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**MEDICAL RESEARCH  
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**TUBERCULOUS INFECTION  
IN MILK**

**A Report by  
THE DEPARTMENT OF HEALTH FOR SCOTLAND**

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## PREFACE

The following report deals with an investigation organized by the Department of Health for Scotland with the co-operation of the Local Authorities of Edinburgh, Glasgow, Dundee, and Aberdeen, and with that of the Hannah Dairy Research Institute. The work was aided by a grant from the Empire Marketing Board.

The findings, although they refer in particular to Scottish conditions, have obviously also a more general application. The Medical Research Council are accordingly glad to have the opportunity of publishing the report in this series, to assist in making the information widely available.

MEDICAL RESEARCH COUNCIL,  
38 Old Queen Street,  
Westminster, S.W.1.

*11th October, 1933.*

APPENDIX TABLE A

*Raw Milk in Churns. Infections in relation to number of churns from which sample is taken.*

Number of churns.	Aberdeen.				Dundee.				Edinburgh.				Glasgow.				All areas.			
	+	-	I.	Total.	+	-	I.	Total.	+	-	I.	Total.	+	-	I.	Total.	+	-	I.	Total.
1	1	34	..	35	4	82	12	98	1	18	2	21	3	23	..	26	9	157	14	180
2	8	71	2	81	3	73	12	88	3	42	1	46	4	31	4	39	18	217	19	254
3	4	50	3	57	4	50	11	65	7	43	2	52	5	47	2	54	20	190	18	228
4	3	54	2	59	4	69	7	80	4	61	6	71	9	59	2	70	20	243	17	280
5	5	39	..	44	9	57	6	72	13	38	3	54	3	38	1	42	30	172	10	212
6	3	19	..	22	1	24	4	29	6	31	2	39	7	30	..	37	17	104	6	127
7	2	10	..	12	2	14	4	20	..	17	..	17	6	19	3	28	10	60	7	77
8	3	5	..	8	2	21	1	24	4	15	..	19	4	15	2	21	13	56	3	72
9	2	10	..	12	1	9	1	11	..	7	..	7	..	7	..	7	3	33	1	37
10	1	..	..	1	1	6	2	9	..	5	..	5	1	9	..	10	3	20	2	25
11	1	1	..	2	..	2	..	2	..	1	..	1	1	4	..	5	2	8	..	10
12	..	1	..	1	1	1	..	2	..	..	..	..	..	..	1	1	1	2	1	4
13					..	..	..	..	1	1	..	2	1	..	..	1	2	1	..	3
14					..	1	..	1	..	1	..	1	..	..	..	..	..	2	..	2
15					..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
16													..	1	1	2	..	1	1	2
17													..	..	..	..	..	..	..	..
18													1	..	..	1	1	..	..	1
55													3	..	1	4	3	..	1	4
N.S.					1	4	..	5	..	1	..	1	..	9	1	10	1	14	1	16
Total	33	294	7	334	33	413	60	506	39	281	16	336	48	292	18	358	153	1,280	101	1,534

+ = positive.

- = negative.

I. = inconclusive.

APPENDIX TABLE B

Raw Milk in Churns. Infections in relation to volume of milk from which sample is taken.

