(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0315 LINDANE PM PM# 04/05/84

CHEM 009001 Lindane (gamma isomer of benzene hexac

BRANCH EEB DISC 35 TOPIC 10990042

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID 00103562 CONTENT CAT 03

Martin, W. (1969) Residues in fish, wildlife, and estuaries. Pesticides Monitoring Journal 3(2):102-114. (Available from: Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402; published study; CDL:091969-AV)

SUBST. CLASS = S.

DIRECT RVW TIME = 2 (MH) START-DATE 2/14/85 END DATE 2/15/85

REVIEWED BY: Ann Stavola
TITLE: Aquatic Biologist
ORG: NED/EEB
LOC/TEL: CM2-801 / 557-7560
SIGNATURE: Ann Stavola DATE: 15 Feb 85

APPROVED BY:
TITLE: Section Head, EEB
ORG:
LOC/TEL:
SIGNATURE: H. T Craven DATE: 6/6/85

DATA EVALUATION RECORD

1. Chemical: Lindane, DDT, DDE, DDD, Dieldrin, Heptachlor Epoxide, BHC.

2. Test Material: Residues

3. Study/Action Type: Field Monitoring of Starlings (Sturnus vulgaris) Across the U.S. for Organochlorine Residues.

4. Study ID: Martin, W. (1969) Residues in Fish, Wildlife and Estuaries. Pesticides Monitoring Journal 3(2): 102-114. MRID: 00103562.

5. Reviewed By: Ann Stavola
Aquatic Biologist
HED/EEB
Signature: Ann Stavola
Date: June 4, 1985

6. Approved By: Harry Craven
Supervisory Biologist
HED/EEB
Signature: Harry Craven
Date: June 6, 1985

7. Conclusions:

Although this study is not required by the EPA, it does provide useful field information regarding the accumulation of organochlorine pesticides by wildlife.

8. Recommendations:

N/A

9. Background:

This study was submitted in the data call-in process for the Lindane Standard.

10. Discussion of Individual Test:

N/A

11. Materials and Methods: (As reported.)

Starlings (Sturnus vulgaris) were collected from 128 sampling sites throughout the contiguous 48 States. Sampling sites were selected randomly. The country was divided into 44 sampling blocks, and up to 4 sampling sites were selected within each block. Collections were made three times during a 15-month period: August 28, to September 7, 1967, (summer - S), January 29, to February 9, 1968, (winter - W), November 18, to November 29, 1968, (fall - F).

Each sample normally consisted of a pool of 10 birds from each site. Birds were taken either by trapping or shooting, and the pooled birds were frozen together until analyzed.

All residue analyses were done by the Wisconsin Alumni Research Foundation under contract with the Bureau of Sport Fisheries and Wildlife.

The birds were skinned, and the beaks, feet, and wings were removed and discarded. The pool of 10 bodies was ground in a blender as a unit, and a 20 gram sample was taken for analysis. Analysis was done according to the procedures outlined in FDA's Pesticide Analytical Manual with minor modifications. Residues were measured by gas chromatography.

12. Reported Results:

Starlings were difficult to collect in some areas, particularly Texas.

The summer collection was expected to reflect residues resulting from direct exposure to pesticide applications during crop growing season. The winter collection was expected to reflect a time when birds had flocked and direct contact with pesticides would be minimal. The fall collection was chosen as a midpoint between summer and winter.

Results of residue analyses for persistent organochlorine pesticides are shown in table 5. The results are given as ppm (μg/g) wet weight of prepared whole starling. Data are presented in an unevaluated form.

DDT and its metabolites and dieldrin were found in all samples taken. As shown in table 2 most of the averaged residues found for DDT and metabolites were in the range of < 1.0 to 3.0 ppm and for dieldrin in the range of < 0.1 to 0.3 ppm. Sampling sites with an averaged residue level > 3.0 ppm DDT and metabolites and/or > 0.3 ppm dieldrin were in the Southeast, southern New Mexico, Arizona, and California (DDT only), eastern Utah (DDT only) and the Willamette River drainage of Oregon (dieldrin only).

Recovery of heptachlor, lindane, and BHC appears to follow more of a seasonal distribution (see table 4) and appears to be correlated with the higher lipid content of the birds during the seasons of fall and winter.

13. Study Author's Conclusions/QA Measures:

Persistent organochlorine pesticides are consistently found as residues in starlings. (See table 5.)

QA measures not given.

14. Reviewer's Discussion and Interpretation of Study Results:

A. Test Procedures:

EPA has no specific guidelines for field monitoring to measure pesticide residues in wildlife. However, the methods appear to be valid and scientifically sound.

B. Statistical Analysis:

N/A

C. Discussion/Results:

The author indicates that the residue data are presented in an unevaluated form for the purpose of establishing baseline levels to develop a long-term monitoring program. Another function of the study was to determine the feasibility of using starlings as a valid indicator species.

The results indicate that the organochlorine pesticides that were monitored are present in terrestrial avian wildlife, and DDT and dieldrin are the most prevalent throughout the country.

D. Adequacy of Study:

1. Classification: Supplemental

2. Rationale: This study is not required but it provides useful information that can be used in a risk assessment.

3. Repairability: N/A

August 28 to September 7, 1967—designated S (summer)
January 29 to February 9, 1968—designated W (winter)
November 18 to November 29, 1968—designated F (fall)

Collection period designators are placed after the sampling site numbers to clearly establish when and where the collections were made; e.g., 1-A-1-W identifies the winter collection near Tacoma, Wash.

The summer collection was expected to reflect residues resulting from direct exposure to crops during growing-season pesticide treatments at a time when birds were dispersed. The winter collection was selected to represent a time when birds had flocked and when direct contact with pesticides would be minimal and might reflect a more stabilized residue level. The fall collection was chosen as a midpoint between summer and winter for consideration as a future single sampling period when it became apparent that biannual collections would not be economically feasible.

Each sample normally consisted of a "pool" of 10 birds collected at each site. Pools of less than 10 birds are indicated in Table 5. Birds were taken either by trapping or shooting. The 10 pooled birds were placed together in a polyethylene bag and frozen immediately after collection. The samples were kept frozen until laboratory analysis.

Analytical Procedures

All residue analyses were done by the Wisconsin Alumni Research Foundation* under contract with the Bureau of Sport Fisheries and Wildlife.

The birds were prepared by skinning and then removing the beak, feet, and wings at the first joint out from the body. The removed parts were discarded, and analyses were made on the remaining whole body. Residues of the persistent organochlorine insecticides and their metabolites were determined by gas chromatography, and identification confirmations were made by thin layer chromatography on 5% of the total collection.

Analytical methodology followed procedures outlined in the Food and Drug Administration's *Pesticide Analytical Manual* (*1*) with minor modifications. Each 10-bird pool was ground in a Hobart food chopper. A sample weighing approximately 20 g was taken and partially de-

* Mention of this commercial laboratory is for identification only and does not constitute endorsement by the U.S. Department of the Interior.

