87--73-70

Industrial **BIO-TEST** *Laboratories, Inc.*
1810 FRONTAGE ROAD
NORTHBROOK, ILLINOIS 60062

REPORT TO

IBT RESEARCH

TOXICITY AND REPRODUCTION STUDY WITH AROCLOR 1242 IN WHITE LEGHORN CHICKENS

JUNE 7, 1973

IBT NO. J1291

REPORT TO

IBT RESEARCH

TOXICITY AND REPRODUCTION STUDY WITH AROCLOR 1242 IN WHITE LEGHORN CHICKENS

JUNE 7, 1973

IBT NO. J1291

I. Introduction

A toxicity and reproduction study with Aroclor 1242 in white Leghorn chickens was initiated. This report presents the results of the investigation conducted at Wedge's Creek Research Farm, Industrial BIO-TEST Laboratories, Inc.

II. Summary

A toxicity and reproduction study was conducted in white Leghorn chickens fed Aroclor 1242 at dietary levels of 1.0, 3.0, and 10.0 ppm. The results of this study were as follows:

A. Toxicity Phase

No effects upon weight gain, food consumption, survival, egg production, egg weight, egg shell thickness or egg specific gravity were observed.

A slight increase in the number of defective eggs and a severe decrease in the hatchability of eggs were recorded for the group fed 10 ppm. Data obtained from the 1 and 3 ppm groups were essentially normal.

A gross pathological examination of all chickens revealed no significant abnormalities.

B. Reproduction Phase

Chick survival was not influenced by the ingestion of Aroclor 1242.

A slight decrease in chick weight gain was recorded for the 10 ppm group. Weight gain for the 1 and 3 ppm groups was considered normal.

No significant abnormalities were noted during the gross pathological examination of each chick.

Respectfully submitted,

INDUSTRIAL BIO-TEST LABORATORIES, INC.

Report prepared by: Dale Fletcher

Dale Fletcher, B.S.
Group Leader
Wedge's Creek Research Farm

Report approved by: Donald H Jenkins

Donald H. Jenkins, D.V.M.
Manager & Technical Director
Wedge's Creek Research Farm

M. L. Keplinger

M. L. Keplinger, Ph.D.
Manager, Toxicology

jv

III. Procedure

A. Experimental Animals

The animals employed in the study were white Leghorn chickens. A total of 80 hens and 16 roosters was used.

B. Organization of Groups

The 96 chickens were divided into one control group and three test groups. A structural outline of the experiment is presented in Table I.

TABLE I

TEST MATERIAL: Aroclor 1242

Toxicity and Reproduction Study - White Leghorn Chickens

Outline of Experiment

Group	Number of Animals Male	Female	Dietary Level (ppm)
Control	4	20	None
T-I	4	20	1.0
T-II	4	20	3.0
T-III	4	20	10.0

C. Dosage and Feeding

All groups received the same basal feed*. Test diets were prepared bi-monthly. The test material was diluted with acetone before addition to the feed to assure even distribution throughout the ration. An equal amount of acetone, without test material, was added to the control feed and the feed was then blended in the same manner as the test feed. All animals were allowed water and their respective control or test feed ad libitum. Dosing began when the birds were 12 weeks of age and was continued for 26 weeks when hatching results were available.

D. Observations

Observations were made daily to ascertain the presence or absence of clinical signs of toxicity indicative of test material effect. All chickens were individually weighed and the group food consumption was determined weekly. As each group began laying, the eggs were collected daily and the egg weights recorded. When the egg weights were consistently between 50 and 60 grams, 50% of the hens in the group were laying, and the hens were at least 28 weeks old, egg collection for that group was started.

* Purina Flock Chow, Ralston Purina Co., St. Louis, Mo.

E. Eggs

The eggs were collected for the following parameters:

1. Egg Production and Quality

Eggs were collected, weighed and candled for a number of seven-day periods. The total number, the individual weights of eggs collected and the total number of uncracked and umblemished eggs were recorded.

2. Hatchability

Three-fourths of all non-defective eggs were randomly selected for hatching. These eggs were turned twice daily during the seven-day collection period then placed in an incubator maintained at 99° to 100° F, with a wet bulb reading of 85°. This procedure was followed until a minimum of 100 eggs from the control group and each test group had been set for hatching. The following were recorded:

a. Number hatched

b. Number unhatched

c. Viability of chicks over a 30-day period, during which time feed and water were permitted ad libitum.

d. Examination of unhatched eggs for fertility and stage of development.

e. Weight of chicks after Day 1 and Day 30.

