

Ergebnisse der Untersuchung über die Rückstände von chlorierten Kohlenwasserstoffen
im Rindfleischgewebe

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Vom 1971. an wurden 628 Proben von Muskeln- und Fettgewebe, Lebern und Nieren von Rindern analysiert.

Die Ergebnisse haben gezeigt dass die untersuchten Proben meistens durch die DDT Rückstände (einschliessend Metaboliten) und dann durch die α HCH und γ HCH Rückständen kontaminiert worden sind. Es wird über die qualitativen und quantitativen Unterschiede der Rückstände von DDT und seiner Metaboliten in den verschiedenen Geweben eines und desselben Tieres diskutiert.

Es wurden Mittelwertunterschiede von chlorierten Kohlenwasserstoffrückstände zwischen dem Rind- und Schweinefleisch festgestellt und die entsprechenden Erklärungen dafür gegeben.

Examination of Organochlorine Pesticide Residues in Beef Tissues

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The examination of organochlorine pesticide residues in beef tissues was carried out according to the program established by authors. Since 1971, a total of 628 samples of muscles, fat, livers and kidneys derived from 157 cattle have been examined.

The obtained results show that the examined samples were most frequently contaminated with DDT residues (including metabolites) followed by α BHC and γ BHC (lindane).

Qualitative and quantitative differences in the findings of isomers of DDT and its metabolites among different tissues of an animal as well as differences in mean values of organochlorine residues between pork and beef tissues were discussed.

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L'examination systematique sur les residus de pesticides du groupe des hydrocarbures halogenes dans les tissus de boeuf

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Dans les tissus de boeuf on a examiné les résidus de pesticides du groupe des hydrocarbures halogenes suivant un programme mis au point par les auteurs. Depuis 1971, on a examiné 628 échantillons de tissu musculaire et graisse, de foies et de reins issus de 157 boeufs. Les résultats obtenus montrent que les échantillons examinés ont été le plus souvent contaminés par des residus de DDT et par des residus de α et β HCH.

Dans cette étude on a montré les différences qualitatives et quantitatives dans les résultats d'isomères de DDT et de leurs métabolites dans les tissus d' un même animal. On a discuté également des différences existantes dans les valeurs moyennes de résidus de pesticides dans les tissus de boeuf et de porc.

Результаты исследования остатков хлорорганических пестицидов в ткани мяса крупного рогатого скота

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Для остатков хлорорганических пестицидов разработана программа посредством которой анализируются ткани мяса крупного рогатого скота как для мяса свиней.

Исследовано 628 образцов мышечной и жировой ткани печеней и почек, взятых из 157 голов крупного рогатого скота.

Результаты показывают что исследованные образцы в большинстве случаев загрязнены остатками ДДТ и его метаболитов. Потом остатками α ГХЦГ и β ГХЦГ.

Ведутся дискуссии о количественной и качественной разнице в находках изомеров и метаболитов ДДТ среди различных тканей одного и того же животного.

Установлена разница между средними величинами содержания хлорорганических пестицидов отдельными тканями свиней и крупного рогатого скота о чем ведутся дискуссии.

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I n t r o d u c t i o n

Besides the unquestionable usefulness of the application of pesticides, there appear harmful consequences as well. The applied pesticides are retained to some extent on the objects through which, directly or indirectly, they are transmitted to man where they can cause some undesirable occurrences (2, 3, 4, 10). According to certain data (6, 10, 11) pesticide residues reaching a man are introduced mostly through a food chain. For the hygiene of food, specially meat, organochlorine pesticides are the most interesting ones due to their lipophilic property, exceptional stability and large use. Nevertheless, a relatively small number of examinations referring to organochlorine pesticide residues in meat has been performed up to present. If such data are found at all, they mostly refer to meat of experimental animals treated regularly with higher doses of pesticides whereas there is not sufficient knowledge of the contamination degree of meat and the distribution of organochlorine compound residues in tissues of slaughter animals. Having this in mind, we have started to analyse organochlorine pesticide residues in cattle since 1971.

M a t e r i a l a n d M e t h o d s

Tissues derived from cattle bred in common conditions served as material for examination. There were examined 629 samples of fat, muscle, liver and kidney derived from 157 cattle. Pesticide residues were determined according to the method described in "Pesticide Analytical Manual", on the "Varian" gas chromatograph, Model 2100-20.

The system of sampling was the same as in our previous work (7).

R e s u l t s a n d D i s c u s s i o n

As seen from the presented results (tables 1-4), 94,90% of fat samples, and 93,63% of muscle and liver samples contain pesticide residues. Such findings are in accordance with the opinion of Sutherland (9), according to whom each animal coming in contact with pesticides must contain their residues. If residues are not proved in some samples, it will mean that they are present to such a small extent that the applied techniques is not sufficiently sensitive to reveal them.

Like in our previous work (7), here are also differences in the quantity of pesticide residues among fat, muscle, liver and kidney. Quantitatively residues are present in the highest quantities in fat, then in muscle, liver and kidney.