FIGURE 1.—*Starling monitoring sites.*

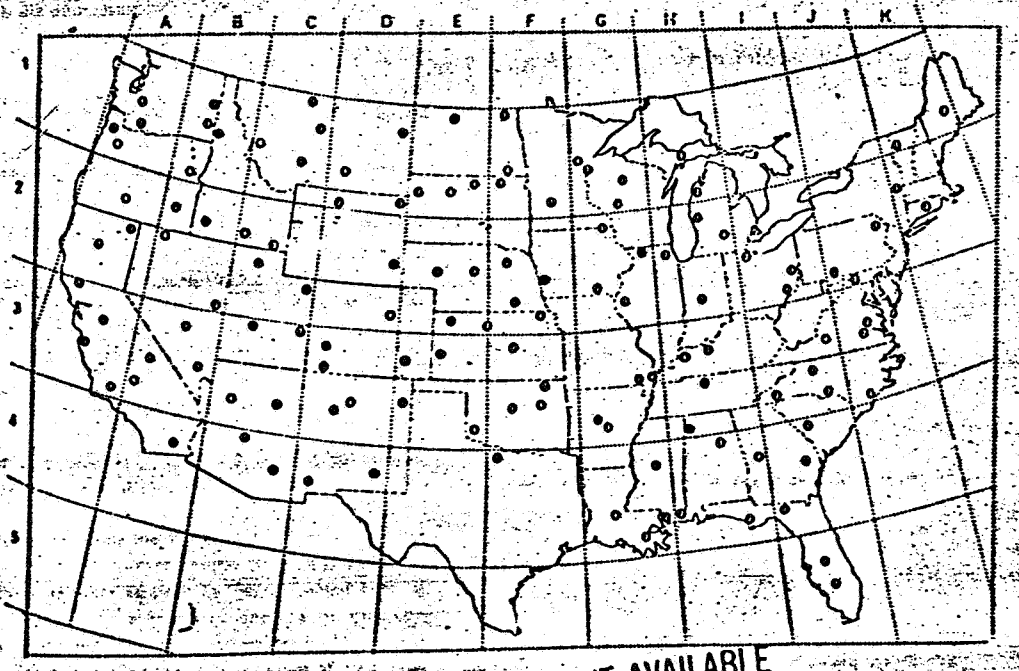

TABLE 2.—*Distribution of average residues of DDT and metabolites and dieldrin by frequency of occurrence in different quantitative ranges*

DDT and Metabolites		Dieldrin	
Range (ppm)	Frequency of Occurrence (sites)	Range (ppm)	Frequency of Occurrence (sites)
≤1.0	76	≤0.1	65
>1.0 and ≤2.0	25	>0.1 and ≤0.2	40
>2.0 and ≤3.0	12	>0.2 and ≤0.3	11
>3.0 and ≤4.0	3	>0.3 and ≤0.4	2
>4.0 and ≤5.0	3	>0.4 and ≤0.5	3
>5.0 and ≤10.0	5	>0.5 and ≤1.0	4
>10.0 and ≤15.0	0	>1.0 and ≤1.5	1
>15.0 and ≤20.0	1	>1.5 and ≤2.0	0
>20.0 and ≤25.0	1	>2.0 and ≤2.5	0
	126		126

TABLE 3.—*Average residue levels for DDT and metabolites >3.0 ppm and for dieldrin >0.3 ppm*

Sampling Site	DDT and Metabolites	Dieldrin
1-A-3		0.528
1-A-4		0.492
1-B-3		0.587
1-B-4		0.418
3-B-4	4.376	
4-B-1	3.450	
2-C-2	9.551	
3-C-2	3.163	
4-C-1	23.902	
4-D-3	19.680	
3-E-4	4.948	
2-G-3		0.657
3-G-1		0.403
3-G-3	5.950	0.317
1-G-1	8.128	
4-G-2		0.970
4-G-4	4.220	
4-H-4	3.510	
3-I-1		1.385
4-I-1	5.483	
4-I-3	5.668	
3-J-1		0.333

TABLE 4.—*Frequency of occurrence of residues of heptachlor epoxide, lindane, and BHC by collection period*

Collection Period	Frequency of Residues by Site [1]			Occurrence of Highest Lipid Wgt. by Site
	Heptachlor Epoxide	Lindane	BHC	
S	43	4	9	8
F	31	17	4	25
W	94	84	45	80
Total				106

[1] 106 sites sampled three times each.

Conclusions

The basic conclusion is that DDT, dieldrin, and other persistent organochlorine insecticides are consistently found as residues in starlings, making them a valid substrate for monitoring. With modification of study design, monitoring of starlings should provide data on the relative status of pesticide residues in a terrestrial avian species. Experience gained in this study should be valuable for establishing areas in which starlings can be used in monitoring for other environmental contaminants, e.g., arsenic, mercury, lead, and synthetic industrial chemicals.

Data are presented for the purpose of establishing general baseline residue levels to develop a long term monitoring program. Specific residue figures are as valid, reliable, and accurate as the study design and methods described for collection and analysis allow. Use of specific residue figures out of context or beyond the limitations of this study could be misleading.

TABLE 5.—*Pesticide residue levels in starlings*

Sampling Station Number	Wet Weight (grams)	Lipid Weight (grams)	Residues in ppm (µg/g)							
			DDE	DDD	DDT	DDT and Metabolites	Dieldrin	Heptachlor Epoxide	Lindane	BHC
1-A-1-S	19.99	0.310	0.220	0.024	0.048	0.292	0.190	0.065	—	—
-W	20.05	0.510	0.420	0.014	0.031	0.715	0.400	0.110	0.011	—
-F	19.74	0.296	0.560	<0.015	<0.015	0.530	0.095	—	—	—
Average	19.92	0.371	0.463	0.018	0.031	0.512	0.223			
1-A-2-S	20.00	0.346	3.590	<0.013	0.044	3.647	0.039	—	—	—
-W	20.03	0.633	2.070	0.033	<0.013	2.116	0.110	<0.010	0.320	—
-F	19.51	0.548	1.690	<0.015	0.021	1.716	0.190	—	—	—
Average	19.85	0.509	2.448	0.020	0.026	2.493	0.113			
1-A-3-S	20.00	0.645	0.490	<0.013	<0.013	0.516	0.034	—	—	—
-W	19.99	1.878	3.320	0.390	0.066	3.776	0.930	0.210	—	—
-F	20.66	1.329	2.320	0.030	0.039	2.389	0.620	—	—	—
Average	20.22	1.284	2.377	0.144	0.039	2.360	0.528			
1-A-4-S	20.00	0.652	0.590	<0.013	<0.013	0.606	0.017	—	—	—
W	19.99	1.170	2.640	0.120	0.056	2.836	0.940	0.060	—	—
F	20.31	0.739	0.990	0.190	0.140	1.360	0.520	—	—	—
Average	20.10	0.858	1.410	0.108	0.053	1.570	0.492			

Orlando Williams Rover 9-2-82

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TABLE 5.—*Pesticide residue levels in starlings—Continued*

