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ORGANOCHLORINE PESTICIDE RESIDUES IN MEAT AND EDIBLE OFFALS

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SUMMARY

Samples were collected from 350 carcases of slaughtered animals (175 beef , 150 buffaloe and 25 mutton). Moreover, 200 samples of fresh and frozen livers were taken. With regard to chickens; skin, abdominal fat, liver, Kidney and gizzard samples were collected from 50 carcases 100 samples of fish flesh, 50 from each of Claris lazera and Tilapia nilotica.

The collected samples were examined for organochlorine residuee by using thin layer chromatoplate. The incidence and the detectable level of organochlorine residues were varied dependent on the species of animals, type of tissue examined as well as the degree of accumulation of these compounds. Non of examined fat samples of slaughtered animals exceeded the permissible limits of DDT while beef muscle and fat as well as buffaloe fat showed high level of lindane residue.Broiler carcases showed no detectable level of any pesticide residues while the detectable level in laying hen carcases did not exceed the permissible limits of aldrin and dieldrin. No detectable level of organochlorine residues in frozen liver as compared with fresh ones which contained low residual olevels of aldrin, dieldrin, lindane and DDT.

Clarias lazera contained high level of dieldrin than other pesticide residues while non of detectable levels of pesticides in Tilapia nilotica exceeded permissible limits.

The sources of contamination to animals, chicken and fish with organochlorine pesticides were discussed.

INTRODUCTION

The widespread acceptance of chlorinated hydrocarbon was due to the fact that they are chemically stable, potent, and extremely persistant when applied to plants, food crops, or other surfaces. In the early 1960, the general public become aware that the use of these biologically active compounds were in fact, a mixed blessing .Public awareness is currently focused on the wide spread use of pesticides in the envitonment and their relationship to environmental health.

The problem of pesticide residues in food has been adressed at the international level through several committees sponsored by the United Nation Organisations FAO/WHO. Contamination of foods of animal origin with organochlorine pesticides and their metabolites has been reported from various countries (Neumann, 1988; Goldman et al., 1990 and Sandhu, 1992). Residues of organochlorine pesticides were reported in various foods as meats (Gergis, 1983 and K'halafalla and Gergis, 1991),poultry. (Ritchey et al., 1967 and Mc-Dougall et al., 1989) and fish (Dogheim et al., 1988; Mc-Dougall et al., 1989 and Bakre et al., 1990). The main side effect of environmental pollution by pesticides is food contamination leading to injury of nontarget organisms concerns the health of the workers and consumers. Many investigations were conducted to correlate between certain disease conditions of non etiological agents and the degree of environmental pollution with pesticide residues (Ingbedioh, 1991 and Heise, 1992).

The present investigation aimed to determine the level of contamination of some animal products with organochlorine residues.

MATERIAL AND METHODS

I-Collection of samples:

Individual 50-100 gram samples of muscle, fat, liver and kidneys, were obtained from both cattle and buffaloes (150 each) slaughtered at Cairo and Giza as well as 25 mutton carcases were represented by muscle, fat, liver and kidneys were examined. The investigated animals were of different age and sex. Moreover, 200 samples of fresh and frozen livers were collected from butcher, shops. With regard to chickens: skin, abdominal fat, liver, kidney and gizzard samples were collected from 50 carcases both of broilers and laying hens. The investigation concluded also the detection of level of organochlorine residues in 100 samples of fish flesh, 50 samples from each of Claris lazera and Tilapia nilotica collected from Giza markets .

The collected samples, were packed separately in sterile polyethylene bags in ice-box and examined as soon as their arrival to the laboratory.

II- Preparation of samples:

25 grams of each sample were grinded with 100 grams of anhydrous sod. sulphate, then stirred for one minute with 200 ml of petroleum ether. Solvent layer was obtained and then fat re-extracted again. Petroleum ether was evaporated to obtain extracted fat. The pesticide residues were extracted from fat by using Acetonitrile saturated with petroleum ether.(Horwitz, AOAC, 1975).

III- Calculation of pesticide residues:

Thin layer chromatoplate was used to calculate the concentration of the pesticide residue in mg/kg of samples according to technique of Horwitz, AOAC (1975)

$$mg/kg = \frac{S}{W}$$

S = Concentration of pesticide standar µg/ ml
W = Weight of unknown sample.