Volume of milk (gallons).	Aberdeen.				Dundee.				Edinburgh.				Glasgow.				All areas.			
	+	-	I.	Total.	+	-	I.	Total.	+	-	I.	Total.	+	-	I.	Total.	+	-	I.	Total.
-5	..	6	..	6	..	11	1	12	..	9	..	9	..	4	..	4	..	30	1	31
5-	..	28	..	28	2	26	5	33	1	14	2	17	2	6	1	9	5	74	8	87
10-	1	32	1	34	2	37	6	45	..	15	..	15	1	21	1	23	4	105	8	117
15-	4	28	..	32	5	26	7	38	3	19	1	23	4	16	..	20	16	89	8	113
20-	8	38	3	49	1	54	10	65	4	19	5	28	2	22	2	26	15	133	20	168
25-	..	24	1	25	1	12	5	18	3	25	..	28	4	14	2	20	8	75	8	91
30-	1	30	1	32	4	51	6	61	4	32	1	37	4	41	..	45	13	154	8	175
35-	1	17	..	18	3	29	3	35	1	24	..	25	4	24	..	28	9	94	3	106
40-	5	30	1	36	1	36	3	40	2	29	3	34	1	28	1	30	9	123	8	140
45-	1	12	..	13	..	21	3	24	7	15	1	23	1	28	1	30	9	76	5	90
50-	2	16	..	18	4	26	1	31	5	18	2	25	1	13	2	16	12	73	5	90
55-	2	6	..	8	1	14	1	16	1	10	..	11	2	12	1	15	6	42	2	50
60-	1	8	..	9	2	16	..	18	3	12	1	16	4	12	2	18	10	48	3	61
65-	1	2	..	3	..	10	2	12	1	8	..	9	3	10	..	13	5	30	2	37
70-	1	3	..	4	1	5	3	9	1	9	..	10	4	12	1	17	7	29	4	40
75-	1	2	..	3	..	8	..	8	1	7	..	8	2	3	..	5	4	20	..	24
80-	..	4	..	4	3	8	..	11	1	4	..	5	2	6	..	8	6	22	..	28
85-	1	3	..	4	1	4	..	5	..	1	..	1	1	3	..	4	3	11	..	14
90-	1	3	..	4	..	3	1	4	..	2	..	2	1	2	..	3	2	10	1	13
95-	1	..	..	1	1	1	..	2	..	2	..	2	1	2	..	3	3	5	..	8
100-	1	1	..	2	..	3	1	4	..	..	..	..	..	..	..	..	1	4	1	6
105-	..	..	..	..	..	2	..	2	..	..	..	..	..	..	..	..	..	2	..	2
110-	..	1	..	1	..	4	..	4	..	2	..	2	..	3	..	3	..	10	..	10
115-	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	1	..	1
120-	..	..	..	..	..	1	1	2	..	2	..	2	..	..	2	2	..	3	3	6
125-	..	..	..	..	..	1	..	1	..	2	..	2	..	..	..	..	..	3	..	3
130-	..	..	..	..	..	..	1	1	..	1	..	1	..	..	..	..	..	1	1	2
135-	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
140-	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	1	..	1
145-	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	1	..	..	1
150-	..	..	..	..	..	..	..	..	..	..	..	..	1	2	..	3	1	2	..	3
155-	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	1	..	1
160-	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
165-	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
825-	..	..	..	..	..	..	..	..	..	..	..	3	..	1	4	3	..	1	..	4
N.S.	..	..	..	..	..	2	..	2	..	..	..	..	..	7	1	8	..	9	1	10
Total	33	294	7	334	33	413	60	506	39	281	16	336	48	292	18	358	153	1,280	101	1,534

+ = positive. - = negative. I. = inconclusive.

APPENDIX TABLE C

Heat-treated milk.

Method of Heat-treatment.	Aberdeen.				Dundee.				Edinburgh.				Glasgow.				All areas.			
	+	-	I.	Total.	+	-	I.	Total.	+	-	I.	Total.	+	-	I.	Total.	+	-	I.	Total.
A	..	114	..	114									..	23	1	24	..	137	1	138
A (1)													..	1	1	2	..	1	1	2
A (2)													1	10	1	12	1	10	1	12
B	4	82	3	89					3	52	2	57	1	23	..	24	8	157	5	170
B (1)	1	28	..	29													1	28	..	29
C									..	88	2	90	..	9	..	9	..	97	2	99
D									..	66	5	71					..	66	5	71
E					21	167	20	208	..	89	4	93	..	6	1	7	21	262	25	308
E (1)													..	1	..	1	..	1	..	1
E (2)													..	1	..	1	..	1	..	1
E (3)													..	3	..	3	..	3	..	3
F					4	187	20	211					..	6	..	6	4	193	20	217
G													..	85	2	87	..	85	2	87
H													..	2	..	2	..	2	..	2
H (1)													..	3	..	3	..	3	..	3
H (2)													..	3	..	3	..	3	..	3
H (3)													..	..	1	1	..	..	1	1
Open cans immersed in boiler													..	1	..	1	..	1	..	1
(1)													..	1	..	1	..	1	..	1
(2)													..	1	..	1	..	1	..	1
(3)													..	1	..	1	..	1	..	1
Sterilized					..	86	7	93									..	86	7	93
Flash treated	15	93	1	109					5	17	..	22	4	150	6	160	24	260	7	291
Total	20	317	4	341	25	440	47	512	8	312	13	333	6	329	13	348	59	1,398	77	1,534