Identification number	Wet Weight (Grams)	Lipid Weight (Grams)	Results in ppm (µg/g) DDE	DDD	DDT	DDT and Metabolites	Dieldrin	Heptachlor epoxide	Lindane	BHC
2-A-1-S	20.30	0.471	1.190	<0.013	0.013	1.216	<0.010	—	—	—
-W	20.06	1.666	2.260	<0.013	0.026	2.299	0.190	0.027	0.027	—
-F	19.99	0.814	1.260	<0.015	0.016	1.311	0.056	—	—	—
Average	20.02	0.990	1.577	0.013	0.018	1.608	0.085			
2-A-2-S	20.00	0.525	0.360	<0.013	<0.013	0.386	>0.010	—	—	—
-W	20.04	0.978	0.370	<0.013	0.016	0.399	0.021	—	0.031	—
-F	20.20	0.851	0.209	<0.015	0.020	0.235	0.043	—	—	—
Average	20.08	0.785	0.313	0.013	0.016	0.340	0.025			
2-A-3-S	20.00	0.763	0.760	<0.013	<0.013	0.786	<0.010	—	—	—
-W	19.94	1.240	0.710	<0.013	0.038	0.761	0.380	0.120	0.033	—
-F	20.01	1.928	0.540	<0.015	<0.015	0.580	0.022	—	—	—
Average	19.98	1.644	0.674	0.013	0.023	0.709	0.137			
2-A-4-S	20.00	0.725	0.130	<0.013	<0.013	0.156	<0.010	0.029	—	—
-W	19.99	1.756	0.460	<0.013	<0.013	0.486	<0.010	0.016	0.014	—
-F	20.43	1.281	0.410	<0.015	<0.015	0.440	0.037	—	—	—
Average	20.14	1.254	0.333	0.013	0.013	0.360	0.019			
3-A-1-S	20.00	0.615	2.270	<0.013	0.094	2.377	0.033	—	—	—
-W	20.00	3.082	1.310	<0.013	0.026	1.349	0.025	0.018	<0.010	—
-F	20.15	0.833	1.940	<0.015	0.028	1.983	0.031	—	—	—
Average	20.05	1.511	1.840	0.013	0.049	1.903	0.030			
3-A-2-S	20.00	0.662	2.930	<0.013	0.025	2.968	0.075	—	—	—
-W	19.97	1.164	1.360	<0.013	0.026	1.399	0.120	0.014	0.014	—
-F	19.72	1.235	1.380	<0.015	0.035	1.430	0.063	—	—	—
Average	19.90	1.020	1.957	0.013	0.029	1.999	0.086			
3-A-3-S	20.00	0.664	4.450	<0.013	0.015	4.478	0.055	—	—	—
-W	20.00	1.198	2.730	0.019	0.031	2.780	0.190	0.016	0.015	—
-F	20.26	1.041	1.540	0.015	0.017	1.572	0.074	—	—	—
Average	20.09	0.964	2.907	0.016	0.021	2.943	0.106			
1-B-1-S	20.00	0.655	1.430	0.013	0.020	1.463	0.014	—	—	—
-W	19.97	1.522	0.680	0.031	<0.013	0.724	0.280	0.032	1.250	—
-F	19.69	1.262	0.350	0.033	0.160	0.543	0.051	—	—	—
Average	19.89	1.146	0.820	0.026	0.064	0.910	0.115			
1-B-2-S	20.00	0.646	0.310	0.013	0.034	0.357	<0.010	—	—	—
-W	20.02	1.859	1.220	0.018	0.049	1.287	0.590	0.045	1.170	—
-F	20.11	1.841	0.250	<0.015	0.016	0.281	0.120	—	—	—
Average	20.04	1.449	0.593	0.015	0.033	0.602	0.237			
1-B-3-S	20.00	0.888	1.810	<0.013	0.014	1.837	<0.010	—	—	—
-W	19.99	1.309	0.680	<0.013	<0.013	0.706	1.090	0.063	0.260	—
-F	20.21	1.082	0.700	<0.015	<0.015	0.730	0.660	—	—	—
Average	20.07	1.093	1.063	0.013	0.014	1.091	0.587			
1-B-4-S	20.00	0.644	0.460	<0.013	0.034	0.507	0.038	—	—	—
-W	20.00	2.312	0.730	0.052	0.038	0.820	1.180	0.253	—	—
-F	20.06	1.996	0.370	0.031	0.056	0.457	0.035	—	—	—
Average	20.02	1.784	0.520	0.032	0.043	0.595	0.418			
2-B-1-S	20.00	0.705	1.340	<0.013	0.014	1.367	0.019	—	—	—
-W	20.03	1.256	1.000	<0.013	0.014	1.027	0.062	0.251	0.019	—
-F	20.31	1.379	0.850	0.022	0.038	0.910	0.170	—	—	0.007
Average	20.11	1.113	1.063	0.016	0.022	1.101	0.084			
2-B-2-S	20.00	0.826	4.730	0.019	<0.013	4.762	0.018	—	—	—
-W	20.32	1.931	0.460	<0.013	0.017	0.490	0.037	0.017	0.025	—
-F	20.35	0.944	0.770	<0.015	0.015	0.800	0.041	—	0.020	—
Average	20.12	1.234	1.987	0.015	0.015	2.017	0.032			
2-B-3-S	20.00	0.753	0.210	0.076	0.150	0.436	0.069	0.028	—	—
-W	19.95	1.363	0.460	0.034	0.047	0.541	0.250	0.030	0.012	—
-F	20.74	1.563	0.420	<0.015	0.015	0.450	0.066	—	—	—
Average	20.23	1.226	0.363	0.042	0.071	0.476	0.122			
2-B-4-S	20.00	0.783	0.440	<0.013	<0.013	0.466	0.023	0.050	—	—
-W	20.07	1.203	0.890	<0.013	0.014	0.827	0.237	0.017	0.016	—
-F	19.86	1.425	0.710	0.019	0.036	0.765	0.088	—	—	—
Average	19.98	1.138	0.650	0.015	0.021	0.686	0.049			
3-B-1-S	20.00	0.691	0.820	<0.013	0.014	0.847	<0.010	—	—	—
-W	20.02	1.686	1.560	<0.013	0.025	1.598	0.250	0.032	0.020	—
-F	19.40	1.632	0.320	<0.015	0.016	0.351	0.090	—	—	—
Average	19.80	1.336	0.900	0.013	0.018	0.932	0.117			

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TABLE 5.—*Pesticide residue levels in starlings*—Continued

