

PREVENTION OF TUBERCULOSIS AMONG CATTLE.*

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THE only justification we have for discussing the subject of the prevention of tuberculosis among cattle is the relationship which exists between the disease in animals and men. The prevention of cattle tuberculosis must be a matter for our colleagues, the members of the veterinary profession, who I know are anxious that a beginning should be made in a systematic attempt to eradicate the disease.

Ever since the establishment of a definite service for the prevention of diseases in the human subject tubercular disease among dairy stock has given us concern, but so far no preventive measures have been taken. The disease is probably more prevalent to-day than it was 30 or 50 years ago. It is an enormous source of loss to stock-owners and butchers, to whom any reasonably effective scheme of eradication would be acceptable, if not too costly.

It has for at least 30 years been generally held by the Public Health Medical Service that tuberculosis in cattle is one of the causes of tuberculosis in man. It is unnecessary to-night to detail the reasons we have for this very strong and generally accepted opinion. Actual experimental proof must always be wanting. Even the best endowed Royal Commission cannot supply this evidence. When an opinion is based on the daily observations of those who have intimate contact with the disease, both in man and animals, and when such opinion is held almost without a single dissentient, I feel that our case is so strong that we can reasonably expect that action shall be taken on it, and that we are wrong in not pushing forward for preventive measures.

While our opinion on the general question is so unanimous, I think it will be found that there is considerable difference of opinion as to the extent to which tuberculosis in the human subject is due to the disease in the lower animals. Within quite recent years we have had assertions made on the one hand by eminent authorities that human tuberculosis is due directly or indirectly to bovine tubercle, and on the other hand that in quite a small number the infection is so derived. Personally I am inclined to believe that we have in the past over-estimated the number of cases derived

from the lower animals, and that, therefore, when the time comes that we are able to say that bovine tuberculosis is practically exterminated some of us will be disappointed in finding that the incidence of the disease in man has not greatly diminished as a result of such preventive work. Whichever opinion we hold, I do not think it weakens our contention that tuberculosis in the lower animals should be dealt with in such a manner as to entirely do away with the possibility of any person deriving tuberculosis from a bovine animal.

Stock-owners have for many generations realised what a scourge tuberculosis has been among their herds. It has only been, however, within quite recent years that any intelligent investigations have been made. We are now able to say, with some degree of accuracy, the extent of the disease among bovines, the conditions under which it is spread, and the methods, or at least some of the methods, by which it may be combated.

I find it is difficult to give a figure which will represent the percentage incidence of tuberculosis among cattle. Many thousands of dairy herds have now been tested with tuberculin with results so varying that while some herds have been found on the first examination to be quite free, others have reacted to the extent of 80 per cent. or more. To be on the safe side, in view of the available tests having been made on more or less selected herds, and in the earlier days with tuberculin of irregular action, it may be asserted with considerable assurance that 30 per cent. of the dairy stock are suffering from tuberculosis.

Obviously, great loss to the stock-owner is occasioned. The amount of this loss, if known, would probably do more to awaken interest than anything else. More or less random estimates have in the past been made, amounting in most cases to millions per year, but in most instances where the methods have been given these have indicated that only certain parts of the loss have been taken into account. The loss to stock-owners, and particularly to dairymen, arises from:—

- (a) General wasting due to the disease;
- (b) Inability to guarantee the butcher in freedom from tubercular disease;
- (c) Shortening of the milking period of good milkers by probably 50 per cent.

As regards the wasting due to tuberculosis, it is not sufficiently well known that in stock sales all over England there are many cows sold at prices from 30s. to £5, and that

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there is a regular trade in such. At intervals, for a good many years, I have sent to stock sales in country districts round Sheffield and Birmingham, and find that quite considerable numbers of cattle are sold at these prices.

The uncertainty shown by the butcher in buying an old cow is an element in reducing the price. I am told that from the above two causes alone it is safe to say that the stock-owner loses on an average about £5 on each animal sold. The latest return of the Board of Agriculture (1908) indicates that there are of cattle over two years old 4,135,468 head, of which about $2\frac{3}{4}$ millions are cows in milk or calf.

Another source of great but unrecognised loss to the dairy farmer is that arising from the fact that owing to tuberculosis he avoids keeping individual cows for any long number of years, as he finds that every year after the fifth or sixth increases his risk of loss. This is in sharp contrast to many of the Danish farmers, who find that it is economical to test the milk yield of every cow, to discard any which do not pay for themselves by their milk, and to carefully keep and breed from those giving a good milk yield. In this way he keeps good milkers for four or five years longer than the English farmer, and at the same time gets four or five calves from good milking stock.

