Paper No. 15

THE EAST COAST FEVER PROBLEM IN THE UNION.

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Introduction.

East Coast fever has now been in the Union for 26 years and this in spite of active measures taken by the State for its suppression and eradication. These measures have been continued uninterruptedly ever since the disease was brought to the country and have cost the State thousands of pounds.

It is true that progress has been made and that East Coast fever is now confined to certain parts of the country, but it is equally true that in spite of all precautions the disease continues to reappear in areas from which it had apparently been eradicated. It would seem, therefore, that, for some reason or other, there has been considerable difficulty in reaching finality in the eradicative measures. It is this aspect of the question, in particular, that I wish to deal with in some detail.

2. Past and Present Position of East Coast Fever in the Union.

In order to show the progress that has been made in the eradication of the disease, I have considered it advisable to collect the figures of new outbreaks that have occurred during the past 16 years (1913 to 1928) and to show these in the form of a chart. (See Chart I.) These figures are taken from all parts of the Union and include all outbreaks that have occurred during the past 16 years. It will be seen at once that the curve—if it may be called such—does not run smoothly in either an upward or downward direction, but falls and rises fairly regularly at certain intervals. It may be thought that this is due largely to the disease spreading to other farms and areas and then being checked again; this may have been so prior to 1924, but, generally speaking, is no longer the case; these well-marked rises and falls may usually be ascribed to outbreaks of the disease reappearing in the same localities. To make the position clearer, I have made two further charts (see Charts IV and V), showing the incidence of the disease in two districts, one in Natal and the other in the Transvaal. A somewhat similar curve as shown for the two Provinces (see Charts II and III) is obtained in each case. This is sufficient to indicate the point previously touched upon, namely, that in spite of our strenuous efforts to eradicate the disease, we have not been entirely successful in certain parts of the country. (For Charts, see end of book.)

Generally speaking, it may be said that during recent years our measures of control have been sufficiently effective to prevent the spread of East Coast fever from infected areas or districts to parts from which the disease had previously been eradicated completely. In the Transvaal, for example, the disease was eradicated as long ago as 1909 from such low veld districts as Marico, Waterberg, etc., and those districts have never been re-infected.

Concerning the parts of the country where the disease is still prevalent, it must be stated at once that this involves areas that are particularly favourable to tick life, i.e. low-lying, moist and warm parts, especially towards the coastal regions. To show how favourable the present East Coast fever position (July, 1929) is, especially in the Transvaal, it is necessary to give the number of farms and districts where infection is still present, as follows:—

In Natal infection is still present on 70 farms and locations in 22 districts; 12 of these farms have been cleared of cattle by slaughtering. In the Cape, including Transkei, active infection may be said to exist on 12 farms and locations in 6 districts. In the Transvaal active infection is restricted to the eastern portion, involving only 11 farms in 5 districts. All cattle have been removed by slaughter from 7 of these farms, and it is hoped to clear 2 more of all cattle. On the remaining 2 only single cases of the disease have occurred. It will be observed that the Transvaal is now practically free of the disease, excepting along its eastern borders. In Natal East Coast fever is still more widely prevalent, but here also good progress is now being made. The reasons for the present improved position will be given more fully later.

3. Earlier Methods of Eradication.

Prior to 1910 dipping as a method of eradicating East Coast fever was not employed to any extent, but since then it has become practically the only method. The earlier method was removal of all cattle from the infected farm and keeping such a farm free of cattle for 15 months. To prevent cattle entering the infected farm, fencing was essential. Usually the removal was effected by slaughter, but in some cases the cattle were moved out through quarantine camps. The latter procedure could, of course, only be adopted when clean camps and farms were available. The method of clearing infected farms of all cattle proved to be entirely successful wherever it was carried out. The main disadvantages were that the immediate expenditure in compensation by the State appeared high and that the farmer's cattle business was interrupted for 15 months. The remarkable fact, however, is that this method of dealing with the disease was so successful that the parts of the country where it had been applied have remained completely free of the disease.

Prior to 1910 the slaughtering policy was generally adopted in the Transvaal, and those districts in which it was applied are free from East Coast fever to this day, whereas the others where dipping was resorted to have been infected off and on ever since then. The only real exception is the Pretoria District, in which East Coast fever appeared suddenly in 1919 and was finally eradicated by dipping in 1922. In Mozambique the slaughter policy proved to be even more effective, and our Portuguese friends are in the proud position of being able to say that they are the only country from which East Coast fever had been completely eradicated within a relatively short space of time.

