Data Evaluation Record

1. CHEMICAL: Thiabenzadole

2. FORMULATION: 98.5% (Technical)

3. CITATION: Fink, R. (1978) One Generation Reproduction Study - Mallard Duck Thiabenzadole 98.5% Technical - Final Report. Submitted to Merck and Company, Inc. Rahway, New Jersey 07065 by Wildlife International Ltd. (Received 11/20/78. Accession No. 235974).

4. REVIEWED BY: R. W. Matheny
Wildlife Biologist
Ecological Effects Branch/HED

5. DATE-REVIEWED: September 6, 1979

6. TEST TYPE: Avian Reproduction

7. REPORTED RESULTS: Thiabenzadole 98.5% Technical, fed to mature mallard ducks at dietary concentrations of 80 ppm and 400 ppm had no effect on reproductive success of the birds throughout a one-generation reproductive study.

8. REVIEWERS CONCLUSIONS: The study is scientifically sound and demonstrates that Thiabenzadole does not cause statistically significant reproductive impairment in waterfowl at the concentrations tested (80 ppm, 400 ppm). The study fulfills the requirement for an avian reproduction study on mallard ducks.

9. MATERIALS/METHODS

Test Procedures

One hundred and five mallard ducks (30 drakes and 75 hens) from Wildlife International's production flock were used in this test, were randomly distributed into the following test groups:

No.	Group	Dosage Level	No. Pens	Mallards/Pen Drakes/Hens	
1	Control	0	5	2	5
2	Thiabenzadole*	80	5	2	5
3	Thiabenzadole*	400	5	2	5

*98.5% Technical

Standard procedures were used in the conduct of this avian reproductive study. The birds were housed outdoors with two drakes and five hens/pen. The photoperiod or temperature were not controlled. The onset of egg laying was prompted by the increasing photoperiod and temperatures of early spring. Other features:

1. Body weights: recorded at initiation, after 5 weeks, prior to onset of laying and termination of the study.

2. Food consumption: recorded bi-weekly

3. Eggs: collected daily, stored @ 60°F, 55% RH; candled on Day 0 of incubation; embryo viability measured 0 Day 14; embryo survival measured on Day 21; placed in hatcher on Day 22 or 23

4. Chicks: removed from incubator on Day 26 or 27; maintained on control diet until 14 days of age

5. Eggshell thickness measurement: 1 egg/pen/group each week randomly selected for measurement

Statistical Analysis

The student's t-test was used to make statistical comparisons between the control group and each experimental group. The parameters compared were:

1. eggs laid
2. eggs cracked
3. eggs set
4. viable embryos
5. live three-week embryos
6. hatchlings
7. body weights - representative hatchlings
8. 14-day-old survivors
9. body weights - representative 14-day-old survivors

Table 1

Reproductive Data - Mallard Duck

	Control	Thiabenzadole (ppm) 80	400
Eggs Laid	615	694	699
Eggs Cracked	32	33	37
Eggs Set	546	621	622
Viable Embryos	489	538	538
Live-Three-Week Embryos	463	489	501
Normal Hatchlings	329	398	417
14-Day-Old-Survivors	318	383	402
Average Eggshell Thickness (mm)	0.361	0.368	0.358

Discussion/Results

There were no mortalities reported for either the control or test birds. According to the registrant, all birds appeared normal throughout the study.

Egg Production

This study is based upon the total 8 weeks egg production and egg set period.

Table 2

Body Weight Mallard Duck

		Thiobenzadole (ppm)	
Age of Bird	Control	80	400
Representative Hatchlings	33 (70)	32 (71)	33 (74)
Representative 14-Day-Old Survivors	205 (70)	214 (71)	224 (74)
Adult Mallard Duck (16 wks)	1,143*	190*	1,133*

( ) numbers of birds sampled
* mean/group

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TABLE 3

Average Food Consumption Per Bird During Study

Week	Thiabenzadole (ppm)		
	Control	80	400
2	77 grams	100 grams	83 grams
6	116 "	172 "	132 "
10	115 "	148 "	133 "
14	134 "	146 "	131 "
16	127 "	161 "	139 "

A. Test Procedures

The test procedures generally comply with the recommended EPA 1978 protocol. The one notable exception was the lack of controlling the photoperiod, however the birds were housed in outside pens and responded to normal fluctuations in light and temperature.

B. Statistical Analysis

As with the accompanying quail reproductive study, the researcher conducted t-tests to determine any differences between means of 2 sets of data.