3. Physical Characteristic of Eggs

One-fourth of the non-defective eggs and all of the defective eggs were examined to determine the following:

a. Specific gravity

b. Thickness of shells at equatorial circumference (Three measurements/egg)

IV. Results

A. Parental Generation

1. Body Weight Data

The average male and female body weights during the test period are shown in Table II. The average male and female body weights during the recovery period are shown in Table III. Body weight gains were considered normal for all test groups.

TABLE II

TEST MATERIAL: Aroclor 1242

Toxicity and Reproduction Study - White Leghorn Chickens

Test Diet Period Body Weight Data

		Mean Body Weight (kilograms) Week:											
Group	Sex	0	1	2	3	4	5	6	7	8	9	10	11
Control	M	1.32	1.41	1.45	1.49	1.59	1.65	1.71	1.78	1.83	1.85	1.84	1.89
	F	0.94	1.03	1.09	1.14	1.21	1.23	1.36	1.44	1.50	1.54	1.58	1.60
T-I	M	1.14	1.24	1.30	1.33	1.43	1.50	1.57	1.62	1.68	1.72	1.78	1.83
	F	0.92	1.03	1.08	1.13	1.21	1.27	1.34	1.42	1.50	1.57	1.62	1.64
T-II	M	1.21	1.32	1.37	1.47	1.56	1.63	1.70	1.78	1.84	1.88	1.93	1.96
	F	0.91	1.00	1.05	1.12	1.18	1.24	1.31	1.37	1.44	1.50	1.55	1.59
T-III	M	1.14	1.23	1.31	1.36	1.47	1.54	1.62	1.66	1.73	1.78	1.86	1.90
	F	0.91	1.01	1.06	1.10	1.19	1.28	1.34	1.42	1.49	1.54	1.60	1.62

TABLE II continued

TEST MATERIAL: Aroclor 1242

Toxicity and Reproduction Study - White Leghorn Chickens

Test Diet Period Body Weight Data

Group	Sex	Mean Body Weight (kilograms) Week: 12	13	14	15	16	17	18	19	20	21	22	23
Control	M	1.91	1.95	1.95	2.01	2.02	2.04	2.03	2.09	2.08	2.11	2.13	2.18
	F	1.59	1.61	1.63	1.67	1.68	1.70	1.68	1.71	1.72	1.72	1.73	1.75
T-I	M	1.86	1.88	1.90	1.95	1.98	2.00	2.01	2.04	2.08	2.12	2.18	2.20
	F	1.64	1.65	1.65	1.68	1.70	1.70	1.70	1.73	1.74	1.75	1.78	1.79
T-II	M	2.09	2.10	2.14	2.25	2.27	2.31	2.34	2.39	2.44	2.46	2.50	2.50
	F	1.62	1.62	1.62	1.65	1.66	1.67	1.69	1.71	1.74	1.74	1.77	1.78
T-III	M	1.93	1.97	1.99	2.06	2.10	2.11	2.15	2.18	2.22	2.26	2.29	2.32
	F	1.63	1.65	1.65	1.68	1.69	1.69	1.69	1.72	1.73	1.74	1.78	1.80

TABLE II continued

TEST MATERIAL: Aroclor 1242

Toxicity and Reproduction Study - White Leghorn Chickens

Test Diet Period Body Weight Data

Group	Sex	Mean Body Weight (kilograms) Week: 24	25	26	Total Weight Gain (kg/chicken)
Control	M	2.17	2.19	2.25	0.93
	F	1.80	1.79	1.80	0.86
T-I	M	2.21	2.22	2.24	1.10
	F	1.81	1.82	1.79	0.87
T-II	M	2.51	2.53	2.57	1.36
	F	1.83	1.83	1.81	0.90
T-III	M	2.30	2.37	2.35	1.21
	F	1.81	1.81	1.84	0.93

TABLE III

TEST MATERIAL: Aroclor 1242

Toxicity and Reproduction Study - White Leghorn Chickens

Recovery Period Body Weight Data

Group	Sex	Mean Body Weight (kilograms) Week: 1	2	3	4
Control	M	2.45	2.47	2.39	2.40
	F	1.84	1.84	1.87	1.87
T-I	M	2.12	2.12	2.05	2.02
	F	1.81	1.87	1.85	1.86
T-II	M	2.75	2.77	2.68	2.70
	F	1.82	1.84	1.84	1.88
T-III	M	2.32	2.34	2.27	2.26
	F	1.83	1.88	1.85	1.89

2. Food Consumption

The food consumption data are presented in Tables IV and V. Food consumption data were considered normal for all test groups.

