

Tuberculosis of Dairy Cows

Prepared by B. A. Taylor, B.Sc., B.V.Sc., M.R.C.V.S., Veterinary
Department, Canterbury Agricultural College.

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Tuberculosis is an infectious disease of man and animals. It is caused by a germ commonly known as the tubercle bacillus, so called because of its tendency to form tubercles or grape-like growths of varying size in the animal body. There are three different types or strains of the germ—one called the human type, because it is most commonly found in man; another the bovine type, found in cattle; and a third type which affects mainly fowls is called the avian type. All these types are the same germ of tuberculosis which has become slightly modified or adapted to different animals; each type is, however, not confined to its own species. Thus the human type of the germ can infect cattle and the bovine type can very readily infect humans, and thus tuberculosis of dairy cows presents its own special problem from a human health point of view.

The disease is unfortunately only too prevalent in New Zealand amongst dairy cows—exact figures are impossible to obtain but in the intensive dairying districts many cows are culled each year for advanced tuberculosis. The extent of the disease varies with the dairy cow population, the more densely populated areas showing a much higher incidence of the disease than the less intensely farmed districts. This applies, of course, to any infectious disease—the more animals are crowded together the greater the chance of healthy ones coming into contact with those carrying the disease.

Any figures of the incidence of tuberculosis are necessarily an approximation. Unless the whole dairy stock population of the country were tested no exact figures could be obtained, but from the number of annual condemnations due to clinical

cases of tuberculosis, the number of reactors to the tuberculin test and the number of cattle totally and partially condemned at meat works and abattoirs, at least ten per cent of the total cattle of the country are affected with tuberculosis. Since this estimate also includes beef cattle with a normally very low incidence of the disease, the figure for dairy cattle must be appreciated some little amount. The actual losses to the dairy industry from the disease can be classified as under:

1. Cows condemned for obvious or clinical tuberculosis. The totals of these reach a large annual figure and a steady continual loss over a number of years has been maintained.

2. Cattle found diseased at slaughter. The annual value of meat lost is somewhat over £75,000.

3. Animals lost under the tuberculin test represent a large figure but a figure which would gradually decrease as testing in a herd continues and the incidence of the disease rapidly declines.

4. To the above actual concrete stock losses must be added such things as loss of milk production from condemned cows, loss of production from cows ailing from the disease and going back in condition, wastage of feed in raising animals later to be condemned, cost of replacements and cost of control measures.

5. Apart from the actual losses to the dairy industry itself, there is another closely related factor to be considered—the loss from tuberculosis in pigs. Pigs are very readily infected with tuberculosis, and a big percentage of the disease in these animals comes directly from tuberculosis cows, usually in the skim milk. A conservative estimate would put the figure from these losses

somewhere approaching £50,000 each year.

In all, an estimate of the total which the disease costs the farmers and the country generally each year must be around one quarter of a million pounds. Thus tuberculosis is, apart from all other considerations, an important economic problem.

THE SPREAD OF THE DISEASE:

Cows can pick up the germ of tuberculosis in many different ways, the commonest being as follows:—

1. Breathed into the lungs. Inhaling dust which is carrying the germ is probably the most common means of infection of adult cattle, the dust having been infected with tubercle bacilli expelled from affected animals. The germs are expelled from a tuberculous cow in several ways—they may either be coughed up in the mucus from diseased lungs and passed out from the mouth in a spray or swallowed and passed out in the droppings, or they may be present in the droppings from tuberculous ulcers in the bowels; they may be discharged in the pus from an open tuberculous gland; they may be passed out from the female passage in the case of a cow with an infected womb. In any case, once outside the body they become dry and are blown about in the dust. These germs are able to live under such conditions for several months.

2. Taken in with the food. Pastures or feed boxes may be contaminated by an infected cow and similarly drinking water and troughs can be affected. A sucking calf will quickly become infected if the mother is passing the germs in her milk.

3. The unborn calf can be infected from a tuberculous mother either from the wall of the womb or through its navel cord. This is known as congenital tuberculosis.

