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In conjunction with environmental pollution studies, it often is necessary to analyze field-collected eggs that are partially decomposed. The effect of putrefaction upon residue analysis, however, is not known and the experiment reported here was designed to determine if recoveries of DDT, DDE, and DDD differed between fresh and addled eggs and also if putrefaction causes appreciable degradation of DDT.

Procedure

Thirty-four fresh chicken eggs were randomly selected from "large" size eggs purchased on the open market. The samples, except for controls, were fortified with p,p'-DDT, p,p'-DDE, and p,p'-DDD according to the plan outlined in Table 1.

The eggs in group C, D, E, and F were fortified soon after purchase. Fortification was accomplished by syringe injection of the standard solution ($\mu g/\mu l$) through the shell and well into the egg. The hole produced in the shell was covered with hot paraffin. The eggs in group C and D were frozen immediately. Those in groups E and F were allowed to rot in an outdoor open shed, and the rate of decomposition was checked periodically by noting the condition of extra eggs. A period of 4 weeks, during the month of September, was required to obtain satisfactorily "rotten" eggs, which then were frozen.

One additional group of eggs (group A) was frozen fresh without injection and one group (group B) was rotted without injection and then frozen. These samples were fortified when they were opened later at the time of analysis. Two eggs from each of the fresh and rotted group were not fortified and served as background controls.

In addition, five randomly selected fresh eggs from hens fed 25 ppm DDT were frozen fresh and five were allowed to rot with the other sets.

All specimens were stored in a freezer at -27°C for 3 years before they were individually analyzed.

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Analysis

Each specimen, including shell, was mixed with anhydrous sodium sulfate, extracted in a soxhlet, and cleaned up by acetonitrile partitioning and florisil column chromatography according to the method of Reichel and Addy (1). The pesticides in the clean extract were analyzed by electron capture gas chromatography on a 3% OV-17 column and residues were confirmed on 3% XE-60 column as described by Reichel et al. (2).

Results and Discussion

The results of the analysis of the fortified eggs are shown in Table 1 as averages of the five individual determinations in each group. The average background level of the control eggs was only 1.6 micrograms of DDE and 1.3 micrograms of DDT, and was not substracted from the values obtained for the experimental eggs.

A statistical F-test analysis of the data showed no significant difference ($P<0.05$) in the recovery of pesticides from fresh and rotten eggs except that the percentage recovery of DDD from rotted eggs fortified with 200 micrograms was greater than from any other group. The higher values of DDE and DDD in the decomposed eggs (group E and F) suggest that there was some degradation of DDT.

The results of analysis of eggs from hens fed DDT is shown in Table 2. Since these results are reported on a ppm basis, it was necessary to adjust the wet weight of the eggs to compensate for the loss of moisture. The fresh weight was estimated from the egg shell dimensions (length x breadth) using the formula suggested by Romanoff (3). A statistical F-test of the data showed no significant difference between the rotten and fresh samples in the levels of DDE or DDT. It is interesting to note that the fresh eggs lost more moisture during freezer storage than did the rotten eggs.

These results show that putrefaction of eggs did not have an appreciable effect on the recovery of DDT and metabolites nor cause conspicuous degradation of DDT.

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TABLE 1

Percentage Recovery of Pesticides From Fresh and Rotten Eggs

Group	Condition of Egg Before Freezing	No. of Eggs	µg of Each Insecticide DDT, DDE, DDD Added/Egg	Time of Insecticide Addition	DDE		DDD		DDT	
					Mean	Standard Error	Mean	Standard Error	Mean	Standard Error
A	Fresh	5	100	Before Extraction	102	6.2	86	1.3	84	.5.0
B	Rotten	5	100	Before Extraction	93	6.2	82	3.7	86	3.4
C	Fresh	5	100	Before Freezing	105	5.7	92	6.0	88	7.3
E	Rotten	5	100	Before Rotting	113	9.8	85	5.7	83	1.6
D	Fresh	5	200	Before Freezing	117	10.5	88	3.6	82	5.2
F	Rotten	5	200	Before Rotting	120	3.3	100*	8.2	80	8.2

*Significant difference at 5% level

TABLE 2

Residues in Eggs From Hens Fed p,p'-DDT

Group	Wet Weight	Corrected Wet* Weight	Residues, ppm Corrected Wet Weight		
			p,p'-DDE	p,p'-DDD	p,p'-DDT
Fresh	29.40	52.03	5.21	-	11.41
	38.19	52.20	2.62	<0.05	9.95
	36.18	53.06	6.00	<0.05	10.98
	39.82	53.06	3.15	<0.05	6.79
	38.41	54.72	5.27	<0.05	9.35
		Mean	4.45		9.70
Rotten	46.62	51.34	2.73	<0.05	6.31
	48.42	52.92	2.61	<0.05	6.81
	47.80	50.49	5.33	<0.05	10.04
	50.96	53.82	6.24	<0.05	11.77
	43.67	48.11	2.78	<0.05	6.89
		Mean	3.94		8.36

*Corrected for loss of weight as described in text

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3. A. L. Romanoff and A. J. Romanoff, The Avian Egg, p. 108 (1963), John Wiley and Sons, New York.