There are several other minor losses to the stock-owner, such as uneconomical feeding of tubercle-infected animals, etc.

Three definite propositions have been made with a view to clearing herds of tuberculosis:—

1. The method of Professor Bang, with numerous slight modifications.
2. The method of Professor Ostertag.
3. The method of Von Behring.

The essentials of Professor Bang's method are: (1) the testing of all animals with tuberculin; (2) the complete and continuous separation of the reactors from the non-reactors, with the necessary disinfection; (3) the feeding of all calves on tubercle-free milk; (4) the repeated testing of all non-reacting animals; (5) the disposal of the reactors at the most profitable time; and (6) the slaughter of all animals with udder tuberculosis. Immediate slaughter of all reactors is not recommended by Bang on account of the financial loss occasioned.

While in Denmark last year Professor Bang informed me that already in that country between 600 and 700 herd of dairy cattle had been freed from tuberculosis. The tuberculin

and the necessary veterinary services are supplied by the State, generally through the medium of Agricultural Societies. The practical result is that since 1895 relatively a small proportion of the farmers have adopted the method. A few who had commenced to free their herds have abandoned the attempt, on account of the disappointment caused by re-infection in the sound part of the herd, or from becoming tired by the constant watchfulness and extra work involved in the separation of their herd into two distinct parts.

In cases where the udder is found involved, great stress is laid by Professor Bang on the necessity for slaughter. Compensation is paid in such cases after confirmatory microscopical examination of sections by a method which seems to be complicated, but which appears to operate well and to be quite satisfactory. Wasters are dealt with in a similar way.

Bang has demonstrated beyond doubt the possibility of freeing herds of cattle at moderate—one might almost say little—cost, and personally I believe his to be the only reasonably effective method for general adoption.

There are, however, many points of difficulty to be encountered. In the first instance, the farm buildings must be suitable for the purpose: (a) they must be hygienic; (b) they must be capable of being divided for the complete separation of the infected from the uninfected parts of the herd (preferably entirely separate buildings for the two parts should be available); (c) the cowkeeper must recognise the chief means by which infection is spread, otherwise he is liable to have re-infection and great disappointment. For reasons of economy and safety he should rear his own calves rather than buy recently calved cows (as is frequently done at present). From even tubercular cows it is possible to rear a tubercle-free herd if tubercle-free milk or boiled milk is supplied to the calves. The tuberculin used must be reliable. It is stated on good authority that at least some of the tuberculin on the market is not reliable. Then some members of the veterinary profession have had but little opportunity of using tuberculin, and others are inclined to belittle the results. Professor Bang, from his exceptionally large experience, affirms that tuberculin, when of proper quality and properly applied, is entirely reliable and satisfactory. There are a few well-known exceptions, the most palpable being that cows which may be described as obvious tuberculous wasters often give indefinite reaction,

and again that a recent injection of tuberculin in a tuberculous cow prevents a definite reaction. In practice, however, I am satisfied that neither of these exceptions is of real importance.

In addition to the above exceptions a small percentage of cows give an indefinite reaction. These Bang suggests should be included with the reacting part of the herd until a second or third test settles whether they are tubercular or not.

In Denmark the expense of supplying tuberculin and veterinary assistance is borne by the State. The farmer bears the cost of adapting his premises and of the extra labour involved. In return he gets, when he can guarantee his milk to come from a herd free from tubercle, a distinct advance in the price of milk. This extra is difficult to estimate, as at the same time he undertakes much additional work in securing that the milk shall be of good quality, free from dirt, and cooled at the time of milking, and kept cool till delivered at the town. One farmer told me he got 28 ore for two litres of certified and cooled milk, as compared with 21 ore for the same quantity of uncooled, uncertified milk—an increase of 33 per cent. As has been mentioned above, part only of this increase is due to the anti-tuberculous work.

Bang's method is highly thought of in Denmark. It is not universally adopted. It is not compulsory. All milk supplied to butter factories in Denmark is required by law to be raised to a temperature of 80 deg. C., a temperature sufficient to kill the bacillus tuberculosis. In several of the states in North America attempts have been made to eradicate tuberculosis by the use of tuberculin, with the slaughter of all reactors. Needless to say, the cost of the necessary organisation, the amount to be paid as compensation, and the dislocation to the dairy industry were so great as to cause the scheme, I think, to be abandoned in every case. Excellent accounts of the work and of its difficulties will be found in the annual reports of the Cattle Commissioners for the State of Massachusetts. In France, Belgium and Germany the method is in use, but apparently not on any extensive scale.