4. Other less common means are through the germ being transferred from cow to cow by the bull at service, or even possibly through open wounds coming in contact with the germ.

Once the germ enters the cow it can settle in any part of the body. If it is taken in by the mouth it will commonly be first trapped in the glands of the head and neck; if breathed in, in dust or in droplets from a coughing infected cow it will settle in the lungs. Once the germ is established in any part of the body the animal reacts against it in an endeavour to confine it to that

part—a strong capsule forms around the area and the infection may be shut off from the rest of the body and kept as a purely local disease. This tends to occur more in fit, healthy cows. In other cases the germs once established may keep on multiplying and form abscesses which enlarge and ultimately burst out, either outside the body or to the inside when they tend to spread rapidly through the rest of the body and produce a case of what is known as generalised tuberculosis. This is more likely to happen if the cow at any time suffers a set-back due to feed, management, weather conditions, or to some other debilitating disease. Tuberculosis is frequently noticed after calving. This is because the cow has already undergone the strain of a heavy milking season, to which is added the strain of producing a calf. This may weaken her sufficiently to allow the otherwise controlled tuberculous germs to flare up and the animal may go down with an acute or general infection of the disease. Tuberculosis is generally a chronic disease; that is, its progress is slow and it shows few well marked signs until something occurs which causes it to flare up, or until the disease progresses so far as to begin to upset the vital functions of important organs. Thus a cow can have tuberculosis for several years before showing any definite symptoms and may, in fact, never in her lifetime give any indication of the infection.—the areas of the disease may be completely closed off, the cow appear perfectly healthy and fully productive and the fact that she is carrying the germ may only be found after death.

The symptoms are thus very variable, depending on the extent of the area involved and exactly what organs are affected. Probably the commonest symptom is that of enlargement of one of the lymph glands of the head and neck—either under the jaw or alongside the throat just behind the jaw bone or just below the ear. If these glands are markedly enlarged, the cow may make “snoring” or “roaring” noises when breathing, and the enlarged glands can be easily seen or felt. She may also stand with her head and neck stretched out to relieve the pressure of the glands. If the lungs or throat are affected, a chronic short dry harsh cough may be present, particularly if the cow is made to run or move suddenly. As the disease advances the animal becomes hide-

bound, the coat harsh and staring and poorer in condition; there is a steady loss of condition and the cow becomes emaciated. If the udder is affected it may be possible to feel the areas of tuberculosis in one or more quarters or in the glands above the udder—as a rule the affected part of the udder is much enlarged. Various other signs and symptoms may also be present, depending on the situation of the tubercles, and the extent of the disease. **It is important to remember, however, that many cows have tuberculosis without showing any outward sign of it at all, sometimes even though the disease is well established and large areas of the body organs are involved and that an apparently healthy cow can be contaminating her surroundings and her milk with tubercle bacilli without showing any evidence of the disease.** When any tubercles are present in the udder, the germs of tuberculosis can almost always be found in the milk at some time or other and it is this type of tuberculous cow that is the danger to human health.

BOVINE INFECTION OF HUMANS.

The danger of the tuberculous cow from a public health point of view is very definite. Although only a small proportion of tuberculous cows pass the germs out in their milk, any infected animal is always a potential menace, because of the possibility of localised infection flaring up and tubercle bacilli becoming established in the udder. Figures from hospitals and institutions show only too clearly the danger of tuberculous milk; the infected milk is particularly dangerous to children—reliable medical authorities estimate that at least 25 per cent of tuberculosis of children and at least 5 per cent of all human tuberculosis is contracted from the cattle type of germ, which means almost invariably from tuberculous milk. In New Zealand alone it is estimated that in one year between 20-30 persons died and 70-150 persons received treatment in hospitals due to infection with tuberculosis from cattle. Thus the disease in cows presents a very serious aspect from the human health point of view—up to the present efforts to control this danger by the use of milk sampling, herd examination and pasteurisation of milk, though helping to keep the incidence within bounds, have by no means eliminated or greatly reduced the infection. Any

major attack on the problem must necessarily be aimed at the control of the infection at its source, that is, in the cows themselves.

CONTROL OF THE DISEASE.

