928
0.50	1.89641	1.67468	2.14922
0.55	1.94561	1.74438	2.23926
0.60	1.99560	1.80603	2.33992
0.65	2.04727	1.86200	2.45171
0.70	2.10172	1.91463	2.57588
0.75	2.16048	1.96622	2.71508
0.80	2.22592	2.01932	2.87444
0.85	2.30219	2.07733	3.06407
0.90	2.39816	2.14650	3.30650
0.91	2.42134	2.16275	3.36551
0.92	2.44652	2.18025	3.42977
0.93	2.47420	2.19932	3.50059
0.94	2.50513	2.22044	3.57988
0.95	2.54039	2.24431	3.67052
0.96	2.58183	2.27211	3.77725
0.97	2.63277	2.30598	3.90877
0.98	2.70048	2.35058	4.08403
0.99	2.80721	2.42009	4.36105

PROBIT ANALYSIS (LOG10) OF Rainbow Trout Mortality AFTER 96-hr EXPOSURE

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Probit Procedure

Probit Analysis on DOSE

Probability	DOSE	95% Fiducial Limits	
0.01	9.67419	0.32464	22.65964
0.02	12.36917	0.61376	26.61845
0.03	14.45623	0.91813	29.52136
0.04	16.25526	1.24191	31.94074
0.05	17.88252	1.58669	34.07813
0.06	19.39529	1.95345	36.03096
0.07	20.82664	2.34292	37.85481
0.08	22.19764	2.75580	39.58489
0.09	23.52272	3.19273	41.24522
0.10	24.81227	3.65437	42.85318
0.15	30.94808	6.35654	50.48557
0.20	36.88972	9.77872	58.04303
0.25	42.88837	14.00449	66.10302
0.30	49.10227	19.09764	75.21448
0.35	55.66130	25.07457	86.06873
0.40	62.69353	31.87377	99.63439
0.45	70.34179	39.34387	117.29485
0.50	78.77920	47.28023	140.99912
0.55	88.22867	55.51053	173.48446
0.60	98.99208	63.97847	218.73357
0.65	111.49871	72.77808	282.95179
0.70	126.39258	82.15355	376.60359
0.75	144.70502	92.51768	518.89393
0.80	168.23558	104.54920	748.92642
0.85	200.53468	119.48992	1159
0.90	250.12473	140.11877	2025
0.91	263.83694	145.46175	2320
0.92	279.58663	151.44239	2690
0.93	297.99161	158.24116	3167
0.94	319.98292	166.12502	3801

0.95	347.05186	175.51286	4683
0.96	381.79411	187.11655	5987
0.97	429.30714	202.29468	8105
0.98	501.74435	224.17056	12135
0.99	641.51783	263.07886	22964

PROBIT ANALYSIS (LOG10) OF Japanese Quail (male) Acute Oral Mortality AFTER 24-hr 11

Probit Procedure

Iteration History for Parameter Estimates

Iter	Ridge	Loglikelihood	Intercept	Log10(DOSE)
0	0	-13.862944	0	0
1	0	-7.6172728	-19.39234437	4.9106177763
2	0	-6.1967505	-32.75230879	8.2715295958
3	0	-5.6753719	-46.12758141	11.62878221
4	0	-5.5953986	-53.74910157	13.539038046
5	0	-5.5932422	-55.27380802	13.921232032
6	0	-5.5932405	-55.31844087	13.932428704
7	0	-5.5932405	-55.31844087	13.932428704

Model Information

Data Set	WORK.D
Events Variable	RESPONSE
Trials Variable	N
Number of Observations	5
Number of Events	7
Number of Trials	20
Name of Distribution	Normal
Log Likelihood	-5.593240482

Number of Observations Read	6
Number of Observations Used	5
Number of Events	7
Number of Trials	20

Parameter Information

Parameter	Effect
Intercept	Intercept
DOSE	DOSE

Last Evaluation of the Negative of the Gradient

Intercept	Log10(DOSE)
5.1300508E-7	1.807049E-6

PROBIT ANALYSIS (LOG10) OF Japanese Quail (male) Acute Oral Mortality AFTER 24-hr

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Probit Procedure

Last Evaluation of the Negative of the Hessian

	Intercept	Log10(DOSE)
Intercept	5.4805067808	21.776646963
Log10(DOSE)	21.776646963	86.55492578

Algorithm converged.