Identification Number	Wet Weight (Grams)	Lipid Weight (Grams)	Residues in ppm (µg/g) DDE	DDD	DDT	DDT and Metabolites	Dieldrin	Heptachlor Epoxide	Lindane	BHC
3-B-2-S	20.00	0.780	0.470	0.013	0.036	0.319	0.018	—	—	—
-W	19.99	1.328	0.170	<0.013	0.016	0.199	0.150	0.100	0.010	—
-F	19.80	1.503	0.540	<0.015	0.016	0.571	0.140	—	—	—
Average	19.93	1.204	0.393	0.013	0.023	0.430	0.103			
3-B-3-S	20.00	0.719	1.860	0.068	0.560	2.488	0.210	—	—	—
-W	19.97	0.860	0.660	0.067	0.200	0.927	0.110	0.100	0.016	—
-F	21.03	1.208	0.390	0.065	0.120	0.575	0.071	0.090	0.012	0.012
Average	20.00	0.929	0.970	0.067	0.293	1.330	0.130			
3-B-4-S	20.00	0.834	3.240	<0.013	<0.013	3.266	0.038	—	—	—
-W	20.00	1.229	7.730	0.047	0.034	7.811	0.370	0.063	0.016	—
-F	20.12	0.971	2.020	<0.015	<0.015	2.050	0.075	—	—	—
Average	20.04	1.011	4.330	0.025	0.021	4.376	0.161			
4-B-1-S	20.00	0.785	6.740	<0.013	0.036	6.789	0.160	—	—	—
-W	20.00	1.040	0.480	0.016	0.026	0.522	0.300	0.036	<0.010	—
-F	20.44	1.072	3.010	<0.015	<0.015	3.040	0.042	0.045	—	—
Average	20.15	0.966	3.416	0.014	0.026	3.450	0.167			
1-C-1-S	20.00	0.610	0.110	<0.013	<0.013	0.136	0.019	—	—	—
-W	20.08	1.874	0.230	<0.013	0.014	0.257	<0.010	0.022	<0.010	—
-F	21.33	2.328	0.250	0.050	0.031	0.331	<0.015	0.130	—	—
Average	20.47	1.604	0.197	0.025	0.019	0.241	0.015			
1-C-2-S	20.00	0.624	0.100	<0.013	0.016	0.129	0.063	—	—	—
-W	20.02	1.867	0.150	0.036	0.051	0.237	0.250	0.049	0.011	—
-F	19.47	2.319	0.150	0.059	0.063	0.272	<0.015	0.066	—	—
Average	19.83	1.603	0.133	0.036	0.043	0.213	0.109			
1-C-3-S	20.00	0.805	0.046	—	—	0.046	<0.010	—	—	—
-W	20.00	1.576	0.068	<0.013	<0.013	0.094	0.182	—	<0.010	—
Average	20.00	1.190	0.057	0.013	0.013	0.070	0.095			
1-C-4-S	20.00	0.661	0.420	<0.013	<0.013	0.446	<0.010	—	—	—
-W	20.01	1.439	1.430	<0.013	0.025	1.468	0.050	0.018	0.020	—
Average	20.00	1.050	0.925	0.013	0.019	0.957	0.030			
2-C-1-S	20.00	0.649	1.290	0.026	0.095	1.411	0.014	—	—	—
-W	20.38	1.952	0.810	0.019	0.048	0.877	<0.010	0.036	0.016	<0.010
-F	20.01	1.550	0.390	<0.015	0.031	0.436	<0.015	—	—	—
Average	20.13	1.394	0.830	0.020	0.058	0.908	0.013			
2-C-2-S	20.00	0.777	28.000	—	<0.013	28.000	0.022	—	—	—
-W	20.01	1.631	0.410	0.028	<0.013	0.451	0.240	0.066	<0.015	<0.010
-F	20.02	2.195	0.150	<0.015	0.025	0.190	0.031	0.056	—	—
Average	20.01	1.534	9.520	0.020	0.019	9.551	0.098			
2-C-3-S	20.00	0.613	0.290	<0.013	0.020	0.323	<0.010	—	—	—
-W	20.02	1.405	3.120	<0.013	0.026	3.159	0.069	0.040	0.031	—
-F	20.13	1.104	0.380	<0.015	0.022	0.417	0.042	0.020	—	—
Average	20.05	1.041	1.263	0.013	0.023	1.300	0.040			
2-C-4-S	20.00	0.295	0.590	<0.013	0.020	0.623	0.017	—	—	—
-W	20.05	1.598	6.650	0.120	0.160	6.930	0.350	0.026	<0.010	—
-F	20.28	1.805	0.550	<0.015	0.018	0.583	0.031	—	—	—
Average	20.11	1.233	2.596	0.046	0.066	2.710	0.133			
3-C-1-S	20.00	0.338	3.170	<0.013	<0.013	3.196	0.218	—	—	—
-W	20.01	1.049	0.710	<0.013	0.022	0.745	0.662	0.020	0.011	<0.010
-F	20.00	1.263	0.750	0.016	0.023	0.789	0.045	0.017	—	—
Average	20.00	0.883	1.543	0.014	0.019	1.577	0.106			
3-C-2-S	20.00	0.262	7.580	<0.013	0.018	7.611	0.031	—	—	—
-W	20.20	1.229	1.530	0.015	<0.013	1.558	0.280	0.310	0.020	—
-F	20.00	1.654	0.260	0.021	0.039	0.320	0.042	—	—	0.019
Average	20.07	1.048	3.123	0.016	0.023	3.163	0.177			
3-C-3-S	20.00	0.283	0.960	0.013	0.046	1.019	<0.010	—	—	—
-W	20.15	0.986	0.600	0.019	0.014	0.633	0.047	0.025	<0.010	<0.010
Average	20.07	0.635	0.780	0.016	0.030	0.826	0.029			
3-C-4-S	20.00	0.273	1.440	<0.013	0.016	1.469	0.130	—	—	—
-W	20.09	1.212	4.360	0.028	0.022	4.410	0.250	0.026	<0.010	<0.010
-F	20.01	0.704	0.086	<0.015	0.027	0.128	0.016	<0.015	—	—
Average	20.07	0.396	1.962	0.019	0.022	2.002	0.132			
4-C-1-S	20.00	0.301	26.600	0.110	0.054	26.764	0.081	—	—	—
-W	20.02	0.665	23.400	0.056	0.026	23.482	0.149	0.014	<0.010	—
-F	20.01	0.701	21.400	—	0.062	21.462	0.097	—	—	—
Average	20.01	0.622	23.800	0.033	0.047	23.902	0.106			

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TABLE 5.—*Pesticide Residue levels in starlings*—Continued

Identification number	Wet Weight (grams)	Lipid Weight (grams)	Residues in ppm (wet wt.) DDE	DDD	DDT	DDT and metabolites	Dieldrin	Heptachlor epoxide	Lindane	BHC
4-C-2-S	20.00	0.360	2.240	<0.013	0.016	2.269	0.015	—	—	—
-W	19.95	0.833	2.110	0.038	0.015	2.163	0.066	0.010	<0.010	—
-F	20.03	0.741	1.610	<0.013	0.029	1.654	<0.015	—	—	—
Average	20.01	0.644	1.987	0.022	0.020	2.028	0.032			
1-D-1-S	20.00	0.309	0.049	<0.013	0.016	0.076	<0.015	—	—	—
-W	20.01	1.377	0.058	<0.013	<0.013	0.084	<0.015	—	<0.010	—
-F	20.21	1.104	0.062	<0.015	0.015	0.092	0.019	—	—	—
Average	20.08	0.997	0.057	0.013	0.014	0.084	0.023			
1-D-2-S	20.00	0.381	0.270	<0.013	0.029	0.312	0.021	—	—	—
-W	19.98	1.794	0.059	<0.013	<0.013	0.065	<0.010	0.024	<0.010	<0.010
-F	20.02	1.049	0.047	<0.015	0.016	0.078	0.017	—	—	—
Average	20.00	0.940	0.126	0.013	0.019	0.138	0.016			
1-D-3-S	20.04	0.659	0.031	<0.013	0.014	0.058	<0.015	—	—	—
-W	20.36	1.425	0.480	<0.013	0.031	0.524	<0.010	0.022	0.011	<0.010
-F	19.99	1.775	0.130	—	0.025	0.155	<0.015	—	—	—
Average	20.13	1.296	0.214	0.013	0.023	0.245	0.012			
1-D-4-S	20.00	0.369	0.200	<0.013	<0.013	0.226	0.140	—	—	—
-W	19.97	0.869	0.051	<0.013	<0.013	0.077	0.018	<0.010	<0.010	—
-F	20.22	1.247	0.110	<0.015	<0.015	0.140	0.259	—	—	—
Average	20.06	0.822	0.120	0.013	0.013	0.147	0.272			
2-D-1-S	20.06	0.719	0.450	<0.013	0.020	0.483	0.026	—	—	—
-W	20.28	1.190	0.480	<0.013	0.022	0.515	0.048	0.020	0.010	<0.010
-F	20.02	1.074	0.230	<0.015	0.025	0.270	0.016	—	—	—
Average	20.12	0.994	0.387	0.013	0.022	0.422	0.029			
2-D-2-S	20.00	0.793	0.150	0.023	0.068	0.251	0.296	—	—	—
-W	19.99	1.391	0.096	<0.013	0.018	0.127	0.190	0.043	0.010	<0.010
-F	20.00	1.089	0.050	—	0.025	0.075	0.048	0.032	—	—
Average	20.00	1.091	0.099	0.023	0.034	0.151	0.178			
2-D-4-S	20.00	3.411	1.130	<0.013	0.046	1.189	0.581	—	—	—
-W	20.12	1.867	0.470	<0.013	0.026	0.509	0.270	0.023	<0.010	<0.010
-F	20.00	1.143	0.420	<0.015	0.038	0.473	0.231	0.041	—	—
Average	20.04	2.140	0.673	0.013	0.037	0.724	0.327			
3-D-1-S	20.00	0.574	2.170	<0.013	<0.013	2.196	0.550	—	—	—
-W	19.91	0.961	1.260	<0.013	0.013	1.286	0.641	0.011	<0.010	<0.010
-F	20.02	1.564	0.180	<0.015	0.019	0.214	0.037	<0.015	—	0.008
Average	19.98	1.033	1.203	0.013	0.014	1.232	0.649			
3-D-2-W	19.44	1.316	0.860	0.019	0.018	0.897	0.220	0.013	0.011	<0.010
3-D-3-S	20.00	0.805	0.900	0.098	0.014	1.012	0.030	—	—	—
-W	19.96	0.960	0.560	0.490	1.250	2.320	0.290	0.063	<0.010	<0.010
-F	20.03	0.930	0.350	<0.015	0.027	0.392	0.019	<0.015	—	—
Average	20.00	0.898	0.610	0.201	0.430	1.241	0.283			
3-D-4-S	20.00	0.432	2.090	<0.013	0.019	2.122	0.030	0.014	—	—
-W	19.96	1.648	0.690	<0.013	0.018	0.721	0.290	0.021	<0.010	0.024
-F	20.01	0.940	0.420	<0.015	0.031	0.461	0.028	<0.015	—	—
Average	19.99	1.070	1.067	0.013	0.023	1.101	0.149			
4-D-1-W	20.10	1.129	3.260	0.019	<0.013	3.292	0.067	0.013	<0.010	<0.010
-F	19.92	0.832	0.530	<0.015	0.023	0.568	0.022	—	—	—
Average	20.04	0.980	1.895	0.017	0.018	1.930	0.034			
4-D-3-S	20.00	0.767	0.098	<0.013	<0.013	0.124	0.017	0.016	—	—
-W	19.89	0.845	48.200	0.046	<0.013	48.259	0.069	0.016	0.031	0.033
-F	20.05	0.956	10.600	—	0.028	10.628	0.052	0.024	—	—
Average	19.98	0.856	19.633	0.030	0.018	19.680	0.046			
1-E-1-W	20.04	1.929	0.190	<0.013	0.014	0.217	<0.015	<0.010	0.012	0.019
-F	20.03	1.521	0.200	<0.015	0.031	0.246	<0.015	—	—	—
Average	20.02	1.675	0.195	<0.014	0.022	0.231	0.012			
1-E-2-S	20.00	0.579	0.120	<0.013	<0.013	0.146	0.063	0.014	—	—
-W	20.08	1.568	0.130	—	0.026	0.156	0.130	0.016	<0.010	0.020
-F	19.97	1.385	0.060	<0.015	<0.015	0.090	<0.015	—	—	—
Average	20.02	1.177	0.103	0.013	0.018	0.131	0.078			
1-E-3-S	20.00	0.623	2.150	1.490	0.034	3.674	0.011	—	—	—
-W	20.49	1.729	0.470	0.071	0.040	0.581	0.410	0.063	0.016	0.016
-F	20.03	1.358	0.066	0.015	0.027	0.128	<0.015	—	—	—
Average	20.17	1.237	0.902	0.525	0.034	1.461	0.145			