There is no effective treatment for animal tuberculosis—the germ is very resistant to drugs and animals held for any sort of treatment are a danger to the rest of the stock. All methods of control of the disease are aimed at the ultimate elimination of all animals affected with the germ and the establishment of tubercle free herds. Tuberculosis is one of the stock diseases that can, with a little time, common sense and expense, be eliminated and kept eliminated from any herd. Partial control by removing only obviously affected cows does not control the infection, as other apparently healthy cows will still be carrying the disease and perpetuating the infection in a herd. A more selective method of diagnosis is necessary and it is here that the **tuberculin test** becomes necessary. The tuberculin test is based on the fact that once any bacteria (including the tubercle bacillus) enter an animal body they stimulate a reaction in the animal and substances are formed by the body to neutralise the toxic effect of the bacteria. If after these substances are formed by the animal more of the same bacteria, or certain extracts of them, enter the body, a reaction takes place. The substance used in tuberculin testing is a specially prepared extract of the tubercle bacillus and if injected into an animal which has tuberculosis anywhere in its body and has therefore these anti-tuberculous substances, a reaction takes place and this reaction can be noted. There are several ways in which the test can be done, but the most convenient and accurate method is by injecting a little of the tuberculin into the skin itself to form a small pea and reading the reaction, if any, 72 hours later. One of the most convenient places to do this is in the fold of skin at the base of the tail. If the cow is free from the germ the injection site is unchanged after 72 hours, but if the cow is infected with the germ a reaction around the injection will occur and this is usually evidenced by a pronounced swelling. The test is simple but the reactions vary with different affected cows and a certain amount of practice and skill are required to read results accurately. This test, like all biological tests, is not infallible;

sometimes a reaction will occur in a non-tuberculous cow. Occasionally an infected cow may pass one test and react to a later test. The number of cases under these headings is, however, very small and the percentage accuracy of the test is very high. With the application of the tuberculin test all affected animals can be removed from the herd but if the infection is well established further action is necessary. The germs will probably be lying about in dust, pastures may be contaminated, and further animals, free at the time of test, will later pick up this residual infection. Thus further tests will be necessary at later intervals to pick out these animals and eliminate them so that no more contamination occurs and by this means the infection quickly dies out. Also, care must be exercised in introducing new animals into the herd. They must be previously tested to ensure their freedom from the disease before being brought into the herd. Adequate protection by good fencing is necessary so that non-tested cows do not stray on to the property and the now healthy herd does not stray on to outside possibly infected pastures. By adopting these methods a herd or group of herds in a district can within a short space of time be cleaned of the disease and kept free indefinitely. The biggest factor involved is the expense of stock replacement. Under the provisions of the Stock Act all known tuberculous infected cattle (and this, of course, includes any reactors) must be destroyed as diseased stock, and if a herd is heavily infected, the cost of replacement must be very high. This is the limiting factor in any campaign against the disease, whether to

an individual farmer, a group of farmers, or to the country as a whole, if the disease is to be tackled on a nation-wide basis. However, there are other factors with regard to the disease to be considered.

On the other side of the scale, balancing against this initial heavy cost of eradication of the disease, there is the steady, heavy annual drag of continual losses to the industry not only in obviously affected cows which must be destroyed but also in the loss of carcasses condemned at abattoirs and meat works, wastage of feed on growing animals later condemned, loss of milk production and the loss involved in the poor doing of the animals affected with the disease. As stated previously, this annual loss is very heavy and the time must come when some direct action will have to be taken.

Already, a start has been made towards ultimate control of the disease with the introduction of legislation for the compulsory testing of all cows in town milk supply herds, and once this has been implemented, we shall have taken the first major step forward against the disease.

From an economic point of view it would be definitely preferable to face the initial heavy cost of a complete tuberculosis eradication campaign rather than to continue paying heavy annual toll to the tubercle bacillus. If the disease were eradicated, in a few years, the annual saving would have paid for the initial cost of the control measures. Again, and above all, a very important source of disease to man would be removed, a factor which cannot be measured alone in terms of pounds, shillings and pence.

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