The next of the three methods I have mentioned for the prevention of tuberculosis among cattle is that devised by Professor Ostertag and extensively used in North Germany. The method is based on the statement

that all cases of bovine tuberculosis are due to infection thrown off by "open" or "infectious" cases. If such cases can be diagnosed and excluded from the herd the incidence of tuberculosis will diminish. The dangerous cases are those advanced cases in which there are open lesions in the lungs and air passages, udder, urethro-genital tract, and intestines. Professor Ostertag lays great stress on the fact that in the majority of cattle the disease is limited to situations from which infection cannot be thrown off, and that such cases are, for the time being at least, not dangerous. It is asserted that such cases seldom exceed two and a half per cent. of a herd.

In Ostertag's method reliance is placed on conjoint veterinary inspection and bacteriological investigation. The herd is submitted annually to veterinary examination, and at other times when occasion requires. The recognition of dangerous animals is often not very difficult, and as a rule in these cases the clinical examination suffices. In doubtful cases resort is made to bacteriological methods. Samples of milk, sputum, or other excretions are sent to accredited bacteriological laboratories. When a dangerous animal is found the owner is obliged to isolate it, and must slaughter it, or sell it for slaughter at the earliest moment to avoid further loss. The owner is also required to disinfect the premises. It is advised that calves be kept apart and fed on boiled milk. Various agricultural societies have been formed among farmers to carry out the method.

The method lies under the disadvantage that it is practically impossible to recognise each dangerously infectious animal the moment it becomes infectious. It is possible that an animal may be intermittently infectious.

The third method for the prevention of tuberculosis is that of Von Behring, which depends on the increasing of the resistance of young animals to the tubercle bacillus by the injection of attenuated cultures. The method has as yet had so small an application as to make it one which need not here be discussed.

In England as in Denmark there are a considerable number of herds of cattle which have been apparently continuously free from tuberculosis. Bang has shown that bovine tuberculosis is of relatively recent introduction into Denmark. Formerly the disease was unknown, and is still unknown in some of the larger islands where the importation of cattle does not occur. At the present time the

prevalence of the disease varies greatly, the local customs of the farmers probably playing an important part in this variation. If we accept the incidence on dairy cows as 30 per cent., this means that there are approximately over 900,000 tubercular cattle in England and Wales. To apply Bang's method universally is entirely out of the question even if agriculturalists be willing at the present time.

Apart altogether from the difficulty of numbers the impossibility of keeping cattle free from infection in the insanitary hovels in which cows are housed must be recognised.

I would, therefore, put forward two propositions as primary essentials:—

1. That an efficient veterinary preventive service be established, capable of increase, to meet the requirements of any scheme for eradication.
2. That the cowsheds must be brought up to a reasonable standard.

My first point is that every opportunity must be given for the establishment of an efficient Public Health veterinary staff to deal with the prevention of disease in live stock. Relatively few such appointments have as yet been made, and these have been mostly in connection with the work of the large cities. To make one veterinary inspection of the cows in England and Wales would probably require the whole time services of over 300 veterinary surgeons.

As in the case of the Public Health Medical Service, so in the case of the Veterinary Preventive Service, special training is required, and therefore it is not likely that any large service will be available for some years.

As regards the second proposition, I need say nothing as to the quality of the present buildings other than that to attempt to reduce tuberculosis in insanitary cowsheds would be a mischievous waste of money.

The practical point I wish to draw your attention to is the means by which amendment is to be accomplished. I suggest that the only way of dealing effectively with many sheds is to entirely rebuild them. Others again may be converted, provided substantial alterations are made, while yet again others need but little alteration.

In order to accomplish this end I believe it is essential that authorities should be empowered to grant loans for short periods to enable the present owners to rebuild or reconstruct their cowsheds. Without such assistance there will be real hardship on the

owners, and much resistance from agriculturalists generally. The proportion of bad cowsheds which for all purposes of milk production should be abolished varies greatly in different districts. The cost of converting could not reasonably be put on the tenant. Obviously the owner will benefit, and should be held responsible if the farm is let as one for dairy stock or capable of holding dairy stock.

Having established the two fundamental parts of any scheme for the prevention of tuberculosis it will be possible probably in the first year to inspect and ascertain the existence of cases of open tuberculosis. If the number of animals affected does not exceed two and a half per cent. of the whole, as in North Germany, this will represent probably over 50,000 animals in the first year of inspection, and if these have to be compensated at the price, say, of £5 per animal it would mean at least a quarter of a million sterling per annum in compensation alone, at least for the first year.