TABLE IV

TEST MATERIAL: Aroclor 1242

Toxicity and Reproduction Study - White Leghorn Chickens

Average Food Consumption (Grams/Bird/Day)

Test Period

Week	Group Control	T-I	T-II	T-III
1	89	89	89	86
2	75	73	70	72
3	79	73	70	72
4	113	101	104	98
5	83	69	69	72
6	100	94	84	86
7	96	102	90	105
8	98	97	91	106
9	102	100	93	102
10	132	111	104	98
11	96	104	97	111
12	134	122	119	142
13	139	116	110	126
14	111	117	109	116
15	127	111	121	119
16	169	128	128	145
17	172	128	119	136
18	94	82	91	95
19	146	122	126	138
20	154	122	114	120
21	142	135	127	149
22	94	96	94	113
23	118	138	108	137
24	126	141	118	152
25	127	117	109	140
26	139	144	125	140
Mean	118	109	103	114

TABLE V

TEST MATERIAL: Aroclor 1242

Toxicity and Reproduction Study - White Leghorn Chickens

Average Food Consumption (Grams/Bird/Day)

Recovery Period

Week	Group			
	Control	T-I	T-II	T-III
1	128	158	130	167
2	150	166	119	158
3	155	177	159	203
4	168	151	147	201
Mean	150	163	139	182

3. Mortality and Reactions

No abnormal behavioral reactions were observed in any of the chickens.

Mortality, chronology and diagnoses are presented in Table VI.

TABLE VI

TEST MATERIAL: Aroclor 1242

Toxicity and Reproduction Study - White Leghorn Chickens

Mortality, Chronology and Diagnoses

Group	Animal Number	Sex	Week Died	Clinical Diagnoses
Control	771*	F	24	Unknown
T-II	791	M	12	Lymphomatosis
T-III	724	F	21	Prolapsed Rectum

* Sacrificed in extremis.

4. Gross Pathology

Postmortem examination of all birds revealed no gross pathological tissue alterations attributable to the ingestion of Aroclor 1242.

B. Eggs

1. Egg Production and Quality

The weekly egg production data are presented in Tables VII & VIII. The egg quality data are presented in Table IX.

Egg production and egg weights were considered normal for all test groups.

A slight increase in the number of defective eggs was recorded for the group fed 10 ppm Aroclor 1242. No effects were observed in the lower two levels (1 and 3 ppm).

TABLE VII

TEST MATERIAL: Aroclor 1242

Toxicity and Reproduction Study - White Leghorn Chickens

Test Period Egg Production Data

Week	Control		T-I		T-II		T-III	
	Average Weight (grams)	Percent Production/Day	Average Weight (grams)	Percent Production/Day	Average Weight (grams)	Percent Production/Day	Average Weight (grams)	Percent Production/Day
1	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-
5	39.4	2.0	-	-	-	-	30.3	1.0
6	40.7	10.0	34.0	5.0	34.4	4.0	36.9	7.0
7	41.0	20.0	38.1	10.0	37.3	7.0	42.1	12.0
8	42.7	29.1	39.2	17.8	38.6	11.3	42.9	23.8
9	46.7	49.2	44.1	36.4	42.3	35.0	45.9	43.5
10	47.3	62.8	45.4	64.2	44.0	46.4	46.3	70.7
11	47.6	65.7	46.9	72.8	45.8	65.7	47.1	76.4
12	48.4	60.7	47.6	75.0	47.2	67.1	49.0	75.0
13	48.3	67.1	49.4	82.8	48.8	87.1	48.4	77.1
14	49.9	80.7	50.6	87.8	50.8	88.5	50.3	80.7
15	51.6	85.0	51.3	82.1	51.3	84.2	51.3	75.7
16	53.1	83.8	52.4	82.2	52.6	83.7	51.6	80.0
17	52.7	80.0	52.7	79.1	52.5	81.4	51.7	75.0
18	53.7	86.4	53.2	80.7	53.5	78.5	53.3	80.0
19	54.0	81.6	55.9	79.4	54.0	82.2	52.7	79.4
20	55.0	74.0	55.2	83.0	55.3	84.0	54.1	71.0
21	55.3	75.0	55.7	82.8	55.5	73.5	54.4	70.0
22	55.8	79.1	56.3	83.3	56.0	73.3	55.2	72.5
23	56.4	81.9	56.7	86.4	56.3	80.7	85.8	77.4
24	58.0	75.9	57.4	73.5	57.5	70.7	56.8	80.4

TABLE VII continued

TEST MATERIAL: Aroclor 1242

Toxicity and Reproduction Study - White Leghorn Chickens

Test Period Egg Production Data

	Control		T-I		T-II		T-III	
Week	Average Weight (grams)	Percent Production/Day	Average Weight (grams)	Percent Production/Day	Average Weight (grams)	Percent Production/Day	Average Weight (grams)	Percent Production/Day
25	57.9	79.6	57.7	80.0	57.1	80.0	56.7	74.4
26	58.5	66.5	58.3	75.5	58.0	75.2	57.3	72.8
Mean	53.0	63.4	50.4	67.6	49.9	64.7	51.9	62.5