A (1) Temp. 145; time 13 mins.

.. (2) .. 145; .. 20 ..

B (1) .. 130; .. not stated

H (1) .. 144; .. 30 mins.

.. (2) .. 145; .. 15 ..

.. (3) .. 150; .. 10 ..

E (1) Temp. 140; time 30 mins.

.. (2) .. 143; .. 30 ..

.. (3) .. 145; .. 20 ..

Open cans (1) .. 150; .. 20 ..

.. (2) .. 150; .. 30 ..

.. (3) Temp. and time not stated

+ = positive.

- = negative.

I. = inconclusive.

APPENDIX TABLE D

*Dates of death of guinea-pigs in tests classified as inconclusive.*

	-7	7-	14-	21-	28-	35-	42-	49-	Total.
<i>Raw Milk in Churns.</i>									
Aberdeen . . .	..	..	1	2	..	1	3	..	7
Dundee . . .	..	2	6	8	21	12	9	2	60
Edinburgh . . .	1	4	..	2	..	3	4	2	16
Glasgow . . .	..	3	..	1	3	3	4	4	18
All areas . . .	1	9	7	13	24	19	20	8	101
<i>Retailed Milk.</i>									
Aberdeen . . .	..	..	2	1	4	2	2	3	14
Dundee . . .	..	3	5	9	9	7	13	1	47
Edinburgh . . .	..	..	5	2	3	2	3	2	17
Glasgow . . .	..	..	..	..	4	2	3	..	9
All areas . . .	..	3	12	12	20	13	21	6	87
<i>Heat-treated Milk.</i>									
Aberdeen . . .	..	..	..	..	2	1	1	..	4
Dundee . . .	2	2	4	6	8	10	12	3	47
Edinburgh . . .	..	1	2	1	1	3	2	3	13
Glasgow . . .	..	..	1	..	2	2	6	2	13
All areas . . .	2	3	7	7	13	16	21	8	77
Certified . . .	1	..	1	..	6	5	8	..	21
Grade A (T.T.) . . .	..	..	..	..	1	2	1	..	4
Total . . .	1	..	1	..	7	7	9	..	25
Raw Milk in Tanks . . .	1	2	..	..	2	2	..	1	8

**INQUIRY INTO THE TUBERCULOUS INFECTION OF THE  
MILK SUPPLY OF SCOTLAND**

GROUP B. HEAT-TREATED MILK

Centre.....

Sample Number.....

Name and Address of  
Pasteurizing Plant:

Whether sampled from (a) Cooler, (b) Churn, (c) Bottle.      Date  
(Delete what does not apply)

Details of Process.

- (i) Type of Pasteurizer
- (ii) Capacity of Pasteurizer
- (iii) Temperature and Time of Heating
- (iv) Method of Temperature Control
- (v) Were temperatures checked by Sampling Officer?

Remarks:

*Signature of Sampling Officer*.....

**RESULT OF BIOLOGICAL TEST      Positive  
Negative**

**DETAILS OF BIOLOGICAL TEST**

Guinea-pig No. ....	Guinea-pig No. ....
Date of inoculation .....	Date of inoculation .....
Date of autopsy: died .....	Date of autopsy: died .....
killed .....	killed .....
<u>Number of days after inoculation</u> .....	Number of days after inoculation.....