TABLE 5.—*Pesticide residue levels in starlings*—Continued

Identification number	Wet weight (grams)	Lipid weight (grams)	Residues in ppm (μg/g) DDE	DDD	DDT	DDT and metabolites	Dieldrin	Heptachlor epoxide	Lindane	BHC
9 1-E-4-W*	20.06	1.431	0.280	0.022	0.034	0.336	0.240	0.081	<0.010	<0.010
-F	20.15	1.285	3.570	<0.015	0.027	3.612	0.020	—	—	—
Average	20.10	1.368	1.925	0.018	0.030	1.974	0.080			
12 2-E-1-S*	20.00	0.566	0.240	<0.013	<0.013	0.266	0.017	—	—	—
-W	20.03	1.459	0.160	<0.013	<0.013	0.186	0.310	<0.010	<0.010	<0.010
-F	20.01	1.136	0.100	<0.015	0.031	0.146	<0.015	—	—	—
Average	20.01	1.120	0.167	0.013	0.019	0.199	0.114			
2-E-2-S	20.00	0.553	0.330	<0.013	0.016	0.357	0.031	—	0.029	—
-W	19.99	1.468	0.810	<0.013	0.013	0.836	0.230	0.160	0.013	0.019
-F	20.00	1.155	0.240	<0.015	0.046	0.301	<0.015	<0.015	—	—
Average	20.00	1.058	0.460	0.013	0.024	0.505	0.092			
2-E-3-S	20.00	0.829	0.460	<0.013	0.026	0.439	0.280	0.320	—	—
-W	20.03	1.572	0.490	0.055	0.064	0.639	0.550	0.022	0.011	0.016
-F	20.20	1.185	0.180	<0.015	<0.015	0.210	<0.015	—	—	—
Average	20.01	1.195	0.357	0.038	0.035	0.429	0.281			
2-E-4-S	20.00	0.769	0.530	0.021	0.015	0.566	0.230	0.130	<0.010	—
9 -W*	20.01	1.139	0.043	<0.013	0.022	0.078	<0.010	<0.010	<0.010	<0.010
-F	20.15	0.910	0.055	<0.015	<0.015	0.085	<0.015	—	—	—
Average	20.05	0.939	0.209	0.016	0.017	0.243	0.085			
3-E-1-S	23.00	0.521	0.110	<0.013	<0.013	0.136	0.075	<0.010	—	—
-W	20.06	1.655	0.160	<0.013	<0.013	0.186	0.210	0.024	0.014	<0.010
-F	20.01	1.093	0.210	0.016	0.120	0.346	0.019	—	—	—
Average	20.02	0.090	0.160	0.014	0.045	0.222	0.102			
3-E-2-W	20.15	1.148	1.230	<0.013	0.014	1.257	0.200	—	0.016	<0.010
-F	20.01	0.887	0.560	0.023	0.031	0.614	0.099	<0.015	—	—
Average	20.08	1.017	0.895	0.018	0.022	0.935	0.150			
3-E-3-S	20.00	0.650	0.650	<0.013	0.015	0.678	0.035	<0.010	0.035	—
-W	20.39	1.396	0.330	0.081	0.210	0.641	0.160	0.023	0.015	<0.010
-F	20.01	1.231	0.340	<0.015	0.064	0.399	0.041	<0.015	—	—
Average	20.10	1.092	0.440	0.036	0.096	0.572	0.079			
3-E-4-S	20.00	0.705	6.090	<0.013	0.015	6.118	0.089	—	—	—
-W	20.00	1.131	6.960	0.058	0.017	7.085	0.088	<0.010	<0.010	<0.010
-F	20.04	0.464	1.590	<0.015	0.037	1.642	0.031	<0.015	—	—
Average	20.01	0.767	4.886	0.038	0.023	4.948	0.069			
1-F-1-S	20.00	0.508	0.270	<0.013	<0.013	0.296	<0.010	—	—	—
-W	19.84	2.005	0.260	<0.013	<0.013	0.286	0.470	0.012	—	0.022
-F	20.23	2.163	0.560	0.027	0.022	0.609	0.015	—	—	—
Average	20.02	1.559	0.363	0.017	0.015	0.397	0.165			
1-F-2-S	20.00	0.608	0.093	<0.013	0.018	0.124	0.061	—	<0.010	—
4 -W*	19.98	2.069	0.140	<0.013	0.022	0.175	0.550	0.120	0.018	0.016
-F	20.28	1.880	0.220	0.017	0.069	0.306	0.140	—	—	—
Average	20.09	1.519	0.151	0.014	0.036	0.202	0.250			
1-F-3-S	20.00	0.407	0.043	<0.013	<0.013	0.069	0.014	—	—	—
-W	20.09	2.381	0.150	0.016	—	0.166	0.560	0.012	<0.010	0.016
-F	20.02	1.326	0.146	<0.015	0.024	0.179	<0.015	—	—	—
Average	20.04	1.371	0.111	0.014	0.018	0.138	0.196			
1-F-4-S	20.00	0.618	0.048	<0.013	<0.013	0.074	<0.013	—	—	—
-E	20.06	2.199	0.098	<0.015	<0.015	0.128	<0.015	—	—	—
Average	20.03	1.408	0.073	0.014	0.014	0.101	0.014			
2-F-1-S	20.00	0.651	0.420	<0.013	<0.013	0.446	0.027	—	—	—
-W	20.48	1.753	0.210	<0.013	0.013	0.236	0.180	0.019	0.011	0.012
-F	20.05	1.169	0.103	<0.015	<0.015	0.130	0.046	—	—	—
Average	20.05	1.191	0.243	0.013	0.013	0.270	0.084			
2-F-2-S	20.00	0.786	0.034	<0.013	<0.013	0.060	<0.010	—	—	—
6 -W*	20.02	0.917	0.150	<0.013	<0.013	0.176	0.330	0.028	<0.010	<0.010
-F	20.04	1.313	0.130	<0.015	0.024	0.169	0.067	—	—	—
Average	20.02	1.005	0.105	0.013	0.016	0.135	0.136			
2-F-3-S	20.02	1.415	0.310	<0.013	0.037	0.360	0.035	<0.013	—	—
-W	19.99	2.013	0.440	<0.013	0.018	0.471	0.270	0.110	<0.010	<0.010
-F	19.92	1.431	0.218	0.018	0.041	0.269	0.110	—	—	—
Average	19.93	1.626	0.320	0.014	0.032	0.367	0.138			
12 2-F-4-S*	[illegible]	0.652	0.280	<0.013	<0.013	0.306	0.025	—	—	—
-W	[illegible]46	1.950	0.190	<0.013	0.021	0.224	0.220	0.024	0.011	<0.016
-F	20.03	1.443	0.669	<0.015	0.039	0.714	0.096	0.048	—	—
Average	20.16	1.348	0.377	0.013	0.024	0.415	0.114			