Goodness-of-Fit Tests

Statistic	Value	DF	Pr > ChiSq
Pearson Chi-Square	0.9075	3	0.8236
L.R. Chi-Square	1.1426	3	0.7668

Response-Covariate Profile

Response Levels	2
Number of Covariate Values	5

Since the chi-square is small ($p > 0.1000$), fiducial limits will be calculated using a t value of 1.96.

Type III Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
Log10(DOSE)	1	5.0473	0.0247

Analysis of Parameter Estimates

Parameter	DF	Estimate	Standard Error	95% Confidence Limits		Chi-Square	Pr > ChiSq
Intercept	1	-55.3184	24.6451	-103.622	-7.0149	5.04	0.0248
Log10(DOSE)	1	13.9324	6.2015	1.7777	26.0871	5.05	0.0247

Estimated Covariance Matrix

	Intercept	Log10(DOSE)
Intercept	607.382896	-152.813520
Log10(DOSE)	-152.813520	38.458425

PROBIT ANALYSIS (LOG10) OF Japanese Quail (male) Acute Oral Mortality AFTER 24-hr

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Probit Procedure

Probit Model in Terms of Tolerance Distribution

MU	SIGMA
3.97048081	0.07177499

Estimated Covariance Matrix for Tolerance Parameters

	MU	SIGMA
MU	0.000942	-0.000043
SIGMA	-0.000043	0.001021

PROBIT ANALYSIS (LOG10) OF Japanese Quail (male) Acute Oral Mortality AFTER 24-hr

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Probit Procedure

Probit Analysis on Log10(DOSE)

Probability	Log10(DOSE)	95% Fiducial Limits
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0.01	3.80351	2.62936	3.89476
0.02	3.82307	2.78117	3.90674
0.03	3.83549	2.87727	3.91456
0.04	3.84483	2.94942	3.92059
0.05	3.85242	3.00799	3.92560
0.06	3.85889	3.05776	3.92996
0.07	3.86456	3.10130	3.93387
0.08	3.86963	3.14022	3.93745
0.09	3.87425	3.17554	3.94077
0.10	3.87850	3.20799	3.94389
0.15	3.89609	3.34143	3.95773
0.20	3.91007	3.44598	3.97023
0.25	3.92207	3.53394	3.98270
0.30	3.93284	3.61072	3.99609
0.35	3.94282	3.67894	4.01144
0.40	3.95230	3.73960	4.03007
0.45	3.96146	3.79267	4.05373
0.50	3.97048	3.83752	4.08437
0.55	3.97950	3.87381	4.12359
0.60	3.98866	3.90218	4.17193
0.65	3.99814	3.92431	4.22911
0.70	4.00812	3.94208	4.29490
0.75	4.01889	3.95713	4.37003
0.80	4.03089	3.97075	4.45683
0.85	4.04487	3.98407	4.56056
0.90	4.06246	3.99852	4.69339
0.91	4.06671	4.00175	4.72573
0.92	4.07133	4.00518	4.76095
0.93	4.07641	4.00885	4.79977
0.94	4.08207	4.01286	4.84322
0.95	4.08854	4.01731	4.89289
0.96	4.09614	4.02242	4.95137
0.97	4.10547	4.02854	5.02342
0.98	4.11789	4.03646	5.11942
0.99	4.13745	4.04856	5.27111

PROBIT ANALYSIS (LOG10) OF Japanese Quail (male) Acute Oral Mortality AFTER 24-hr

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Probit Procedure

Probit Analysis on DOSE

Probability	DOSE	95% Fiducial Limits	
0.01	6361	425.95505	7848
0.02	6654	604.18641	8068
0.03	6847	753.82589	8214
0.04	6996	890.05935	8329
0.05	7119	1019	8426
0.06	7226	1142	8511
0.07	7321	1263	8588
0.08	7407	1381	8659
0.09	7486	1498	8725
0.10	7560	1614	8788
0.15	7872	2195	9073
0.20	8130	2792	9338
0.25	8357	3419	9609
0.30	8567	4081	9910
0.35	8766	4775	10267
0.40	8960	5490	10717
0.45	9151	6204	11317
0.50	9343	6879	12144
0.55	9539	7478	13292
0.60	9742	7983	14857
0.65	9957	8401	16947
0.70	10189	8751	19720
0.75	10445	9060	23444
0.80	10737	9349	28631
0.85	11088	9640	36355
0.90	11547	9966	49361
0.91	11660	10040	53177