RESULTS AND DISCUSSION

Table 1 summarizes the results of recognition of various organochlorine pesticides in differe samples. Lindane and DDT were detected in al red meat samples, while endrine was detected i buffaloe samples and dieldrin in beef samples. I is worthmentioning that aldrin, dieldrin, linda and DDT residues were frequently detected i fresh liver samples. while no detectable level o any organochlorine pesticide residues was recog nised in the frozen liver samples. Moreover, th fresh liver samples were subjected for contamina tion with organochlorine pesticide residues a compared with liver samples collected from di ferent carcases at slaughter house. The data ob tained during this investigation indicated that th fat and liver samples should be considered th samples of choice for recovery of pesticide res dues. This agrees with that reported by Gergi (1983) and Khalafalla and Gergis (1991). Thi may be attributed to way of nutrition (graze in di ferent pastures) and continousely exposure to th spraying with insecticides to control external pa asites. On the other hand, the missuse of pesti cides in atomised containers in butcher's shop may be responsible for the high incidence of i residues in fresh liver samples.

Concerning chickens, aldrin and dieldrin residu were the only pesticides detected in laying he samples. On the other hand, no detectable level any pesticide was detected in broiler samples an lyzed. This may be attributed to frequently spray ing of laying chicken with pesticide to avoid e ternal parasites specially in native breeds as we as pesticides particules may be drift on drinki water. Nearly similar findings were reported Putnam et al., (1974) and Mc-Dougall et a (1989).

With regard to fish samples; aldrin, dieldrin, a DDT residues in Clarias lazera showed higher f quency than in Tilapia nilotica. However, t highest level of the dieldrin was detected in C rais lazera than other meat samples.This agre with that reported by Dogheim et. al. (1988) a Mc-Dougall (1989). From the present data could be concluded that the high incidences of d tection were obtained in fish samples (Clarias la era), followed by laying hen samples and fre liver and finally the carcasses of slaughtered a mals but no detectable levels in broiler sam and frozon livers samples. The detectable lev

Table (1): Incidence of organochlorine pesticides residues in meats and edible offals

Samples	No. of exam. samples	Aldrin		Dieldrin		Endrin		Lindane		DDT	
		No.	%	No.	%	No.	%	No.	%	No.	%
Beef carcases	175	0	0	0	0	0	0	2	1.7	2	1.7
Muscle		0	0	0	4.6	2	1.1	0	7.9	7	4
Fat		0	0	1	0	1	4.6	0	0	1	4.6
Liver		0	0	0	0	0	0	0	0	0	0
Kidney											
Buffaloe carcases	150										
Muscle		0	0	0	0	0	0	0	0	0	0
Fat		0	0	0	0	0	0	1	0.7	1	0.7
Liver		0	0	0	0	2	1.3	2	1.3	1	0.7
Kidney		0	0	0	0	1	0.7	0	0	0	0
Mutton carcases	25										
Muscle		0	0	0	0	0	0	0	0	1	4
Fat		0	0	0	0	0	0	4	16	3	12
Liver		0	0	0	0	0	0	0	0	1	4
Kidney		0	0	0	0	0	0	0	0	0	0
Fresh liver	50										
Frozen liver	150	3	2	8	8	0	0	1	0	8	8
Broiler carcases	150	0	0	0	0	0	0	0	0	0	0
Skin		0	0	0	0	0	0	0	0	1	0
Abd. fat		0	0	0	0	0	0	0	0	0	0
Liver		0	0	0	0	0	0	0	0	0	0
Kidney		0	0	0	0	0	0	0	0	0	0
Gizzard		0	0	0	0	0	0	0	0	0	0
Laying hen carcases (over year)	30										
Skin		4	13.3	5	16.7	0	0	0	0	0	0
Abd. fat		5	16.7	6	20	0	0	0	0	0	0
Liver		4	13.3	3	10	0	0	0	0	0	0
Kidney		1	3.3	1	3.3	0	0	0	0	0	0
Gizzard		1	3.3	1	3.3	0	0	0	0	0	0
Cattle [illegible]	50	5	10	12	24	0	0	2	4	6	12
Tilapia nilotica	50	3	6	8	16	0	0	2	4	4	8

[illegible] residues were varied in quantities dependent on the species of animal, type of tissue examined and exposure of examined animals to different pesticides before slaughter as well as the degree of accumulation of these compounds in the examined tissues (Table 2).

The maximum residual limits for DDT, lindane, [illegible] in carcase fat are 7,2 and 0.2 mg/kg (The [illegible] FAO/WHO Food standard Programme, Codex Alimentarius Commission, Rome, (1978). [illegible] of examined fat samples of each of beef, buffaloe, mutton and chicken carcases exceeded the permissible limits of DDT residue while only one sample of buffaloe liver (9.6 p.p.m) exceeded this limit. Concerning the lindane residue, beef muscle and fat as well as buffaloe fat showed higher level of residue than other examined samples while non of dieldrin residual level in examined samples exceeded the acceptable limit. It could be concluded that the highest level of pest.- icide residues were reported in fats as compared with livers, muscles and Kidneys of examined samples. This could be attributed to the fact that chlorinated hydrocarbons are fat soluble and tend to be stored more extensively in adipose tissue than other tissues. Such residues may be released from fat depots during starvation, however true excretion may occur by way of urine, faeces, milk, egg, and also crosses the placental barrier into faetal liver. This held the view reported by Ecobichon and Saschenbrecker (1968).