**INQUIRY INTO THE TUBERCULOUS INFECTION OF THE MILK SUPPLY OF SCOTLAND**

GROUP C. RETAILED MILK

Centre.....

Sample Number.....

Name and Address of  
Retailer:

Whether sampled from (a) Churn, (b) Bottle. Date  
(Delete what does not apply)

Previous treatment, if any  
(If unknown, say so)

Remarks:

*Signature of Sampling Officer*.....

**RESULT OF BIOLOGICAL TEST** Positive  
Negative

**DETAILS OF BIOLOGICAL TEST**

Guinea-pig No. ....  
Date of inoculation .....  
Date of autopsy: died .....  
                                    killed .....  
Number of days after inoculation .....

Guinea-pig No. ....  
Date of inoculation .....  
Date of autopsy: died .....  
                                    killed .....  
Number of days after inoculation .....

**AUTOPSY**

Typical tuberculous lesions? .....

**AUTOPSY**

Typical tuberculous lesions? .....

**DISTRIBUTION:**

Local? ..... Lymphatic Glands { regional? .....  
  abdominal? .....  
  thoracic? .....  
Spleen? ..... Liver? ..... Lungs? .....  
Other areas? .....  
Acid-fast bacilli  
demonstrated in .....

**DISTRIBUTION:**

Local? ..... Lymphatic Glands { regional? .....  
  abdominal? .....  
  thoracic? .....  
Spleen? ..... Liver? ..... Lungs? .....  
Other areas? .....  
Acid-fast bacilli  
demonstrated in .....

**DOUBTFUL LESIONS:**

Features .....  
Results of culture .....  
Guinea-pig inoculation.....

**DOUBTFUL LESIONS:**

Features .....  
Results of culture .....  
Guinea-pig inoculation.....

**DIED OF INTERCURRENT INFECTION:**

Features and nature of condition .....

**DIED OF INTERCURRENT INFECTION:**

Features and nature of condition .....

*Signature of Bacteriologist*.....

## INQUIRY INTO THE TUBERCULOUS INFECTION OF THE MILK SUPPLY OF SCOTLAND

GROUP D. GRADED MILK

Centre.....

Sample Number.....

Name and Address of  
Producer:

Name and Address of  
Retailer:

Where sampled ?

Date

Bulk from which } (a) Total herd, (b) Single churn, (c) Bottle.  
sample is taken } (Delete what does not apply)

For farm samples, state number of cows in milk

Remarks:

*Signature of Sampling Officer*.....

### RESULT OF BIOLOGICAL TEST Positive Negative

#### DETAILS OF BIOLOGICAL TEST

Guinea-pig No. ....  
Date of inoculation .....  
Date of autopsy: died .....  
                          killed .....  
Number of days after inoculation .....

Guinea-pig No. ....  
Date of inoculation .....  
Date of autopsy: died .....  
                          killed .....  
Number of days after inoculation .....

#### AUTOPSY

Typical tuberculous lesions? .....

#### AUTOPSY

Typical tuberculous lesions? .....

#### DISTRIBUTION:

Local? ..... Lymphatic Glands { regional? .....  
  { abdominal? .....  
  { thoracic? .....  
Spleen? ..... Liver? ..... Lungs? .....  
Other areas? .....  
Acid-fast bacilli  
demonstrated in .....

#### DISTRIBUTION:

Local? ..... Lymphatic Glands { regional? .....  
  { abdominal? .....  
  { thoracic? .....  
Spleen? ..... Liver? ..... Lungs? .....  
Other areas? .....  
Acid-fast bacilli  
demonstrated in .....

#### DOUBTFUL LESIONS:

Features .....  
Results of culture .....  
Guinea-pig inoculation .....

#### DOUBTFUL LESIONS:

Features .....  
Results of culture .....  
Guinea-pig inoculation .....

#### DIED OF INTERCURRENT INFECTION:

Features and nature of condition .....

#### DIED OF INTERCURRENT INFECTION:

Features and nature of condition .....

*Signature of Bacteriologist*.....

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