0.92	11785	10120	57670
0.93	11924	10206	63062
0.94	12080	10300	69698
0.95	12261	10407	78142
0.96	12478	10530	89406
0.97	12749	10679	105541
0.98	13119	10876	131650
0.99	13723	11183	186685

hr PROBIT ANALYSIS (LOG10) OF Japanese Quail (female) Acute Oral Mortality AFTER 24-16

Probit Procedure

Iteration History for Parameter Estimates

Iter	Ridge	Loglikelihood	Intercept	Log10(DOSE)
0	0	-13.862944	0	0
1	0	-9.1124357	-18.75257036	4.842501572
2	0	-8.8051342	-24.97158194	6.4277336139
3	0	-8.796431	-26.19984269	6.7385831367
4	0	-8.7964187	-26.24750229	6.7506184991
5	0	-8.7964187	-26.24757291	6.7506363216
6	0	-8.7964187	-26.24757291	6.7506363216

Model Information

Data Set	WORK.E
Events Variable	RESPONSE
Trials Variable	N
Number of Observations	5
Number of Events	10
Number of Trials	20
Name of Distribution	Normal
Log Likelihood	-8.796418721

Number of Observations Read	6
Number of Observations Used	5
Number of Events	10
Number of Trials	20

Parameter Information

Parameter	Effect
Intercept	Intercept
DOSE	DOSE

Last Evaluation of the Negative of the Gradient

Intercept	Log10(DOSE)
1.823786E-11	6.548419E-11

hr PROBIT ANALYSIS (LOG10) OF Japanese Quail (female) Acute Oral Mortality AFTER 24-17

Probit Procedure

Last Evaluation of the Negative of the Hessian

	Intercept	Log10(DOSE)
Intercept	8.6135582178	33.672723548
Log10(DOSE)	33.672723548	131.78317587

Algorithm converged.

Goodness-of-Fit Tests

Statistic	Value	DF	Pr > ChiSq
Pearson Chi-Square	2.3394	3	0.5050
L.R. Chi-Square	3.0503	3	0.3839

Response-Covariate Profile

Response Levels	2
Number of Covariate Values	5

Since the chi-square is small ($p > 0.1000$), fiducial limits will be calculated using a t value of 1.96.

Type III Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
Log10(DOSE)	1	6.7177	0.0095

Analysis of Parameter Estimates

Parameter	DF	Estimate	Standard Error	95% Confidence Limits	Chi-Square	Pr > ChiSq
Intercept	1	-26.2476	10.1876	-46.2149 -6.2803	6.64	0.0100
Log10(DOSE)	1	6.7506	2.6046	1.6458 11.8555	6.72	0.0095

Estimated Covariance Matrix

	Intercept	Log10(DOSE)
Intercept	103.787009	-26.519252
Log10(DOSE)	-26.519252	6.783684

PROBIT ANALYSIS (LOG10) OF Japanese Quail (female) Acute Oral Mortality AFTER 24-18 hr

Probit Procedure

Probit Model in Terms of Tolerance Distribution

MU	SIGMA
3.88816278	0.14813418

Estimated Covariance Matrix for Tolerance Parameters

	MU	SIGMA
MU	0.002614	-0.000465
SIGMA	-0.000465	0.003267

PROBIT ANALYSIS (LOG10) OF Japanese Quail (female) Acute Oral Mortality AFTER 24-19 hr

Probit Procedure

Probit Analysis on Log10(DOSE)