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TABLE 5.—*Pesticide residue levels in starlings—Continued*

Identification number	Wet weight (grams)	Lipid weight (grams)	Residues in ppm (μg/g): DDE	DDD	DDT	DDT and metabolites	Dieldrin	Heptachlor epoxide	Lindane	BHC
3-F-1-S	20.00	0.921	0.340	<0.013	0.076	0.729	0.018	—	0.017	<0.010
-W	20.28	2.563	0.290	<0.013	0.026	0.319	<0.010	0.025	—	—
-F	20.00	0.862	0.215	<0.015	0.034	0.339	0.041	—	—	—
Average	20.09	1.449	0.415	0.013	0.032	0.462	0.023			
3-F-2-S	20.00	0.606	0.710	<0.013	0.029	0.742	0.034	—	—	—
-W	20.07	1.655	0.210	<0.013	<0.013	0.236	0.310	0.018	0.031	0.027
-F	20.03	0.827	0.410	—	0.019	0.429	0.062	0.120	—	—
Average	20.03	1.029	0.443	0.013	0.020	0.469	0.135			
3-F-3-S	20.00	0.799	0.710	<0.013	0.031	0.754	<0.010	—	—	—
-W	20.00	2.270	0.583	0.019	<0.013	0.572	<0.010	0.046	<0.010	<0.010
-F	20.04	1.035	0.446	<0.015	0.044	0.499	0.017	—	—	—
Average	20.01	1.385	0.580	0.016	0.029	0.609	0.012			
3-F-4-S	20.00	0.772	1.360	<0.013	0.019	1.372	<0.010	—	—	—
-W	19.31	2.236	2.640	0.016	0.019	2.665	0.410	0.018	0.021	0.011
-F	20.01	0.968	0.370	—	0.025	0.495	<0.015	—	—	—
Average	19.78	1.332	1.250	0.014	0.020	1.312	0.145			
4-F-3-W	20.00	1.580	0.640	<0.013	0.014	0.667	0.034	0.013	<0.010	<0.010
1-G-1-S	20.00	0.683	0.240	<0.013	0.014	0.367	0.150	—	—	—
-W	19.98	2.058	0.850	0.019	0.031	0.210	0.360	0.023	0.015	—
-F	20.05	2.091	0.610	0.015	0.024	0.249	<0.015	—	—	—
Average	20.01	1.611	0.567	0.016	0.023	0.275	0.175			
1-G-2-S	20.00	0.802	0.170	<0.013	<0.013	0.166	0.063	—	—	—
-W	20.15	1.884	0.750	0.099	0.071	0.890	0.370	0.029	0.017	—
-F	20.01	2.184	0.200	0.019	0.024	0.243	<0.015	—	—	—
Average	20.05	1.610	0.373	0.044	0.036	0.433	0.133			
1-G-3-S	20.00	0.536	0.052	<0.013	<0.013	0.118	<0.010	—	—	—
-W	20.09	2.641	0.350	0.019	0.031	0.430	<0.010	0.024	0.018	<0.010
-F	20.21	1.929	0.310	0.019	0.054	0.303	0.023	—	—	—
Average	20.10	1.702	0.234	0.017	0.033	0.284	0.013			
1-G-4-S	20.02	0.665	0.027	<0.013	<0.013	0.063	<0.010	—	—	—
-F	20.01	1.965	0.270	0.019	0.031	0.320	0.054	0.042	—	—
Average	20.01	1.315	0.153	0.016	0.022	0.192	0.032			
2-G-1-S	20.00	0.812	0.690	<0.013	<0.013	0.716	<0.010	<0.013	—	—
-W	19.90	1.891	0.870	0.015	<0.013	0.898	0.580	0.082	0.033	0.013
-F	20.27	1.533	0.350	0.015	0.039	0.464	0.250	0.170	—	—
Average	20.06	1.412	0.637	0.013	0.020	0.673	0.280			
2-G-2-W	20.02	1.511	0.240	<0.013	<0.013	0.296	0.430	—	—	—
-F	20.07	1.760	0.180	<0.015	0.031	0.216	0.061	0.087	0.015	0.015
Average	20.04	1.635	0.210	0.014	0.025	0.241	0.256	0.030	—	—
2-G-3-S	20.00	0.798	0.250	<0.013	<0.013	0.276	0.290	0.044	—	—
-W	19.88	2.018	0.550	0.016	0.029	0.595	0.940	0.200	0.018	0.014
-F	20.23	1.525	0.630	0.027	0.069	0.726	0.750	0.033	—	—
Average	20.04	1.447	0.477	0.019	0.037	0.532	0.657			
2-G-4-W	19.98	2.191	0.120	0.025	0.018	0.163	<0.010	0.031	0.013	0.011
-F	20.04	1.225	0.120	0.015	0.031	0.166	0.054	0.046	0.046	—
Average	20.01	1.708	0.120	0.020	0.024	0.164	0.032			
3-G-1-S	20.01	0.539	0.390	<0.013	0.013	0.416	0.350	0.016	—	—
-W	20.06	2.086	1.390	0.049	0.018	1.457	0.590	0.049	0.340	—
-F	20.03	1.063	0.640	0.024	0.039	0.703	0.270	0.081	—	—
Average	20.01	1.279	0.806	0.029	0.023	0.858	0.403			
3-G-2-S	20.02	0.868	1.360	<0.013	0.021	1.384	<0.010	—	—	—
-W	20.02	1.849	0.760	0.026	0.039	0.845	0.240	—	—	—
-F	20.32	0.866	0.420	<0.015	0.016	0.451	0.039	—	—	—
Average	20.12	1.194	0.920	0.017	0.025	0.952	0.096			
3-G-3-S	20.01	0.777	4.860	0.062	0.031	4.933	0.310	0.042	—	0.044
-W	20.02	1.704	11.010	0.260	0.044	11.304	0.540	—	0.009	—
-F	19.37	0.932	1.550	0.024	0.040	1.614	0.100			
Average	19.87	1.138	5.796	0.115	0.038	5.950	0.317			
3-G-4-S	20.00	0.850	0.480	<0.013	0.013	0.506	0.020	0.016	—	—
-W	20.04	4.498	1.350	0.097	0.034	1.481	0.550	0.070	0.016	<0.010
-F	20.01	0.919	0.270	0.015	0.024	0.309	0.051	0.034	—	—
Average	20.01	2.089	0.700	0.042	0.024	0.765	0.207			

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TABLE 5.—*Pesticide residue levels in starlings*—Continued