The detectable level of pesticide residue in livers may be attributed to the great metabolization of these substances by liver enzymes. Greater excretion in urine may be the reason for the neglectable levels of pesticide residues in the Kidneys. Feeding stuffs and the control of ectoparasites are the contributing factors for the contamination of meat with different types of pesticides. Grossklaus (1978), assumed that up to 50% of all chlorinated hydrocarbons ingested by man are derived from foods of animal origin.

Table (1): Levels of organochlorine pesticides residues in meats and edible offals

Samples	No. of exam. samples	Aldrin	Dieldrin	Endrine	Lindane	DDT
Beef carcasses	150		0	0	1.11	1.4
Muscle			0.1	16	5.8-12	1.7
Fat			0	4	0	4
Liver			0	0	0	0
Kidney						
Buffalo carcasses	150					
Muscle				0	0	5
Fat				0	0	4
Liver				0	4	5.6
Kidney				4	0	0
Mutton carcasses	15					
Muscle			0		0	4
Fat			0		5.5	1.7
Liver			0		0	5
Kidney			0		0	5
Fresh liver	100	0.018-.022	0.015-.058	0	0.001	.002-.027
Frozen liver	100	0	0	0	0	0
Broiler carcases	30	0	0	0	0	0
Skin		0	0	0	0	0
Abd. fat		0	0	0	0	0
Liver		0	0	0	0	0
Kidney		0	0	0	0	0
Gizzard						
laying hen carcases (one year)	30					
Skin		.02-0.31	0.013-0.062	0	0	0
Abd. fat		.021-.092	0.032-0.12	0	0	0
Liver		.003-.052	0.013-.05	0	0	0
Kidney		0.02	0.03	0	0	0
Gizzard		0.018	0.012	0	0	0
Claris lezera	50	0.011-0.047	.027-1.1	0	.002-.017	0.01-6.8
Tilapia nilotica	50	.001-.009	.005-.032	0	.001-.015	.011-.57

Broiler carcases showed no detectable level of any pesticide residues while the detectable level in laying hen carcases did not exceed the permissible limits of aldrin and dieldrin residues recommended by the Joint FAO/WHO (1978) (Table 2) . Pesticides are used against undesirable plants and insects that injure, destroy, or cause disease to animals and humans. The promiscus use of such compounds may be continousely exposed the animals to chemicals which accumulated in its meats and consumed by humans leading to public health hazards. Moreover, the continuous exposure of poultry feed to low level of organochlorine pesticides led to appearance of measurable residues in the abdominal fat of chickens. This held the view reported by Grossklaus (1978), the Dougall at. al., (1989) and Igbedioh (1991). In this respect, Putnam et. al., (1974) , stated that poultry house contaminated with small amounts of pesticides from isolated pest treatments may also serve to increase the risk of tissue residues.

The detectable level of aldrin, dieldrin, lindane and DDT residues in fresh liver did not exceed the perimissible limits while no detectable level in frozen livers. This may be attributed to the effect of freezing which destructed the residues . This agrees with view reported by Gergis (1987) and Khalafalla and Gergis (1991). On the other hand Lane et. al., (1979) reported that the major portion of DDT was converted to DDD during storage at 18°C for 18 mouths.

Clarias lazera contained high level of dieldrin than other pesticide residues that exceeding the recommended limits (0.2 mg/kg) while none of detectable levels of pesticide residues in Tilapia nilotica exceeded such limits. High level of pesticides residues in *Claris lazera* can to some extent be justified by the way of nutrition and the fat content of the particular species of fish. *Clarias lazera* is bottom feeder, as it mostly feeds plankton from the bottom of water where as sediments more contaminated with chlorinated hydrocarbons as well as exposed to more concentration of such compounds. Nearly similar view, were reported by Dogheim et al., (1988) and Bakre et. al., (1990). In this respect, Mc.-Dougall et al., (1989), reported that fat content and residues in the fish tended to be higher during the warmer season of the year.

Consequently, organochlorine pesticide residues in food of animal origin are substantially high in developing countries than in areas of intensive urban due to application of pest control programs with care under official supervision.

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