Probability	Log10(DOSE)	95% Fiducial Limits	
0.01	3.54355	2.39174	3.71848
0.02	3.58393	2.55527	3.74358
0.03	3.60955	2.65875	3.75977
0.04	3.62883	2.73641	3.77214
0.05	3.64450	2.79944	3.78234
0.06	3.65785	2.85298	3.79114
0.07	3.66955	2.89982	3.79895
0.08	3.68002	2.94166	3.80604
0.09	3.68955	2.97964	3.81257
0.10	3.69832	3.01451	3.81866
0.15	3.73463	3.15789	3.84489
0.20	3.76349	3.27022	3.86737
0.25	3.78825	3.36481	3.88842
0.30	3.81048	3.44768	3.90941
0.35	3.83108	3.52190	3.93142
0.40	3.85063	3.58907	3.95557
0.45	3.86955	3.64983	3.98317
0.50	3.88816	3.70426	4.01569
0.55	3.90678	3.75220	4.05470
0.60	3.92569	3.79368	4.10157
0.65	3.94524	3.82929	4.15728
0.70	3.96584	3.86018	4.22262
0.75	3.98808	3.88783	4.29883
0.80	4.01284	3.91385	4.38846
0.85	4.04169	3.94006	4.49704
0.90	4.07800	3.96919	4.63753
0.91	4.08677	3.97579	4.67189
0.92	4.09630	3.98281	4.70937
0.93	4.10678	3.99038	4.75074
0.94	4.11848	3.99866	4.79711
0.95	4.13182	4.00792	4.85019
0.96	4.14750	4.01858	4.91276
0.97	4.16677	4.03142	4.98994
0.98	4.19239	4.04813	5.09291
0.99	4.23277	4.07381	5.25586

hr PROBIT ANALYSIS (LOG10) OF Japanese Quail (female) Acute Oral Mortality AFTER 24-20

Probit Procedure

Probit Analysis on DOSE

Probability	DOSE	95% Fiducial Limits	
0.01	3496	246.45679	5230
0.02	3836	359.14810	5541
0.03	4070	455.77652	5751
0.04	4254	545.02013	5918
0.05	4411	630.15009	6058
0.06	4548	712.81694	6182
0.07	4672	793.99188	6294
0.08	4787	874.30521	6398
0.09	4893	954.19530	6495
0.10	4993	1034	6587
0.15	5428	1438	6997
0.20	5801	1863	7368
0.25	6141	2316	7734
0.30	6464	2803	8117
0.35	6778	3326	8539
0.40	7090	3882	9028
0.45	7405	4465	9620
0.50	7730	5061	10368
0.55	8068	5652	11342
0.60	8427	6218	12635
0.65	8815	6750	14364
0.70	9244	7247	16696
0.75	9729	7724	19899
0.80	10300	8201	24460
0.85	11008	8711	31408

0.90	11968	9315	43404
0.91	12212	9458	46978
0.92	12483	9612	51212
0.93	12787	9781	56330
0.94	13136	9969	62678
0.95	13546	10184	70825
0.96	14044	10437	81800
0.97	14682	10750	97711
0.98	15574	11172	123855
0.99	17091	11853	180242

PROBIT ANALYSIS (LOG10) OF Japanese Quail (male and female) Acute Oral Mortality AFTER 24-hr 21

Probit Procedure

Iteration History for Parameter Estimates

Iter	Ridge	Loglikelihood	Intercept	Log10(DOSE)
0	0	-27.725887	0	0
1	0	-17.300778	-19.07245737	4.8765596741
2	0	-16.038528	-27.92693991	7.1157351793
3	0	-15.917159	-31.64082056	8.0514451108
4	0	-15.915472	-32.14267363	8.1777690349
5	0	-15.915471	-32.14985672	8.1795764232
6	0	-15.915471	-32.14985672	8.1795764232

Model Information

Data Set	WORK.F
Events Variable	RESPONSE
Trials Variable	N
Number of Observations	5
Number of Events	17
Number of Trials	40
Name of Distribution	Normal
Log Likelihood	-15.91547141

Number of Observations Read	6
Number of Observations Used	5
Number of Events	17
Number of Trials	40

Parameter Information

Parameter	Effect
Intercept	Intercept
DOSE	DOSE

Last Evaluation of the Negative of the Gradient

Intercept	Log10(DOSE)
2.1375182E-7	7.7566301E-7

PROBIT ANALYSIS (LOG10) OF Japanese Quail (male and female) Acute Oral Mortality AFTER 24-hr 22

Probit Procedure

Last Evaluation of the Negative of the Hessian

Intercept	Log10(DOSE)
Intercept	15.547547315 61.204044411

Log10(DOSE) 61.204044411 241.11740832

Algorithm converged.

Goodness-of-Fit Tests

Statistic	Value	DF	Pr > ChiSq
Pearson Chi-Square	0.1632	3	0.9833
L.R. Chi-Square	0.1919	3	0.9789

Response-Covariate Profile

Response Levels	2
Number of Covariate Values	5

Since the chi-square is small (p > 0.1000), fiducial limits will be calculated using a t value of 1.96.

