

Organochlorine Residues in Wild Ring-necked Pheasants from Southwestern Idaho¹

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Organochlorines may produce harmful effects in the ring-necked pheasant (*Phasianus colchicus*). DDT included in the diet of pheasant hens was passed into the egg resulting in increased mortality in pheasant chicks (1). Baxter, Linder, and Dahlgren (2) found increased mortality in the second generation of penned pheasant hens to receive 4 to 6 mg of dieldrin in their diet. These workers observed reduced production, hatchability, and fertility of eggs, and decreased visual discrimination in chicks.

Organochlorine residues in wild pheasants and other game species may have significance from a public health standpoint. Residue monitoring programs in California (3), South Dakota (4), and Iowa (5) revealed measurable amounts of several organochlorine pesticides in wild ring-necked pheasants.

For these reasons, I surveyed organochlorine residues in pheasants, pheasant eggs, associated soils and food plants from southwestern Idaho.

Study Area and Methods

I conducted this study on 7 farms in Canyon County, in southwestern Idaho. The mosaic of orchards, alfalfa, small grains, and other crops grown in this irrigated area provides good ring-neck habitat. Benson (6) estimates that nearly 40,000 lb of DDT were used on crops and orchards in Canyon County during 1969. Other pesticides were also extensively used.

During 1969, I collected pheasants, pheasant eggs, pheasant food plants, and associated soils from contrasting areas of high pesticide use and no pesticide use, except for herbicides. Each soil sample represents a composite of several soil samples taken over an entire field. I sampled the top 6 inches of soil. I collected all age and sex classes of pheasants

¹This research was funded by the Bureau of Sport Fisheries and Wildlife through the Idaho Cooperative Wildlife Research Unit, University of Idaho, Moscow, Idaho. Laboratory services were contributed by the Canyon County Community Pesticide Study, Idaho Department of Health, Boise, Idaho.

for liver and subcutaneous fat, and eggs from 60 active and abandoned nests.

Eggs (without shells) and adipose were analyzed for benzene hexachloride, lindane, heptachlor, heptachlor epoxide, aldrin, endrin, DDT, DDD, DDE, and dieldrin. Livers were analyzed for DDT, DDD, DDE, and dieldrin. The laboratory staff of the Canyon County Community Pesticide Study headquartered in Boise, Idaho performed the residue analyses for this project.

Results

DDT, DDT metabolites (DDE, DDE), and dieldrin predominated among the organochlorine residues found in ring-necked pheasants and pheasant eggs collected in Canyon County, Idaho during 1969. Some adipose and egg samples contained trace amounts of BHC, lindane, heptachlor, heptachlor epoxide, aldrin, and endrin. Except for 1 liver and 1 egg, all samples contained residues (Table I).

Eggs collected from the same nest sometimes contained different pesticides and widely divergent amounts of the same pesticides. Twelve eggs from a single nest on a farm where pesticide use was heavy had a range for all organochlorines combined of 0.57 to 63.14 ppm, with a mean of 0.80 ppm.

Organochlorine residues in pheasant foods and in the crop contents of pheasants were uniformly low in samples from both heavy and no pesticide use areas. Residues in 5 samples of corn, alfalfa, and barley averaged 0.03 ppm. The mean for organochlorine residues in the contents of 7 pheasant crops was 0.08 ppm.

Residues in soil samples collected during 1969 varied with previous insecticide use patterns. Eight soil samples from heavy pesticide use areas averaged 3.40 ppm for all residues combined. Ten samples from no pesticide use areas averaged 1.12 ppm.

Discussion

Previously, organochlorine pesticides probably produced the major source of pesticide exposure to wildlife in southwestern Idaho. However, 1969 was part of a transitional period characterized by decreasing use of certain organochlorines and increasing use of organophosphorus pesticides. This transition

TABLE I
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Organochlorine residues in ring-necked pheasants
and pheasant eggs (ppm), Canyon County, Idaho, 1969

Area	Kind of Sample	Total No. Samples	DDT and Metabolites			Dieldrin		
			No. Samples With Residue	Mean	Range	No. Samples With Residue	Mean	Range
Heavy Pesticide Use	Adipose	9	9	26.86	0.07-75.38	4	0.78	0.0-3.20
	Liver	10	9	1.17	0.0 - 4.44	5	0.05	0.0-0.43
	Eggs	36	36	6.88	0.08-63.10	27	0.23	0.0-3.64
No Pesticide Use	Adipose	50	50	4.70	0.03-29.37	47	0.42	0.0-3.96
	Liver	55	55	0.78	0.04- 9.92	35	0.10	0.0-0.97
	Eggs	51	50	0.85	0.0 - 5.34	40	0.18	0.0-4.74

* In addition to the residues of DDT, DDT metabolites and dieldrin reported in this table, adipose and egg samples contained trace amounts of benzene hexachloride, heptachlor, heptachlor epoxide, aldrin, endrin, and lindane. Liver was analyzed only for DDT, DDT metabolites and dieldrin.

continued in 1970 with enactment of legal restrictions on the use of some chlorinated insecticides. Even though the farms selected as heavy pesticide use areas applied relatively small amounts of organochlorines during 1969, residues in eggs and tissues reflect earlier intensive use of this category of chemicals (Table I). In general, residues in pheasants and eggs indicate the magnitude of exposure. Amounts of residues in eggs and tissues taken from one area varied substantially among samples, probably because of exposure differences due to pheasant age and movements.

Residues in liver were lower than in fat. This agrees with the findings of Hunt et al. (7) on DDT residues in penned pheasants. These workers suggest that DDT residues in adipose reflect long-term chronic exposure while residues in liver indicate more recent exposure.

Hunt et al. (ibid.) also reports that DDT residues varied up to twenty fold in eggs laid by the same hen. I found variation in residues among eggs from the same nest which greatly exceeded this, but it is conceivable that more than one hen contributed eggs to these clutches.

Wild pheasants from the Richvale, California area contained an average of 741 ppm DDT in adipose (3), which is much higher than any contamination I found. Richvale pheasants fed on DDT-coated rice seed which was inadvertently deposited on ditch banks and levees during aerial seeding. These high residues resulted in crippling and lowered viability among progeny. Samples from wild pheasants in 2 other states had less contamination than Idaho pheasants. Residues of 8 organochlorines in the fat of 48 pheasants collected in South Dakota averaged 0.5 ppm (4). Pheasant eggs from Iowa contained residues of several organochlorines, but amounts were mostly below 1 ppm (5).

Organochlorine residues in southwestern Idaho pheasants will decrease due to decline in the use of those chemicals. Since amounts of residues correlate with the intensity of pesticide use, sportsmen can probably minimize intake of pesticides by consuming pheasants from areas of no pesticide use.

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