

## THE FREQUENCY OF THE APPEARANCE OF TUBERCLE BACILLI IN THE FAECES OF THREE APPARENTLY HEALTHY COWS.

BY R. STENHOUSE WILLIAMS AND W. A. HOY.

(*The National Institute for Research in Dairying, University of Reading.*)

IN a previous paper (Williams and Hoy, 1927) it was shown that living and virulent tubercle bacilli could be demonstrated in the faeces of six apparently healthy cows from among a total of 391 which were examined. All these cows were living the normal life of the herds in which they were discovered, and three of them were brought to the Institute in order that a study might be made of the frequency with which tubercle bacilli could be found in their faeces.

A study of the literature on this subject has not revealed any truly comparable work, although Schroeder and Cotton (1907) made three examinations of faeces from an apparently healthy cow and on one occasion found that tubercle bacilli were present. V. A. Moore (1911) examined eight samples of faeces from a cow which was apparently healthy, although it reacted to the tuberculin test, and, on one occasion, found tubercle bacilli.

### HISTORY OF THE COWS.

*Cow No. 1 (Shorthorn).* A sample of faeces which was found to contain tubercle bacilli was taken from this cow on November 16th, 1915. The result of the examination was at once reported to the owner who was not convinced that anything was amiss with the cow; a further test, however, was again positive and the cow was purchased by the Institute in March 1916; she was then in good condition and did not show any clinical symptoms of tuberculosis.

We were informed that she was a good milker and had had six calves.

Her condition remained good until January 1917 when udder trouble began to develop, and she appeared to fail in health although showing no signs of emaciation. As her condition did not improve she was slaughtered on August 31st, 1917.

*Post mortem.* Generalised tuberculosis including the udder; no evidence of tuberculosis of the mucous membrane of the intestine. A thick piece of iron wire 9 in. long was present in the liver.

*Cow No. 2 (Shorthorn).* This cow was first examined in October 1915 and after the positive result had been confirmed by a second test she was purchased in May 1916. This animal was described as a young cow, was in excellent condition on arrival at the Institute and remained so until the following

February when she gave birth to a calf. She then developed a tuberculous udder from which she did not recover and was, therefore, slaughtered in March 1917.

*Post mortem.* Generalised tuberculosis. Tuberculosis of the udder and early ulceration of the mucous membrane of the intestinal tract.

*Cow No. 4 (Guernsey).* This cow was first examined in October 1916 and was presented to the Institute when the result of the test was known. She was in excellent condition and remained so up to the time of slaughter in October 1920.

*Post mortem.* Condition very good, left pharyngeal glands very slightly affected, left lobe of the lung markedly affected and containing one large tubercle, the bronchial glands affected on both sides. Anterior and posterior mediastinal glands affected. A few small pin head glands in the mesentery. All other organs healthy. There was abundant evidence that the cow was steadily improving since quite large completely healed lesions were found.

The carcase, with the exception of the head, tongue, skirt, mesenteric and omentum fat, was passed for food by the Public Health Authorities.

*Results of the Examinations.*

Date	Cow No. 1		Cow No. 2		Cow No. 4	
	No. of samples	Tubercle bacilli present	No. of samples	Tubercle bacilli present	No. of samples	Tubercle bacilli present
1915, Oct.-Dec. ...	1	1	1	1	—	—
1916, Jan.-March ...	3	2	0	0	—	—
April-June ...	0	0	1	1	—	—
July-Sept. ...	9	1	5	1	—	—
Oct.-Dec. ...	9	2	9	1	1	1
1917, Jan.-March ...	9	3	7	6	6	3
April-June ...	12	9	Cow slaughtered		12	2
July-Sept. ...	19	4	March 5th, 1917		22	2
Oct.-Dec. ...	Cow slaughtered		—	—	12	0
1918, Jan.-March ...	August 31st, 1917		—	—	13	0
April-June ...	—	—	—	—	13	0
July-Sept. ...	—	—	—	—	9	2
Oct.-Dec. ...	—	—	—	—	17	3
1919, Jan.-March ...	—	—	—	—	11	4
April-June ...	—	—	—	—	13	4
July-Sept. ...	—	—	—	—	6	3
Oct.-Dec. ...	—	—	—	—	4	1
1920, Jan.-March ...	—	—	—	—	8	0
Totals ...	62	22	23	10	147	25

The Table shows that 62 samples of faeces from Cow No. 1 were examined between November 1915 and September 1917 and that 22 of these were positive. The examination of 23 samples from Cow No. 2 between October 1915 and March 1917 gave 10 positive results; and 25 positive results were obtained from the examination of 147 samples from Cow No. 4 between October 1916 and March 1920.

The final result, therefore, was that 232 samples were examined and 57 were positive, or 24 per cent. of the total number examined.

It has already been pointed out, however, that Cow No. 1 began to fail

in January 1917 and Cow No. 2 in February 1917. Cow No. 4 remained apparently healthy throughout the period of the tests. If, then, the results of the examinations of the faeces of Cows Nos. 1 and 2 after December 1916 be excluded, the remainder represent those taken at a time when the cows were still in apparently healthy condition. The number of such samples was 185, of which 35 (18 per cent.) were positive.

There is little doubt that this percentage does not overestimate the frequency of the presence of *B. tuberculosis* in the faeces of cows which are apparently healthy, though suffering from tuberculosis, since most of the infection probably comes from swallowed infected sputum and is, therefore, very irregularly distributed throughout the faeces. The generally accepted view that the chief source of infection of the faeces is from the lungs is supported in these cases by the fact that at the post mortem examinations only one cow showed any naked eye evidence of tuberculous infection of the mucous membrane of the intestine. Further, if such cows as these be watched it is found that they have an occasional slight cough, not at all severe, and usually swallow their sputum; some sputum, however, may escape and in such dribblings *B. tuberculosis* was demonstrated repeatedly.

Moreover, the methods of examination did not permit us to obtain a fair measure of the true amount of infection, since it was not found possible to inoculate more than a fraction of 1 oz. of faeces, out of the total of 30–40 lb. which a cow excretes during a day, into the two guinea-pigs which were used in each of these experiments. Irregularity of cough and sputum excretion, irregularity of distribution of the sputum in the faeces, and the small quantity which it was possible to examine on any one occasion, help to explain the fact that whereas eight positive results were obtained from the examination of 41 samples of faeces from Cow No. 4 between October 1916 and September 1917, the results of the next series of 38 samples between October 1917 and June 1918 were all negative.

#### CONCLUSIONS.

Two hundred and thirty-two samples from three cows which were known to be excreting *Bacillus tuberculosis* have been examined, of which 57 (24 per cent.) were positive.

One hundred and eighty-five samples were examined while these cows were still apparently healthy, of these 35 (18 per cent.) were positive.

#### REFERENCES.

- MOORE, V. A. (1911). The elimination of tubercle bacilli from infected cattle. *J. Med. Research*, **24**, 517–21.
- SCHROEDER, E. C. and COTTON, W. E. (1907). The danger from tubercle bacilli in the environment of tuberculous cattle. *U.S. Dept. Agric., Bureau of Animal Industry, Bulletin No. 99*.
- WILLIAMS, R. S. and HOY, W. A. (1927). Tubercle bacilli in the faeces of apparently healthy cows. *Journal of Hygiene*, **27**, 37–40.

(MS. received for publication 11. v. 1928.—Ed.)