The EE Branch, using the TI-59 computer, conducted the ANOVA tests on six parameters (see attached printout) and found no significant differences between the means of the three levels tested (control, 80 ppm and 400 ppm). Duncan's analysis, therefore was not conducted.

C. Discussion/Results

Thiabenzadole, tested at 80 ppm and 400 ppm did not appear to cause any adverse effects upon the reproductive behavior of mallard ducks. Statistically there were no significant differences between treated and controls.

TABLE 4

REPRODUCTIVE DATA BY PEN - MALLARD DUCK

THIABENZADOLE 98.5% TECHNICAL

	1	2	3	4	5	6
	Eggs Laid	Eggs Cracked	Eggs Set	Viable Embryos	Live Three-Week Embryos	Normal Hatchlings
	90	5	79	74	72	50
	112	3	101	91	85	59
Controls	144	8	128	109	104	74
	132	7	117	110	108	88
	137	9	121	105	94	58
Totals	615	32	546	489	463	329
	113	2	103	84	80	68
	146	6	132	110	92	68
80 ppm	139	7	124	110	106	80
	155	9	138	123	114	99
	141	9	124	111	97	83
Totals	694	33	621	538	489	398
	136	3	125	112	106	86
	138	16	114	73	67	50
400 ppm	149	5	136	120	113	99
	169	9	152	136	129	113
	107	4	95	91	86	69
Totals	699	37	622	532	501	417

D. Conclusions

1. Category: Core

2. Rationale: Satisifies registration requirements

3. Repairability: N/A

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Eggs Laid — Mallard Diet

ANOVA + DUNCAN

Control	90.	
	112.	Test
	144.	set
	132.	1
	137.	
	123.	Mean
	385.6	Variance
80 ppm	113.	
	146.	Test
	139.	set
	155.	2
	141.	
	138.8	Mean
	196.96	Variance
400 ppm	136.	
	138.	Test
	149.	set
	169.	3
	107.	
	139.8	Mean
	406.16	Variance
	1.077918926	F value
	2.	numerator
	12.	denominator
	4943.6	Error sum of sq.
	888.1333334	Trtmt. " "
	5831.733333	Total " "
	139.8	Ranked means
	138.8	
	123.	
	3.23	SSR
	3.	P
	139.8	
	123.	

ANOVA + DUNCAN NS

Eggs Cracked - Mallard

ANOVA + DUNCAN

	5.
	3.
	8.
	7.
	9.
	6.4
	4.64
	2.
	6.
	7.
	9.
	9.
	6.6
	6.64
	3.
	16.
	5.
	9.
	4.
	7.4
	22.64
	.0990566038
	2.
	12.
	169.6
	2.8
	172.4
	7.4
	6.6
	6.4
	3.23
	3.
	7.4
	6.4

ANOVA + DUNCAN NS

% Thiabendazole Eggs set — Mallard

ANOVA + DUNCAN

	79.
	101.
	128.
	117.
	121.
	109.2
	306.56
	103.
	132.
	124.
	138.
	124.
	124.2
	140.16
	125.
	114.
	136.
	152.
	95.
	124.4
	373.84
	1.111631081
	2.
	12.
	4102.8
	760.1333334
	4862.933333
	124.4
	124.2
	109.2
	3.23
	3.
	124.4
	109.2

ANOVA + DUNCAN NS

4. Thiabenzadole
Viable Embryos - Mallard

ANOVA + DUNCAN

74.
91.
109.
10.
105.

77.8
1299.76

84.
110.
110.
123.
111.

107.6
163.44

112.
73.
120.
136.
91.

106.4
489.04

1.749211163
2.
12.

9761.2
2845.733333
12606.93333

107.6
106.4
77.8

3.23
3.

107.6
77.8
ANOVA + DUNCAN NS

5. Thiabenzadole
Live - 3 wk. Embryos
Mallard

ANOVA + DUNCAN

72.
85.
104.
108.
94.

92.6
170.24

80.
92.
106.
114.
97.

97.8
136.16

106.
67.
113.
129.
86.

100.2
466.16

0.234441338
2.
12.

3862.8
150.9333334
4013.733333

100.2
97.8
92.6

3.23
3.

100.2
92.6
ANOVA + DUNCAN NS

6. Thiabenzadole
Normal Hatchlings
Mallard

ANOVA + DUNCAN

50.
59.
4.
8.
58.

35.8
603.36

68.
8.
80.
99.
83.

67.6
985.84

86.
0.
9.
113.
69.

55.4
1932.24

.8770502976
2.
12.

17607.2
2573.733333
20180.93333

67.6
55.4
35.8

3.23
3.

67.6
35.8
ANOVA + DUNCAN NS

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