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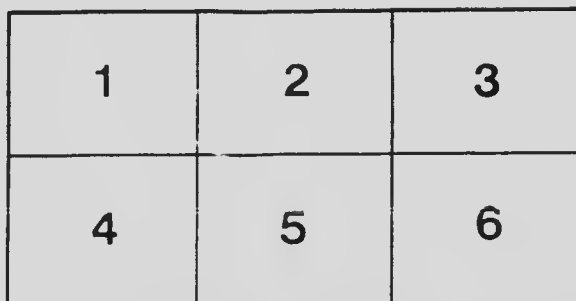
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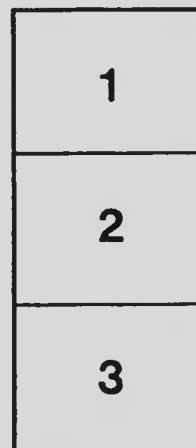
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DEPARTMENT OF AGRICULTURE  
OTTAWA

THE CONTROL  
OF  
BOVINE TUBERCULOSIS

A PAPER READ BEFORE SECTION VII.

OF THE  
INTERNATIONAL CONGRESS ON TUBERCULOSIS, AT WASHINGTON, D.C.

October 1, 1908

BY

J. G. RUTHERFORD,  
*Veterinary Director-General and Live Stock Commissioner  
for the Dominion of Canada.*

Published by order of the Hon. SYDNEY A. FISHER, Minister of Agriculture, Ottawa, Ont.  
8131—1



OTTAWA, October 31, 1908.

SIR,—I have the honour to transmit herewith a copy of a paper read by me at the recent International Congress on Tuberculosis held at Washington, D.C.

In this paper I have confined myself to that phase of the question set forth in the title, viz., 'The Control of Bovine Tuberculosis,' refraining almost entirely from any mention of measures for the protection of the public against possible infection from bovine sources.

Of the two problems connected with bovine tuberculosis, namely, the eradication of the disease from the herds of a country and the protection of the human race from bovine infection, the latter is by far the most simple and easy of solution.

Under the system now followed in Canada, matters of this nature are properly dealt with by the public health authorities operating under provincial laws which, in cases where this has not been already done, can easily be so amended as to furnish the powers necessary for the absolute control of the situation as regards the supply of milk and meat, these products being, needless to say, the most important agents in the communication of tuberculosis from animals to man.

Danger from the first mentioned source can be practically eliminated by providing for the regular veterinary inspection and testing with tuberculin of all herds supplying milk for human consumption; animals reacting to the test or, even in default of reaction, showing clinical evidence of being affected with tuberculosis, to be permanently ear-marked and the use of their milk for human food absolutely prohibited.

This course has been followed in some communities in Manitoba for a considerable time by virtue of amendments made, many years ago, to the Municipal Act of that province.

Similar regulations are in force in several communities in other provinces and I may remind you that, with the view of encouraging and assisting the efforts of municipal authorities in this direction, this branch of your department supplies tuberculin, free of charge, for the use of duly qualified veterinarians, on condition that reports of all tests made are promptly furnished and that reacting animals are properly ear-marked.

The meat supply can be similarly safe-guarded by the abolition of the secret and unsanitary private slaughter-houses and the substitution thereof of municipal abattoirs conducted under the supervision of specially trained and qualified veterinary inspectors as is now done, under the provisions of the Meat and Canned Foods Act, in all establishments engaged in the export or interprovincial meat trade.

A satisfactory, practical solution of the wider problem of the complete eradication of bovine tuberculosis has yet to be found.

While I regret that I am not, at present, in a position to recommend any definite policy with this end in view, I have, in the accompanying paper, made some tentative

suggestions as to the lines which, with our, even yet, very imperfect knowledge of the subject, it would, in my opinion, be reasonably safe to follow.

Meanwhile, I am watching very closely the more or less experimental policies adopted, from time to time, by other countries, as also the earnest and painstaking work of the many veterinary scientists who, in various parts of the world, are striving to discover some reasonable method of effectively stamping out the disease.

The unfortunate and, in some cases utterly discouraging results which have followed hasty and ill-digested legislation in other countries indicate that, in dealing with this much vexed question, it is advisable to make haste slowly and to be at least reasonably certain of success, before committing the Dominion to the large expenditures involved in an undertaking of such magnitude.

I have the honour to be, sir,

Your obedient servant,

J. G. RUTHIERFORD,

*Veterinary Director General and Live Stock Commissioner.*

The Honourable,  
The Minister of Agriculture.