The established differences can be explained by different contents of triglycerides and phospholipids in subcutaneous fatty tissue and muscular fatty tissue. Triglycerides predominate in the former whereas the phospholipid content can amount up to nearly 70% in muscular fatty tissue. The solubility of residues in the two lipid kinds is by all means different.

Metabolism of organochlorine compounds takes place under the influence of enzymes (3) the presence of which is higher in liver than in other examined tissues. From this it comes out that liver can not represent a more important store of pesticide residues.

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If it is taken into consideration that organochlorine compounds are to a considerable extent excreted from the body through the urine then higher quantities of pesticides should not be expected in kidneys.

The examined pesticide residues in cattle tissues are quantitatively represented in the following order: DDT (total), metoxychlor, γ BHC, α BHC, heptachlorepoxyde, dieldrine (tables 1-5).

Mean values of the quantities of pesticide residues in beef tissues are higher than those established in pork tissues in our previous work (7). This can be explained by differences in metabolism between these two animal kinds as well as by different feed composition.

Number of Fat Samples with Different Residual Quantities of DDT, BHC, Dieldrine, Heptachlorepoxyde and Metoxychlor

Table 1.

	0,001 to 0,01 ppm	0,01 to 0,05 ppm	0,05 to 0,1 ppm	0,1 to 0,5 ppm	0,5 to 1 ppm	1 to 3 ppm	More than 3 ppm	Samples with positive finding
DDT (total)	15	26	8	57	18	20	5	149
α BHC	17	19	61	23	23	6	-	149
γ BHC	13	9	32	45	32	11	-	142
Dieldrine	16	7	-	-	-	-	-	23
Heptachlor- epoxyde	4	-	-	3	-	-	-	7
Metoxychlor	-	-	1	3	-	-	4	8

94,90% of samples contain DDT and α BHC

90,44% of samples contain γ BHC

14,64% of samples contain Dieldrine

4,45% of samples contain Heptachlorepoxyde

5,09% of samples contain Metoxychlor

Number of Muscle Samples with Different Residual Quantities of DDT, BHC, Dieldrine, Heptachlorepoxyde and Metoxychlor

Table 2

	0,001 to 0,01 ppm	0,01 to 0,05 ppm	0,05 to 0,1 ppm	0,1 to 0,5 ppm	0,5 to 1 ppm	1 to 3 ppm	Samples with positive finding
DDT (total)	8	27	19	52	20	21	147
α BHC	17	36	62	26	3	-	144
γ BHC	11	25	19	48	37	4	144
Dieldrine	7	-	-	-	-	-	7
Heptachlor- epoxyde	-	6	-	4	-	-	10
Metoxychlor	-	1	-	3	1	3	8

93,63% of samples contain DDT

91,71% of samples contain α BHC

91,71% of samples contain γ BHC

4,45% of samples contain Dieldrine

6,36% of samples contain Heptachlorepoxyde

5,09% of samples contain Metoxychlor

Number of Liver Samples with Different Residual Quantities of DDT, BHC, Dieldrine
Heptachlorepoxyde and Metoxychlor

Table 3

	0,001 to 0,01 ppm	0,01 to 0,05 ppm	0,05 to 0,1 ppm	0,1 to 0,5 ppm	0,5 to 1 ppm	1 to 3 ppm	Samples with positive finding
DDT (total)	21	34	19	37	24	12	147
αBHC	19	11	44	16	-	-	90
γBHC	-	25	36	28	10	-	99
Dieldrine	3	9	8	-	-	-	20
Heptachlor- epoxyde	5	5	2	-	-	-	12
Metoxychlor	-	-	1	-	-	-	1

93,63% of samples contain DDT

57,32% of samples contain αBHC

63,05% of samples contain γBHC

12,73% of samples contain Dieldrine

7,64% of samples contain Heptachlorepoxyde

0,63% of samples contain Metoxychlor

Number of Kidney Samples with Different Residual Quantities of DDT, BHC, Dieldrine,
Heptachlorepoxyde and Metoxychlor

Table 4

	0,001 to 0,01 ppm	0,01 to 0,05 ppm	0,05 to 0,1 ppm	0,1 to 0,5 ppm	0,5 to 1 ppm	1 to 3 ppm	Samples with positive finding
DDT (total)	5	42	24	21	2	5	99
αBHC	35	25	11	-	-	-	71
γBHC	18	34	31	-	-	-	83
Dieldrine	-	-	-	-	-	-	-
Heptachlor- epoxyde	-	-	-	-	-	-	-
Metoxychlor	-	1	-	-	-	1	2

63,05% of samples contain DDT

45,22% of samples contain αBHC

52,86% of samples contain γBHC

1,27% of samples contain Metoxychlor

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Mean Values of Quantities of DDT, α BHC and γ BHC

Table 5

	Fat	Muscle	Liver	Kidney
DDT	0,745	0,533	0,333	0,156
α BHC	0,263	0,153	0,083	0,027
γ BHC	0,476	0,422	0,180	0,031

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