TABLE VIII

TEST MATERIAL: Aroclor 1242

Toxicity and Reproduction Study - White Leghorn Chickens

Recovery Period Egg Production Data

	Control		T-I		T-II		T-III	
Week	Average Weight (grams)	Percent Production/Day	Average Weight (grams)	Percent Production/Day	Average Weight (grams)	Percent Production/Day	Average Weight (grams)	Percent Production/Day
1	58.3	74.6	58.1	78.5	57.9	67.1	55.7	76.1
2	59.7	74.6	58.7	72.8	58.8	67.1	56.9	73.0
3	60.8	73.0	59.6	77.1	59.5	68.5	57.7	73.0
4	61.3	65.0	60.3	81.4	59.0	77.1	58.1	84.1
Mean	60.0	71.8	59.2	77.4	58.8	70.0	57.1	76.6

TABLE IX

TEST MATERIAL: Aroclor 1242

Toxicity and Reproduction Study - White Leghorn Chickens

Egg Quality Data

Group	Defective		Normal		Total
	Number	Percent	Number	Percent	Number
Control	812	37.6	1347	62.4	2159
T-I	685	30.4	1572	69.6	2257
T-II	664	31.2	1466	68.8	2130
T-III	971	45.4	1168	54.6	2139

2. Hatchability

The hatchability data are presented in Table X.

A severe decrease in hatchability was recorded for eggs from birds fed 10 ppm. The hatchability of eggs from the 1 and 3 ppm groups was considered normal.

TABLE X

TEST MATERIAL: Aroclor 1242

Toxicity and Reproduction Study - White Leghorn Chickens

Hatchability Data

Group	Eggs Set	Eggs Hatched	Percent Hatched	Eggs Unhatched	Stage of Incubation			Infertile Eggs	
					Full Term	Mid Term	One Week	Number	Percent*
Control	103	91	88.3	12	3	0	2	7	6.8
T-I	110	96	87.3	14	4	2	4	4	3.6
T-II	110	81	73.6	29	12	5	3	9	8.2
T-III	107	7	6.5	100	39	21	25	15	14.0

* Percent of total set

3. Specific Gravity

The specific gravity data of the eggs collected and candled are presented in Table XI.

No significant differences were noted between test and control group data.

TABLE XI

TEST MATERIAL: Aroclor 1242

Toxicity and Reproduction Study - White Leghorn Chickens

Specific Gravity Data

	Normal Eggs		Defective Eggs		Total Eggs	
Group	Number	Average Specific Gravity	Number	Average Specific Gravity	Number	Average Specific Gravity
Control	354	1.082	812	1.080	1166	1.081
T-I	416	1.083	685	1.080	1101	1.082
T-II	387	1.082	664	1.077	1051	1.080
T-III	321	1.082	971	1.076	1292	1.079

4. Egg Shell Thickness

The egg shell thickness data are presented in Table XII.

The egg shell thickness was considered normal for all test groups.

TABLE XII

TEST MATERIAL: Aroclor 1242

Toxicity and Reproduction Study - White Leghorn Chickens

Egg Shell Thickness (inches)

	Normal Eggs		Defective Eggs		Total Eggs	
Group	Number	Average inches Thickness	Number	Average inches Thickness	Number	Average inches Thickness
Control	354	0.012	812	0.012	1166	0.012
T-I	416	0.012	685	0.012	1101	0.012
T-II	387	0.012	664	0.011	1051	0.012
T-III	321	0.012	971	0.012	1292	0.012

C. F_1 Generation

1. Mean Body Weights and Viability

The mean body weights and viability data are presented in Table XIII.

Body weight gains for chicks of the 10 ppm group were slightly reduced. Chicks of the 1 and 3 ppm groups exhibited normal weight gains. Chick viability was not influenced by the ingestion of Aroclor 1242.

TABLE XIII

TEST MATERIAL: Aroclor 1242

Toxicity and Reproduction Study - White Leghorn Chickens

Mean Body Weight and Viability Data

Group	Number of Chicks Day 1	Mean Body Weight (grams) Day 1	Number of Chicks Day 30	Mean Body Weight (grams) Day 30	Percent Viability
Control	91	39.4	82	241.0	90.1
T-I	96	38.0	88	222.5	91.6
T-II	81	38.4	75	222.0	92.6
T-III	7	37.6	6	213.0	85.7