## THE CONTROL OF BOVINE TUBERCULOSIS.

**A Paper read before Section VII. of the International Congress on Tuberculosis, at Washington, D.C., on October 1, 1908.**

MR. PRESIDENT,—It would be most unbecoming in me, following the various distinguished speakers who have taken part in the discussions of this Congress, and especially at this late date in the proceedings, to occupy any great length of time in laying before its members the few ideas on the control of Bovine Tuberculosis which I have been able to put together in the limited period at my disposal.

I observe that on the official programme the subject assigned to me is the 'Control of Bovine Tuberculosis in Canada,' the last two words having been added to the title originally sent in by me.

I have but little to say on the control of bovine tuberculosis in Canada, inasmuch as while in some districts, under municipal and provincial laws, efforts are being made to control the disease in dairy herds supplying various centres of population, very little is now being done by the federal government through the Health of Animals Branch of the Department of Agriculture, which is in my charge.

Although for some years, at a period prior to my assuming office, a very considerable amount of testing with tuberculin upon the application of owners was carried on, no appreciable benefit was found to result, and, as a matter of fact, we now confine ourselves to the testing of cattle imported or exported for breeding purposes, those on the Experimental Farms, and a few other herds which have been placed by their owners under the direct control of our officers.

We, however, on the request of owners of cattle who desire them tested, supply tuberculin free of charge to any reputable qualified veterinary surgeon, on condition that he will send to the department the results of the tests made by him, on which we furnish for that purpose.

All cattle reacting to tuberculin in Canada, save those privately tested permanently earmarked by cutting a large T out of the right ear.

I may as well frankly state that the reason for this apparent inertia is that, so far, no satisfactory intelligent method of dealing with bovine tuberculosis has been evolved and we deem it wiser, before taking action, to await the results of the investigations now being conducted by veterinary scientists in various countries, in the hope that some better way of dealing with the problem may be discovered.

Our knowledge of tuberculosis, the tuberculin test, and of their vagaries, has all along been defective and incomplete and undoubtedly is so to-day, and when we bear in mind the many legislative mistakes which, owing to this lack of exact knowledge, have been made in the past, it must be admitted that caution is commendable, and that, before taking any definite departmental action involving the large interests which are at stake in such a country as Canada, it is reasonable that we should 'look before we leap,' and guard, as far as may be, against the possibility of having to recede, more or less ignominiously, from a position once taken.

Many of our medical friends and some veterinarians whose zeal outruns their discretion, advocate compulsory testing and the slaughter of all reacting animals. At first sight, to men lacking practical experience and perhaps devoid of responsibility, this policy may appear a very simple solution of the problem. That it is very far from being so, however, needs but little demonstration to an audience of this nature. All practical veterinary sanitarians, dealing in large matters, are, even without taking into consideration the painful experience of those communities which

in earlier days were rash enough to adopt it, well aware, not only of the great difficulties to be encountered in carrying out such a policy, but of the fact that under ordinary circumstances, in spite of the great economic waste involved, its results are by no means so satisfactory as its advocates would like to have us believe.

Most of us can remember the time when the majority of veterinarians, many of whom should have known better, believed that if a herd of cattle were tested, the reactors destroyed and the premises disinfected, the disease was stamped out and the owner might thereafter be left to follow his own courses.

Intelligent men have, of course, understood from the beginning that there must be, in the very nature of things, a period of latency or incubation between the time of infection and that when an infected animal would react to tuberculin. This period was fixed in 1899 and 1900 by contemporaneous but entirely independent experiments, carried on by the Tuberculin Committee of the Royal Agricultural Society of England and by Dr. Nocard and Rossignol, under the auspices of the Société de Médecine Vétérinaire Pratique of France. The results in both cases were practically the same and showed the period of incubation, while depending somewhat upon the mode and degree of infection, to range from eight to fifty days.

This fact, affecting vitally as it does both the original herd and any additions or replacements which may be made, is in itself a very serious obstacle to the satisfactory working out of a policy of compulsory testing and slaughter, even with liberal compensation. Taken in conjunction with the vagaries of tuberculin, especially on second, third and fourth tests in the same herds, and the numerous ingenious methods adopted by owners, especially of pure bred cattle, in order to defeat the test, it is sufficient to exclude from the field of practical action this method of dealing with tuberculosis, except in small and circumscribed communities, in which all, or at least a majority of the owners are alive to the necessity of stamping out tuberculosis and are willing to co-operate heartily with the authorities in bringing about that result.