Identification number	Wet weight (grams)	Lipid weight (grams)	Residues in ppm (μg/g) DDE	DDD	DDT	DDT and metabolites	Dieldrin	Heptachlor epoxide	Lindane	BHC
4-G-1-S	25.01	0.722	9.760	0.060	<0.025	9.845	0.090	0.030	—	—
-W	25.05	1.298	8.420	0.044	0.026	8.490	0.180	—	—	—
-F	20.15	0.698	6.010	0.023	0.015	6.048	0.067	—	—	—
Average	20.07	0.906	8.063	0.042	0.022	8.128	0.112			
4-G-2-W	20.00	0.902	1.180	0.017	0.014	1.231	0.670	0.130	<0.010	—
-F	20.65	0.614	1.820	<0.015	0.085	1.930	1.320	—	—	—
Average	20.32	0.758	1.500	0.016	0.054	1.580	0.970			
4-G-3-W	20.01	1.609	0.370	0.024	0.034	0.428	0.260	0.120	0.011	—
-F	21.27	0.748	1.380	0.018	0.036	1.434	0.026	0.120	0.011	—
Average	20.14	1.178	0.875	0.021	0.035	0.931	0.143			
4-G-4-S	20.00	0.789	2.580	<0.025	<0.025	2.630	<0.013	—	—	0.012
-W	20.04	1.766	6.640	0.049	0.031	6.720	0.350	0.094	—	—
-F	21.40	1.144	3.160	0.027	0.043	3.250	0.043	—	0.006	—
Average	20.48	1.233	4.133	0.034	0.033	4.200	0.135			
1-H-1-S	20.00	0.584	0.120	<0.025	<0.025	0.170	<0.013	—	—	—
-W	19.98	0.941	1.800	0.063	0.250	2.113	0.170	0.053	—	—
Average	19.99	0.762	0.960	0.044	0.137	1.141	0.091			
1-H-2-S	20.00	0.603	0.360	<0.013	<0.013	0.386	<0.013	<0.013	—	—
-W	20.12	1.339	0.930	0.026	0.078	1.034	0.190	0.039	0.010	<0.010
-F	20.02	2.939	1.210	0.036	0.110	1.356	<0.015	0.045	0.022	—
Average	20.05	1.627	0.833	0.025	0.067	0.925	0.073			
2-H-1-S	20.01	0.717	0.610	<0.025	<0.025	0.660	0.025	0.025	—	—
-W	20.02	1.859	1.610	0.230	0.590	2.730	0.390	0.098	—	—
-F	20.02	1.372	6.790	0.062	0.190	1.042	0.022	0.066	0.024	—
Average	20.02	1.316	1.003	0.106	0.368	1.477	0.096			
2-H-2-S	20.00	0.682	0.750	0.025	0.054	0.829	0.078	0.063	—	—
-W	19.98	2.064	1.420	0.064	0.140	1.624	0.470	0.088	0.015	<0.010
-F	20.02	1.093	0.770	0.019	0.055	0.844	0.074	0.066	<0.010	—
Average	20.00	1.280	0.980	0.036	0.083	1.099	0.208			
2-H-3-S	20.01	0.428	0.140	<0.013	0.019	0.172	0.047	0.025	—	—
-W	20.02	1.219	1.370	0.021	0.026	1.417	0.050	0.032	—	—
-F	20.02	1.223	0.570	0.022	0.039	0.631	0.071	0.045	<0.010	—
Average	20.02	0.957	0.693	0.018	0.028	0.740	0.056			
2-H-4-S	20.02	0.831	0.720	<0.013	<0.013	0.746	0.013	0.036	—	—
-W	20.03	1.735	1.370	0.022	0.075	1.467	0.260	0.024	0.012	—
-F	20.06	1.274	0.950	0.015	0.039	0.904	0.028	0.030	<0.010	—
Average	20.04	1.280	0.980	0.016	0.042	1.039	0.100			
3-H-1-S	20.01	0.607	2.220	<0.013	0.019	2.249	0.066	0.140	—	—
-W	20.01	1.307	2.190	0.076	0.034	2.300	0.170	0.120	—	—
-F	19.58	1.092	1.750	0.018	0.057	1.835	0.050	—	—	—
Average	19.87	1.302	2.053	0.036	0.037	2.125	0.095			
3-H-2-S	20.01	0.931	0.230	<0.013	<0.013	0.256	<0.013	<0.013	—	—
-W	19.99	1.773	0.320	<0.013	0.016	0.349	<0.010	—	—	—
-F	19.67	1.024	0.260	0.029	0.042	0.331	0.140	—	—	—
Average	19.89	1.242	0.270	0.018	0.024	0.312	0.054			
3-H-3	20.01	0.830	0.470	0.034	0.100	0.604	0.081	0.031	—	—
	20.00	1.821	0.620	0.031	0.044	0.695	0.560	0.130	—	—
-F	19.70	0.859	0.300	0.018	0.056	0.394	0.093	—	0.006	—
Average	19.90	1.170	0.463	0.034	0.067	0.564	0.245			
3-H-4-S	20.01	0.787	0.250	<0.013	<0.013	0.276	0.025	—	—	—
-W	20.07	2.042	6.950	0.100	0.280	7.330	<0.010	0.034	—	—
-F	20.54	1.422	0.880	0.024	0.040	0.944	0.028	—	—	—
Average	20.21	1.417	2.693	0.046	0.111	2.850	0.021			
4-H-1-S	20.02	0.870	1.690	<0.025	0.031	1.746	0.190	0.310	—	—
-W	20.00	0.975	0.810	0.018	0.022	0.850	0.130	0.190	—	—
-F	20.31	0.878	1.050	<0.015	0.048	1.113	0.084	—	—	—
Average	20.11	0.908	1.183	0.019	0.034	1.236	0.135			
4-H-2-S	20.00	0.771	0.940	0.330	0.210	1.181	0.490	0.440	—	—
-F	20.75	1.156	0.640	0.018	0.052	0.710	0.087	—	<0.005	—
Average	20.37	0.963	0.790	0.024	0.131	0.945	0.288			
4-H-3-S	20.01	0.786	1.640	0.091	0.200	1.931	0.031	0.047	—	—
-W	20.09	1.258	3.280	0.059	0.100	3.439	0.180	—	—	—
-F	20.58	0.916	1.340	0.021	0.310	1.671	0.068	—	—	—
Average	20.30	0.986	2.086	0.057	0.203	2.347	0.093			

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TABLE 5.—*Pesticide residue levels in starlings*—Continued

