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 For The Atomic Energy Commission
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 Chief, Declassification Branch

SUBJECT Radioactivity in Upland Wild-Fowl
From Areas Surrounding The R.W. Project

File

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RADIOACTIVITY IN UPLAND WILD-FOWL FROM AREAS SURROUNDING THE
HANFORD WORKS PROJECT

Introduction

Routine checks of beta activity on vegetation by Site Survey have shown detectable quantities over a rather wide expanse of privately owned agricultural lands of Washington, Idaho, and Oregon. (1) It has been shown that the most significant fission product accumulated on plants or in animal tissues is radio-iodine, (I131). (2), (3) Radioiodine is especially detectable in birds and mammals due to the great affinity of the thyroid gland for that element. Since the waste gases from the separation plants have been discharged to the atmosphere it is conceivable that some quantity of other beta emitters, as well as plutonium, might be present in animals of this locale. This study serves to check the validity of our present tolerance levels of 0.2 $\mu\text{c}/\text{kg}$ for I131 on vegetation and 1×10^{-4} $\mu\text{c}/\text{liter}$ in air for a 24-hour day. (4), (5) In some cases thyroids of game birds probably are eaten by man and thus may contribute to the hazard of eating lower level muscle tissue.

This study was made possible by the contributions of sample materials from birds shot during the regular hunting season by certain selected sportsmen. The author was assisted in collections and preparations of samples by the following members of the Radiobiology group: J. J. Koch, J. M. Somers, J. L. Moyer and J. M. Fuller.

Summary

Twenty-two chinese pheasants and two quail were collected from the area extending from 40 miles west to 70 miles east of the 200 Area waste stacks. All birds showed some detectable beta activity. Thyroid tissue was highest, ranging as high as 5 $\mu\text{c}/\text{kg}$. The thyroids varied considerably in size usually being between 40 and 60 mg. for both lobes in the pheasant and 15 and 20 mg. in the quail. Other tissues were occasionally as high as 6.2×10^{-2} $\mu\text{c}/\text{kg}$ for bone, 5×10^{-2} $\mu\text{c}/\text{kg}$ for testes, 9×10^{-3} $\mu\text{c}/\text{kg}$ for kidney. Gut activity was positive in about 40% of the birds collected, but was usually at a very low level, (maximum, 9×10^{-3} $\mu\text{c}/\text{kg}$).

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Alpha activity was not detectable in bone samples and not over 200 dis/min/kg in the intestinal caeca.

Methods

Hunters contacted in advance, called upon the Radiobiology group to take samples at their respective homes during the drawing operation of the fowls. Usually seven organs were samples as tabulated in this report. Samples of less than 3 grams were placed in small vials moistened inside with normal saline solution. All samples were weighed and macerated on $1\frac{1}{2}$ " stainless steel plates except that 1" watch glasses were used for thyroid samples. A few drops of sodium thiosulfate were placed on the plate to reduce the I^{131} to a non-volatile state. Plates other than caecae and bone were dried under an infra-red lamp and counted on the first shelf of a standard mica-window beta counter for twenty minutes. Gut (caecum and contents) and bone samples were ashed and digested in nitric acid on $1\frac{1}{2}$ " steel plates until reduced to a minimum of gray ash and counted for both alpha and beta activity.

Decay and absorption studies have been made to demonstrate that thyroid activity is practically all I^{131} . Unfortunately, the highest bone plates were discarded by mistake before such studies were made, however, the highest bone plate counted only $26\frac{1}{2}$ [3] counts per minute and such a study would be inconclusive.

Results

The most interesting facts presented are the occasionally high bone activities in fowl taken as far as 20 miles from the waste stacks, and the relatively high readings noted at a distance of about 70 miles. The small size of testes resulted in readings of insignificant value. The diet of birds varied considerably from a mixture of insects and wild grass seed to almost 100% corn or wheat. No positive identification of alpha emitters was made. The direct count method used could hardly be expected to be sensitive to amounts less than 500 dis/min/kg of alpha activity.