This conclusion on my part has not been rashly arrived at. Ever since tuberculin was first used as a diagnostic agent in bovine tuberculosis I have been studying its action and during the whole of that period my opportunities for such study have been considerably greater than fall to the lot of the average veterinarian.

Let us go a little more into detail. A herd of, say one hundred cattle, kept under ordinary stable conditions is tested and twenty-five reactors are found. These twenty-five animals, together with any which, owing to the disease being in an advanced stage, may fail to react but which are detected by clinical examination, are slaughtered and the premises carefully disinfected. It is not so very long, as I have already said, since many veterinarians were teaching that such a herd was safe and sound and that provided any animals added were carefully tested before being brought into contact, no further danger need be apprehended. This is, of course, very far from being the case.

In the first place a retest after three months will, depending to some extent on the virulence of the particular infection, a point of great importance, and the sanitary conditions, reveal perhaps from five to ten new reactors. Even after these have been destroyed and the premises again disinfected the herd is by no means safe. The ten reactors, taking that as the number, have been living in close contact with the remaining sixty-five and it is quite likely that three months later, several of the latter will be found to be affected. Here also comes into play the uncertainty of tuberculin in repeated tests, a most serious consideration, especially where doubtful reactions are concerned. In spite of Professor Vallé's important and valuable discovery, which I may say does not by any means apply in all cases, it is quite within the bounds of possibility that a number of animals, affected to a greater or less degree, will fail to react when tested for the third or fourth time. This acquired tolerance to tuberculin is one of its most serious limitations and constitutes another difficulty somewhat hard to overcome. Let us admit, however, that

after the lapse of a longer or shorter period and a number of carefully conducted retests, the survivors of the original herd are properly pronounced healthy.

We must now take into consideration the question of additions and replacements, one which, from a business standpoint, is in the majority of instances of paramount importance to the owner. It is not enough to have the new animals tested before bringing them on to the premises. The same limitation, viz., that of the incubative period, applies to such tests as to those with which we have been dealing. New arrivals must be isolated, not only from the original herd but from each other, and submitted to a retest at the expiry of at least three months before being allowed to come in contact with any other cattle.

Two further points here demand our attention. We have hitherto, presumably, been speaking of tests honestly applied to the cattle of an honest owner and by a capable, intelligent and experienced veterinarian. We must now first consider some of the nefarious methods employed by dishonest and unprincipled owners to nullify the test and so defeat the end in view.

The old method of dosing beforehand with tuberculin, although still followed in many herds, has largely lost its value through the discovery of Professor Vallé above referred to, and is now, as a rule, only employed when the testing veterinarian is agreeably complacent, or a few years behind his age. It has, among the more astute breeders and dealers, been largely superseded by the practice of administering one or other of the modern antipyretics, combined for the sake of safety with other drugs, to such animals as are known to be tuberculous, or which show any rise of temperature when undergoing the test.

This plan is beautiful in its simplicity. Temperatures are quietly taken from half an hour to an hour before the veterinarian makes his rounds and the febrifuge, mixed with a little sugar and disguised in a handful or two of meal, is licked up by the animal without fuss or trouble. There is no drenching, no handling, no excitement, the temperature drops and although there may be and often is thermal irregularity, there is no distinct rise and above all no tuberculin arch.

This brings us to the second of my two further points, viz., the veterinarian making the test.

While, with all its limitations, I have great confidence in the diagnostic properties of tuberculin, I must confess to a feeling of suspicion with reference to all charts that are in any degree, what I may term colourless, unless I know that the man who signs them is an honest, conscientious, wide-awake and experienced veterinarian. Too many men take it for granted that everything is fair and above board, and depending entirely on their thermometer readings, allow themselves to be hood-winked by dishonest and unscrupulous owners. I could go into many details and perhaps furnish some amusement by recounting a few of the artful dodges resorted to in order to keep the veterinarian away from his cattle between temperatures so as to permit of their being safely manipulated, but time will not permit.

One thing, however, should be emphasized, viz., the fact that in the overwhelming majority of cases we have, in addition to the temperature rise, a distinct clinical reaction, some of the most salient features of which may be and ~~are~~ are only temporary, while others persist until at least twenty-four hours after injection. Among the temporary signs which may be noticed, as a rule, from six to twelve hours after injection, are, in severe cases, rigors, often accompanied by staring coat, general excitation and frequently diarrhoea. In less well marked cases we have coldness over the loins, quarters, thighs and tail, sub-acute excitation and general malaise. Even when these symptoms have passed off the animal maintains a standing posture and is more or less stiffened; there is loss of appetite, rumination is suspended, and in milk cows the flow of milk is diminished.