Identification number	Wet weight (grams)	Lipid weight (grams)	Residues in ppm (μg/g) DDE	DDD	DDT	DDT and metabolites	Dieldrin	Heptachlor epoxide	Lindane	BHC
4-1-4-S	20.00	0.695	1.210	<0.025	0.038	1.[illegible]	0.160	0.031	—	—
-W	20.01	1.292	5.150	0.010	0.050	5.[illegible]	0.062	—	—	—
-F	20.27	1.136	3.970	<0.015	0.028	[illegible].13	0.097	—	—	—
Average	20.09	1.041	3.443	0.028	0.039	3.510	0.106			
5-1-1-S	20.01	0.850	0.310	<0.013	0.014	0.339	0.025	<0.025	—	—
-W	20.03	1.620	0.370	0.073	0.085	0.528	0.140	0.019	<0.010	—
-F	20.02	1.287	0.230	0.022	0.031	0.283	0.016	0.016	<0.010	—
Average	20.03	1.252	0.237	0.036	0.043	0.316	0.060			
2-1-2-S	20.00	0.406	2.220	0.031	0.028	2.279	0.076	0.016	—	—
-W	19.99	2.310	0.630	0.052	0.080	0.762	0.460	0.057	—	—
-F	20.03	0.901	0.300	0.022	0.062	0.384	0.045	0.030	<0.010	—
Average	20.01	1.206	1.050	0.035	0.057	1.141	0.193			
2-1-3-S	20.01	0.735	0.210	<0.013	<0.015	0.236	0.025	0.027	—	—
-W	20.07	1.606	0.150	0.021	0.026	0.197	0.260	0.039	<0.010	—
-F	20.01	1.171	0.320	0.022	0.019	0.381	0.016	0.016	<0.010	—
Average	20.03	1.171	0.227	0.019	0.026	0.271	0.100			
3-1-1-S	20.01	0.553	0.800	<0.025	0.037	0.862	2.730	—	—	—
-F	20.42	0.999	0.270	<0.015	0.021	0.366	<0.045	—	—	—
Average	20.21	0.776	0.535	0.020	0.029	0.584	1.385			
3-1-2-S	20.01	0.703	1.480	<0.025	0.069	1.574	0.550	—	—	—
-F	20.78	0.851	1.120	<0.015	0.055	1.190	0.034	—	—	—
Average	20.39	0.777	1.300	0.020	0.062	1.382	0.242			
3-1-3-S	20.01	0.493	0.470	<0.025	<0.025	0.520	<0.013	—	—	—
-W	20.00	0.962	0.760	<0.013	0.019	0.793	<0.010	0.030	—	—
-F	19.79	0.800	0.200	<0.015	<0.015	0.278	<0.047	—	—	—
Average	19.93	0.752	0.476	0.017	0.019	0.530	0.023			
3-1-4-S	20.01	0.527	0.310	<0.013	<0.014	0.327	<0.013	0.044	—	—
-W	20.01	1.639	0.150	<0.013	0.016	0.179	<0.010	0.067	<0.010	<0.010
-F	20.05	0.849	0.700	<0.013	0.029	0.744	0.150	—	—	—
Average	20.02	1.005	0.386	0.013	0.021	0.420	0.024			
4-1-1-S	20.01	0.711	7.030	0.027	0.036	7.088	0.052	0.028	—	—
-W	20.03	1.329	3.900	0.023	0.031	3.954	0.062	0.027	0.017	0.012
-F	20.98	0.927	5.440	<0.015	0.027	5.467	0.057	—	—	—
Average	20.34	0.989	5.450	0.022	0.030	5.483	0.057			
4-1-2-S	20.01	0.957	4.690	0.047	0.016	4.753	0.028	0.016	—	—
-W	20.01	1.094	0.760	<0.013	0.044	0.817	0.030	—	0.011	—
-F	19.95	1.017	1.270	<0.015	0.041	1.326	0.022	—	—	—
Average	19.99	1.022	2.240	0.025	0.034	2.299	0.027			
4-1-3-W	20.00	0.959	3.600	<0.013	0.034	3.647	0.038	0.039	0.015	—
-F	19.95	0.676	7.640	<0.015	0.035	7.695	0.073	—	—	—
Average	19.98	0.817	5.620	0.014	0.034	5.668	0.055			
5-1-1-S	20.02	0.729	2.150	0.028	0.350	2.528	0.081	0.039	—	—
-W	19.98	0.995	2.260	0.100	0.031	2.391	<0.010	0.040	<0.010	—
-F	19.83	0.855	1.340	<0.015	0.063	1.418	0.170	—	—	—
Average	19.94	0.860	1.917	0.048	0.148	2.112	0.087			
5-1-2-S	20.00	0.902	0.460	<0.013	0.013	0.486	0.019	0.044	—	—
-W	20.01	0.658	0.780	<0.013	0.130	0.923	0.035	—	—	—
-F	19.95	0.977	1.470	<0.015	0.071	1.556	0.120	—	—	—
Average	19.99	0.846	0.903	0.013	0.071	0.988	0.058			
3-1-1-W	20.01	1.236	0.760	0.051	0.120	0.931	0.360	0.170	—	—
-F	19.22	0.631	0.260	<0.015	0.100	0.375	0.073	—	—	—
Average	19.61	0.933	0.510	0.033	0.110	0.653	0.144			
3-1-2-S	20.00	0.670	0.530	0.013	0.016	0.559	0.016	0.016	—	—
-W	20.03	1.614	0.760	0.021	0.037	0.818	<0.010	—	—	—
-F	19.90	1.352	0.230	0.019	0.031	0.280	0.024	—	—	—
Average	19.97	1.212	0.507	0.018	0.028	0.552	0.017			
2-1-3-S	20.01	0.877	0.500	<0.013	0.026	0.539	0.039	—	—	—
-W	19.98	1.697	0.760	0.014	0.025	0.799	0.460	0.099	0.012	—
-F	21.23	1.619	1.140	0.018	0.052	1.210	0.082	—	<0.005	—
Average	20.07	1.398	0.800	0.015	0.034	0.849	0.194			
3-1-1-S	20.01	0.784	2.160	<0.013	0.019	2.192	0.110	0.053	—	—
-W	19.99	1.414	1.540	0.017	0.046	1.653	0.770	0.046	<0.010	—
-F	19.98	1.077	0.510	0.041	0.046	0.597	0.120	—	—	—
Average	19.99	1.092	1.420	0.024	0.037	1.481	0.333			

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TABLE 5.—*Pesticide residue levels in starlings*—Continued

Identification number	Wet weight (grams)	Lipid weight (grams)	Residues in ppm (μg/g)							
			DDE	DDD	DDT	DDT and metabolites	Dieldrin	Heptachlor epoxide	Lindane	BHC
3-J-2-S	20.01	0.692	0.410	<0.013	0.019	0.442	0.014	0.041	—	—
-W	20.07	2.212	0.150	0.190	0.290	0.630	<0.010	0.069	0.016	<0.010
-F	19.88	1.242	0.540	<0.015	0.025	0.580	0.021	—	—	—
Average	19.99	1.382	0.367	0.073	0.111	0.551	0.015			
3-J-3-S	20.01	0.571	0.250	<0.013	0.013	0.286	0.014	0.062	—	—
-W	20.01	2.031	0.160	<0.013	0.019	0.192	<0.010	0.110	<0.010	<0.010
-F	19.38	0.579	0.580	<0.015	0.048	0.581	0.140	—	—	—
Average	20.80	1.060	0.330	0.013	0.040	0.353	0.055			
6 — 1-K-1-S [6]	20.01	0.635	0.150	<0.013	<0.013	<0.176	<0.010	0.016	—	—
-F	19.33	2.094	0.290	0.024	0.065	0.379	0.033	—	0.005	—
Average	19.67	1.364	0.220	<0.018	0.039	0.277	0.021			
1-K-2-S	20.01	0.636	0.310	<0.013	<0.013	0.336	<0.010	<0.013	—	—
-W	20.00	1.390	0.300	0.026	0.059	0.385	<0.010	—	0.013	—
-F	19.89	2.071	0.420	0.043	0.082	0.545	0.054	—	0.006	—
Average	19.97	1.366	0.343	0.027	0.051	0.422	0.025			
5 — 2-K-1-S [5]	20.00	0.526	0.410	<0.013	0.019	0.472	0.010	0.026	—	—
-W	19.99	1.783	0.560	0.025	0.075	0.660	0.010	0.096	—	—
-F	20.28	2.247	0.850	0.041	0.067	0.958	0.013	—	0.375	—
Average	20.26	1.519	0.617	0.026	0.054	0.697	0.012			
2-K-2-S	20.02	0.493	0.620	<0.013	0.028	0.661	0.010	—	—	—
-W	20.02	1.631	0.410	0.016	0.029	0.455	<0.010	0.027	0.012	—
-F	19.51	1.158	0.290	<0.015	0.044	0.349	0.019	—	0.005	—
Average	19.98	1.094	0.440	0.015	0.034	0.488	0.013			

[3] 3 birds.
[4] 4 birds.
[5] 5 birds.
[6] 6 birds.
[7] 7 birds.
[8] 8 birds.
[9] 9 birds.
[12] 12 birds.

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See Appendix for chemical names of compounds mentioned in this paper.

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