While this general veterinary inspection of the dairy stock is in progress it will be possible to commence the systematic testing of herds on the lines outlined by Bang. The cost of each cow tested for veterinary services and tuberculin, provided the work is done systematically, may be reckoned at 4s. per head.

I have probably said enough to indicate the complicated and somewhat costly nature of any scheme for effectively dealing with tuberculosis among cattle and the probability of delay in obtaining anything like the general operation of the scheme.

I believe that probably better results will be obtained by the administration of this new service being put in the hands of the County Councils and County Borough Councils than by retaining the supervision of diseases of animals so largely by the central authority as at present.

Pending the creation of such an effective service, it is possible for much valuable protective work to be done—work which at the same time will be of great educational value.

In Birmingham, as a result of the operation of the Model Milk Clauses, we ascertained that 14 per cent. of the churns of milk coming to the City contained the living germs of tuberculosis. This indicated the necessity of some protective measures. Already several of the large hospitals are supplied with tubercle-free milk, and at a recent meeting of the Health Committee of the City the following scheme was provisionally approved for submission to the City Council. The scheme, as will

be noted, is on the lines of that suggested in the report of the Second Royal Commission on Tuberculosis:—

(a) The scheme to apply only to cowsheds situated within ten miles of the city, and from which milk is sent to Birmingham, with the additional limitation that it shall only apply to sheds suitable for the purpose.

(b) The Corporation to supply free of charge the necessary tuberculin and veterinary assistance for the testing of the cows twice annually, and also the necessary veterinary assistance and advice in carrying out the scheme.

(c) The farmer to undertake to separate the diseased from the healthy cows, and to gradually get rid of the diseased animals. Cows with tuberculosis of the udder to be dried off and sold for slaughter.

(d) The farmer to permit the marking of animals free from tuberculosis by means of a lead button on one ear.

(e) The farmer to carry out the necessary disinfection after the removal of an infected cow from the shed.

(f) A certificate to be issued quarterly to those farmers who keep their herds free from tuberculosis, as follows:—

Quarter ending.....

I hereby certify that on behalf of the Corporation of the City of Birmingham I have visited the farm occupied by

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and examined the cows and farm premises. I found that proper precautions were being taken to keep the cows free from tuberculosis, and that they were housed under hygienic conditions.

This certificate must not be used after, 19 .

Signed.....
 Veterinary Superintendent to the Corporation of Birmingham.

(g) A list of farms at which the cattle are being kept free from tuberculosis to be printed and supplied to any person in Birmingham who desires such list.

NOTE—

1. Pending the time when the herd shall be entirely free from tuberculosis, reacting animals, except those having tuberculosis of the udder, may be kept and milked with a view to the most profitable use being made of them before they are disposed of.

2. Cows purchased to replace infected stock should be bought with a certificate to the effect that they have been tested within a month and found not to react to tuberculin, or they should be bought subject to their being returned if they react to the test. Until tested they should be kept in a shed by themselves.

3. It is probable that two or three years will be occupied in freeing the herd from tuberculosis unless the farmer chooses to immediately sell reacting animals, in which case there is likely to be some loss.

THE LIVERPOOL TOWN PLANNING ACT.*

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THE most suitable introduction to the consideration of the various attempts that have been made in Liverpool to lay out wide streets and boulevards would be a short note on the Liverpool "Town Planning" Act, otherwise officially called the Liverpool Corporation (Streets and Buildings) Act, 1908. This is all the more interesting as it is, so far as I know, the only Act of its kind which has been passed by Parliament, and it contains powers which are far in advance of anything that has been previously suggested.

The Parliamentary Committee which considered the Bill themselves said, in presenting the Bill for the approval of the House of Commons, that the powers were of a very exceptional character, and that other districts were not to consider the granting of these powers a precedent for them to ask for similar powers until their effect in Liverpool had been ascertained. As a preliminary it may be well to glance at one or two points in the various bye-laws which regulate the erection of buildings in Liverpool, and which are, no doubt, similar to those in other large cities in the kingdom.

Under those bye-laws the first thing the owner of an estate who wishes to build on it has to do is to send in a plan to the Local Authority, who must approve or disapprove of it within a given time. The plan can *only* be disapproved on the grounds of contravening the bye-laws. The roads may be placed in a most awkward position, but nothing can be done to prevent this. Furthermore the plan itself is no guarantee that the proposal put before the Committee will be carried out, in fact it can be altered with

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