Close attention to and observation of the animals undergoing the test are, in my opinion, indispensable. Even with them it is possible for mistakes to be made; without them the tuberculin test is very apt to be badly discredited.

The older veterinarians here will recollect that, prior to the discovery of tuberculin, much attention was paid, both by teachers and practitioners, to the clinical diagnosis of bovine tuberculosis. Of late years this phase of practice has been almost entirely lost sight of, the younger men practically depending on tuberculin as a diagnostic. This state of affairs is regrettable and should be remedied by cultivating, with regard to cases of tuberculosis, that habit of painstaking observation which alone makes for success in the diagnosis of most of the other maladies to which dumb animals are subject.

I might perhaps explain that the foregoing remarks on the necessity of care and exactitude in making tests are intended to emphasize the idea that only skillful and specially trained men can with safety be employed in this work, no small difficulty in itself, when it comes to undertaking a universal and compulsory testing policy.

There is still more to be said against compulsory testing and slaughter. Many reactors are but slightly affected, and while in the case of beef cattle in good condition the loss from their slaughter may be insignificant, it is a very different matter when valuable pure-bred herds or even common grade stock, thin in flesh, are condemned. It is true that with the latter the question of compensation may be more easily settled than with the former, but the matter of economic waste is only one of degree, for while the pure-bred reactors might live out their natural lives and produce much valuable and, with proper precautions, healthy stock, the thin grades might be fattened and slaughtered under careful supervision for purposes of human food.

For the reasons given above I am convinced that, at least on any large scale, the policy of compulsory testing and slaughter is not a practicable one.

Turning to the policy of voluntary testing, or testing in response to applications from owners, now followed in certain of the United States and in several of the countries of Europe, I would point out that not only do most of the arguments against compulsory testing apply to it with equal force, but several other factors come up for consideration. Among these perhaps the most important is the fact that in testing only those herds in a country which are voluntarily submitted to the authorities, the progress made in the direction of eradicating tuberculosis must, of necessity, be not only very slow but very uncertain. Even Professor Bang admits that, under the experience of repeated and often disappointing tests, the patience and courage of our Danish friends not unfrequently fail and they become weary of well-doing and relapse into carelessness.

This phase of the matter is one which must be taken into account and when with it is considered the fact that the last to ask for the test are, as a rule, the breeders of pure-bred stock, whose herds are the principal agents in disseminating disease, the ultimate ineffectiveness of voluntary testing is pretty clearly demonstrated. Owners must obtain fresh blood from time to time and unless a man is heart and soul with the authorities in their efforts to clean up his herd and takes every possible and minute precaution accordingly, it is, so long as tuberculosis exists in the country, only a matter of time until his stock relapses into a condition of disease.

In this connection I have read with much interest the plan proposed by Dr. Niven, Medical Health Officer of Manchester, and supported by Professor Delapine and Mr. Brittlebank, the chief veterinary officer of that city, which includes the forming of disease-free islands by eradicating tuberculosis from certain farms and gradually extending the work over small districts, to be still further enlarged as the system finds favour with stock owners.

While there are some features of the scheme, such as the spending of public money in specially selected localities to the exclusion of other taxpayers and the supplying of sanitary buildings, through bringing pressure to bear on landlords or otherwise, which are scarcely applicable to conditions in America, it is, in my opinion, much more sensible and likely to be productive of ultimate benefit than the diffuse policy of promiscuously testing a herd here or there.

over an extensive territory, difficult, if not impossible, to keep under observation or control without an enormous staff of well trained, experienced and absolutely conscientious veterinary inspectors, having no interest, beyond that of duty, in the hords with which they are called upon to deal or their owners. I might here say that the policy of employing local practitioners for this work has been repeatedly tried and, in my experience at least, has not in the majority of instances proved either beneficial or successful.

I have nothing to say against the Bang system itself; in fact I am, and always have been, one of its most consistent advocates and admirers. I cannot, however, after thirty years experience as a veterinarian ~~and with the~~ and with the knowledge, acquired in that time, of conditions on the ordinary North American farm, bring myself to believe that it is capable of successful general application on this continent.