The following table shows the beta emitting radioactivity by locality:

Tissue and Gut Activity Levels of Wild Fowls

(For convenience activity levels are tabulated in millimicrocuries per kilogram)

Location	Direction and Distance From 200 Areas	Type of Fowl	Date	Thyroid	Bone	Testes	Liver	Kidney	Muscle	Gut
(5 Mi. NW) Summyside	35 Mi. W.S.W.	Pheasant	10-12-47	< 60	< 4	< 20	~ 4.5	--	< 4	< 5
Summyside	35 Mi. W.S.W.	Pheasant	10/12/47	45	< 5	--	< 3	< 8	< 6	~ 3
Summyside	35 Mi. W.S.W.	Pheasant	10/12/47	330	< 7	< 10	< 15	< 10	< 8	< 4
Grandview	30 Mi. S.W.	Pheasant	10/12/47	880	< 5	< 60	< 8	~ 9	< 8	< 3
(5 Mi. W) Prosser	20 Mi. S.S.W.	Pheasant	10/18/47	300	62	< 40	2	< 4	8	< 4

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Location	Direction and Distance from 200 Areas	Type of Fowl	Date	Thyroid	Bone	Testes	Liver	Kidney	Muscle	Gut
(8 Mi. NW) Benton City	15 Mi. S.	Pheasant	10/12/47	~ 40	< 3	< 100	< 10	< 7	< 6	~ 8
Benton City	15 Mi. S.	Pheasant	10/18/47	< 60	< 5	< 40	< 5	~ 4	< 5	~ 3
Benton City	15 Mi. S.	Pheasant	10/19/47	300	< 6	< 80	< 3	< 5	< 6	< 5
1/2 Mi. N. Benton City	15 Mi. S.	Pheasant	10/12/47	-	12	-	< 3	< 8	< 3	9
(1 1/2 Mi. N.E.) Benton City	15 Mi. S.	Pheasant	10/12/47	1300	< 2	< 50	< 7	< 10	< 8	~ 4
3 Mi. E. Benton City	15 Mi. S.S.E.	Pheasant	10/12/47	820	< 6	< 40	< 5	< 6	< 6	< 5
8 Mi. W. Richland	15 Mi. S.S.E.	Quail	10/12/47	3600	-	-	< 9	-	< 6	5.2
8 Mi. N.W. Richland	15 Mi. S.S.E.	Pheasant	10/16/47	1400	< 3	< 60	< 3	< 4	< 6	< 5
8 Mi. N.W. Richland	15 Mi. S.S.E.	Pheasant	10/12/47	5000	< 4	< 20	~ 9	< 3	< 8	5.7
8 Mi. N.W. Richland	15 Mi. S.E.	Quail	10/12/47	1100	-	Ovary ~ 180	< 8	< 11	< 5	< 6
1 Mi. S. Richland	24 Mi. S.E.	Pheasant	10/13/47	-	< 5	-	< 4	< 7	~ 4	~ 5
4 Mi. N. Richland	20 Mi. S.E.	Pheasant	10/12/47	1100	8.6	< 30	< 3	< 4	~ 5	< 5
4 Mi. N. Richland	20 Mi. S.E.	Pheasant	10/13/47	2300	60	< 50	~ 6	6.3	~ 5	7.6
2 Mi. N Touchet	50 Mi. S.E.	Pheasant	10/12/47	140	< 2	50	< 4	< 9	-	-
2 Mi. N Touchet	50 Mi. S.E.	Pheasant	10/12/47	330	< 5	< 100	< 6	< 2	< 10	< 7
2 Mi. N Touchet	50 Mi. S.E.	Pheasant	10/12/47	480	< 4	< 20	< 10	< 10	< 7	~ 4
5 Mi. S.W. Prescott	70 Mi. E.S.E	Pheasant	10/18/47	550	~ 4	< 60	< 4	< 3	< 4	< 5
6 Mi. S.W. Prescott	70 Mi. E.S.E	Pheasant	10/18/47	900	~ 4	< 70	~ 5	< 7	< 6	6.9

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