Type III Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
Log10(DOSE)	1	12.2612	0.0005

Analysis of Parameter Estimates

Parameter	DF	Estimate	Standard Error	95% Confidence Limits	Chi-Square	Pr > ChiSq
Intercept	1	-32.1499	9.1992	-50.1799 -14.1198	12.21	0.0005
Log10(DOSE)	1	8.1796	2.3360	3.6012 12.7580	12.26	0.0005

Estimated Covariance Matrix

	Intercept	Log10(DOSE)
Intercept	84.624515	-21.480666
Log10(DOSE)	-21.480666	5.456693

PROBIT ANALYSIS (LOG10) OF Japanese Quail (male and female) Acute Oral Mortality AFTER 24-hr 23

Probit Procedure

Probit Model in Terms of Tolerance Distribution

MU	SIGMA
3.93050386	0.12225572

Estimated Covariance Matrix for Tolerance Parameters

	MU	SIGMA
MU	0.000964	-0.000061
SIGMA	-0.000061	0.001219

PROBIT ANALYSIS (LOG10) OF Japanese Quail (male and female) Acute Oral Mortality AFTER 24-hr 24

Probit Procedure

Probit Analysis on Log10(DOSE)

Probability	Log10(DOSE)	95% Fiducial Limits	
0.01	3.64609	3.26570	3.76143
0.02	3.67942	3.34003	3.78416
0.03	3.70057	3.38701	3.79876
0.04	3.71647	3.42224	3.80987
0.05	3.72941	3.45080	3.81899
0.06	3.74042	3.47503	3.82683
0.07	3.75008	3.49622	3.83377
0.08	3.75873	3.51513	3.84004
0.09	3.76659	3.53227	3.84580
0.10	3.77383	3.54800	3.85115
0.15	3.80379	3.61248	3.87395
0.20	3.82761	3.66272	3.89308
0.25	3.84804	3.70477	3.91054
0.30	3.86639	3.74137	3.92738
0.35	3.88340	3.77395	3.94432
0.40	3.89953	3.80332	3.96194
0.45	3.91514	3.82998	3.98075
0.50	3.93050	3.85423	4.00124
0.55	3.94587	3.87638	4.02383
0.60	3.96148	3.89675	4.04893
0.65	3.97761	3.91573	4.07694
0.70	3.99461	3.93383	4.10837
0.75	4.01296	3.95161	4.14402
0.80	4.03340	3.96984	4.18531
0.85	4.05721	3.98959	4.23493
0.90	4.08718	4.01290	4.29889
0.91	4.09442	4.01834	4.31453
0.92	4.10228	4.02419	4.33158
0.93	4.11093	4.03055	4.35040
0.94	4.12058	4.03758	4.37150
0.95	4.13160	4.04551	4.39564
0.96	4.14454	4.05472	4.42411
0.97	4.16044	4.06592	4.45924
0.98	4.18159	4.08062	4.50612
0.99	4.21491	4.10347	4.58034

PROBIT ANALYSIS (LOG10) OF Japanese Quail (male and female) Acute Oral Mortality AFTER 24-hr 25

Probit Procedure

Probit Analysis on DOSE

Probability	DOSE	95% Fiducial Limits	
0.01	4427	1844	5773
0.02	4780	2188	6084
0.03	5018	2438	6292
0.04	5206	2644	6455
0.05	5363	2824	6592
0.06	5501	2986	6712
0.07	5624	3135	6820
0.08	5738	3274	6919
0.09	5842	3406	7011
0.10	5941	3532	7098
0.15	6365	4097	7481
0.20	6724	4600	7818
0.25	7048	5067	8138
0.30	7352	5513	8460
0.35	7645	5942	8797
0.40	7935	6358	9161
0.45	8225	6760	9566
0.50	8521	7149	10028
0.55	8828	7523	10564
0.60	9151	7884	11193
0.65	9498	8236	11938
0.70	9877	8587	12834
0.75	10303	8946	13932

0.80	10799	9329	15322
0.85	11408	9763	17176
0.90	12223	10301	19902
0.91	12429	10431	20631
0.92	12656	10573	21458
0.93	12910	10729	22408
0.94	13200	10904	23523
0.95	13539	11105	24868
0.96	13949	11343	26553
0.97	14469	11639	28790
0.98	15191	12040	32072
0.99	16403	12690	38049