There is no doubt that if all our stock owners were thoroughly intelligent, well informed, anxious to rid their herds of tuberculosis and gifted with an infinite capacity for taking pains, either the Bang system or that of Ostertag might be adopted with every hope of a successful issue. As matters stand, we must, in order to deal with bovine tuberculosis effectively, have some definite policy of legal control and the question, to my mind, is whether or not such control can properly be based on the tuberculin test.

At present I am inclined to favour a combination of the systems of Bang and Ostertag with that of the Manchester men, accompanied by a closer supervision of infected herds than is recommended by either of the two first named authorities, so far as I understand their methods.

All clinical or, if they can be detected, open cases of tuberculosis, should be destroyed; all the adults in herds, in which such cases are found, to be treated as if diseased, marked and segregated accordingly; all milk from such herds to be pasteurized, whether used for human food or for that of animals; the progeny to be effectively separated from the adults, regularly submitted to the tuberculin test and kept by themselves until the disease has been eliminated from the premises by the death or removal of the affected parent stock. Any animals added to the healthy herd would, of course, have to be tested on purchase, and retested after three months careful isolation.

I am free to admit that this plan is open to many of the objections which I have advanced against the other two already mentioned, but it appears to me to obviate the enormous economic waste and the tremendous popular opposition involved in the policy of compulsory slaughter, while it promises, if systematically applied and patiently and carefully carried out, infinitely better results than can be hoped for from that of promiscuously testing the herds of only such owners as are willing to submit them to the action of the authorities.

The presence of one or more actual clinical cases of tuberculosis in any herd would constitute a perfectly defensible and reasonable ground for official action, and by making notification by owners or veterinarians compulsory, as in other scheduled diseases, reliable information on which such action could be taken, would in most instances be forthcoming.

As has been well said by the editor of the *Lancet* in commenting on the recent able paper of Dr. Overland of Norway, the famous address of Dr. Koch in 1901 has, after all, by stimulating others to investigation and research, been productive of good, perhaps to an extent sufficient to offset the hesitation and delay in actual practical effort which it undoubtedly caused.

As a result of that address, we veterinarians to-day know, or perhaps I should say, have the proofs conclusive and satisfactory of many things which we knew before, but were scarcely able to prove, regarding the transmissibility to man of bovine tuberculosis and vice versa.

And this brings me to vaccination, a subject on which I have nothing to say, beyond that, up to the present, the published results of inoculation with bove-vaccine

are, from a practical viewpoint, singularly confusing, inconclusive, and discouraging. The immunity acquired under the most favourable conditions appears to be of short duration, and any advantage which may be gained, is, to my thinking, more than offset by the danger of spreading the disease.

Where cultures of the human type are used the risks appear to be, if possible, even more serious. Weber and Tirze working under the direction of the German Imperial Health Office, report, according to Theobald Smith, that the udder of a cow vaccinated with a human culture, shed human bacilli into the milk for a period of fifteen months.

Let us make haste slowly in work of this kind and be sure of our ground before we issue any more of these definite pronouncements which make nasty swallowing later on.

I have now briefly and inadequately placed before this Congress my views regarding the various methods recommended by scientists for the control of bovine tuberculosis. While these views may to some appear pessimistic, they are at least honest and have been carefully considered with due regard to the responsibility which the veterinary sanitarian, entrusted with large interests, owes to humanity at large as well as to those interests. Dogmatize as we may, we are still groping, and in this as in other matters of a like nature, those who have delved the deepest are the least sure of their ground.

In the meantime, while we are awaiting, as I fear we will, for some time yet have to await, the discovery of a certain and satisfactory scientific method of dealing with bovine tuberculosis, let us, as practical men, carry on an energetic campaign of education among cattle owners and the general public. Bovine tuberculosis will be stamped out when individual owners realize that it pays much better to keep sound cattle than to lose money and feed in maintaining herds tainted with disease.

In this campaign of education there should first be taken up a question in regard to which veterinarians have hitherto, in most cases, been culpably negligent. If there is one matter to-day in which veterinarians are behind the age, it is that of failing to insist at all times, in season and out of season, on the importance to live stock of thorough and effective stable ventilation. Having before us the object lesson afforded by the medical profession, and the marvellous results which its members are achieving by open air treatment, not only helping, but actually curing advanced cases of tuberculosis, to say nothing of checking the disease, as is now daily done, in its early stages, it is nothing short of disgraceful that we are yearly permitting thousands of valuable animals to become infected owing to the unsanitary conditions under which their owners insist on keeping them.

Of the truth of this contention, which is, perhaps, at first sight, rather sweeping, there is no lack of proof. In northern countries where cattle are generally closely housed, and where a proper system of ventilation is the exception and not the rule, we almost invariably find bovine tuberculosis rampant. In milder climates where animals have free access to fresh air, as for instance among the Hereford cattle in England, it is a rare thing to find a case of that disease. On the ranges tuberculosis is unknown, except where it has been introduced by some pampered stable-bred individual, and even such a one is more likely to recover than to die, provided the malady is not too far advanced and the first winter can be endured.

To put the case plainly, stockmen are breeding tuberculosis a great deal faster through neglect of this important subject of ventilation than it will ever be possible to stamp it out by the promiscuous use of tuberculin and the slaughter of diseased animals.

I may be pardoned if, while on this subject, I refer briefly to an experiment which I have been carrying on for the last three years. A herd of forty-three (43) cattle, (twenty-one (21) being dairy cows) twenty-eight of which had reacted to tuberculin, the remaining fifteen being apparently free from disease, has been kept under open air conditions since the fall of 1905.



The objects of this experiment, which is of a purely practical nature, are threefold; firstly, to ascertain the effect of open air treatment upon the diseased cattle themselves; secondly, to ascertain to what extent healthy cattle, kept in contact with diseased cattle under open air-conditions, are subject to infection; thirdly, to ascertain what percentage of healthy calves it is possible to rear from diseased cows, kept without any precautions under open air conditions.

The experiment is not yet concluded, nor have its results been properly tabulated for publication. I may say, however, that of the twenty-eight reactors, one only has broken down from generalized tuberculosis during the three years which have elapsed since the experiment began. One other has been killed owing to tuberculosis of the udder. Of the healthy animals kept in contact with them, feeding from the same racks, grazing over the same ground, drinking from the same pool, not a single one has become affected and this in spite of the fact that from time to time, animals suffering from acute generalized tuberculosis have been introduced to the herd and allowed to mix freely with its original members.

The results in the rearing of healthy calves, however, remind one somewhat of the Irishman's pigs, which, you will recollect, when killed, did not weigh as much as he expected and he never thought they would.

Of the calves dropped and reared by reacting cows, seventy-five per cent (75 per cent) have so far entirely failed to react, while twenty-five per cent (25 per cent) have reacted at various ages ranging from four months to one year. One calf died at six weeks old from generalized tuberculosis, this case being probably congenital.

The results of the various tests of the original reactors made at intervals of about six months and in the last case after a lapse of twelve months, are exceedingly interesting and will, when published, together with the *post mortem* notes, merit the careful perusal of those who believe in the absolute reliability of tuberculin as a diagnostic agent.

I might add that the cattle have had no shelter but open sheds and have, with the exception of a few of the weaker individuals, been fed nothing but hay for the three winters during which they have been under observation.

It should be mentioned that through an error in judgment on the part of an over-zealous herdsman, during the first winter, our calves began to arrive in December of 1906, the first being dropped when the thermometer was 29° below zero, the others following at intervals, sometimes very short, until the middle of March, 1907, and that in spite of this both dams and progeny thrive well in the open air.

The results are very interesting in view of the present tendency to consider the digestive tract the most frequent and certain channel of infection. While the experiment above outlined assists in proving that young animals can be and are most frequently infected through the digestive system, it also, to my mind, shows that, in the case of adults, infection through the air passages plays an important part.

I feel satisfied, and I think all practical men will agree, that had the healthy cattle in this experiment been kept under ordinary stable conditions with their diseased companions, they would not have escaped as they have done.

The highest medical authorities are nowadays advising, and with the very best possible results, our modern hot-house humanity, to get 'closer to nature' in every possible way. The advantages of adopting a similar policy in the handling and housing of domestic animals are too apparent to admit of discussion. Nature has furnished our animal friends with every conceivable requisite for protection against ordinary climatic conditions and most of the diseases and disabilities to which they are subject have been caused by and owe their continuance to the irrational artificial conditions imposed upon them by well-meaning but ignorant, or rather unthinking owners and attendants.

I am here, however, to learn and not to teach. The problem of the Control of Bovine Tuberculosis is undoubtedly the most serious confronting the veterinary sanitarian of to-day, and if the labours of this section of the International Congress rest in its solution, I for one will be forever grateful.