4. Recent Methods of Eradication.

During recent years compulsory short interval dipping has been the official method of eradication employed in the Union. So much reliance has been placed on short interval dipping that, apart from restrictions in movement of cattle in infected and suspected areas, other methods of dealing with East Coast fever have for all practical purposes been discarded.

The results obtained are clearly shown in the charts previously referred to, and cannot be regarded as altogether satisfactory. The Natal graph shows that there were nearly as few outbreaks in 1918-19 as there were 10 years later. Very much the same remarks apply to the Transvaal for different periods. But when we look at the district graphs (Pietersburg, Transvaal, and Richmond, Natal) the results appear to be even more unconvincing. These districts represent typical examples of areas where compulsory dipping had been carried out for many years, and illustrate very clearly what has been happening in other parts of the Union. As a result of these failures to eradicate East Coast fever by dipping, further experiments in connection with dipping have been carried out during the past few years. These experiments were conducted on a badly infected farm, and the results obtained will be published shortly in a report written by Du Toit and Viljoen. The conclusions arrived at were, shortly, as follows:—

(1) Short-interval dipping with handdressing has been shown not to be effective in checking an outbreak of East Coast fever on an already badly infected farm. Cases of the disease will occur so long as there are infected ticks on the farm and the cattle are exposed to infection by such ticks.

(2) There appears to be very little difference in the effects of three and five day interval dipping and handdressing.

(3) The value of dipping in plain arsenite of soda of three-day strength (0.08 per cent. As_2O_3) is not materially enhanced by adding to this fluid soap and paraffin (Pitchford's formula).

(4) Handdressing of the ears and tails appears to be a necessary adjunct to dipping for the destruction of all ticks on animals. Of the preparations tried a tobacco and oil mixture has given the best results.

(5) The clipping of hairs from the ears and brush of the tail seems to assist dipping and handdressing in the destruction of ticks.

(6) Cattle which have been dipped regularly for a considerable time seem to contract East Coast fever as readily as those only recently dipped for the first time. This result speaks against the idea that there is an appreciable accumulation of arsenic in the skin of dipped animals.

(7) On many infected farms where short-interval dipping is carried out, further infection of ticks takes place, this being due mostly to the many practical difficulties in the way of carrying out the system in a perfect manner. Among these difficulties may be mentioned unfavourable climatic conditions, poor grazing, lack of fencing, and proper control of the animals.

(8) In the destruction of ticks and the eradication of tick-borne disease dipping has been of inestimable value; it has rendered many parts of the Union fit for cattle and sheep farming.

(9) For the eradication of East Coast fever dipping is a slow process which has many disadvantages. With the present very limited distribution of the disease in the Union it would pay the State much better to adopt other measures (e.g. slaughtering or removal of cattle) especially in isolated outbreaks.

5. Reasons for our Failure to Eradicate East Coast Fever from the Union.

This brings me to my main theme which I would like to elaborate in greater detail.

During the past few years a great deal of attention has been paid to this aspect of the East Coast fever problem, the whole position has been carefully analysed, and the methods of control and eradication have been thoroughly studied. Resulting from this, I think we can put our fingers on the weak spots in our methods and suggest definite means of improving the position.

(A) *Diagnosis.*—When dealing with any disease, and particularly an infectious disease, a correct and early diagnosis is of paramount importance. Unfortunately, in the case of East Coast fever, this is one of the most difficult matters, especially where ticks are few and the disease does not appear in epizootic form. What makes the diagnosis so difficult is explained by the following:—

(*a*) Many farmers do not report sporadic deaths in their cattle. Owing to the low value of their stock they do not worry about odd deaths.

(*b*) Some farmers do not keep proper control over their cattle, and very often do not know that an animal is missing.

(*c*) Sometimes the type of country is of such a rough and wooded nature that it is not an easy matter to collect all cattle for inspection and counting at regular intervals. In such cases odd deaths are not noticed.

(*d*) Quite commonly smears are submitted from dead animals, but these smears are in such an advanced stage of decomposition that a microscopic diagnosis becomes impossible.

(*e*) In areas where short-interval dipping has been carried out for a number of years, ticks are few, and consequently, unless great care is taken to account for every death and to make a microscopic diagnosis in every case, odd cases of East Coast fever may be present and escape detection.

(*f*) A similar position is met with in highveld or partly highveld areas, where ticks are normally very scarce and where the existence of East Coast fever is not suspected. This point is of great importance and will be referred to again later.

(*g*) A few owners, unfortunately, deliberately conceal deaths from East Coast fever, they being afraid of the quarantine measures and restrictions that have to be imposed. Such persons hope to eradicate the disease on their own by dipping and handdressing, but in every case the disease sooner or later gets the upper hand and its existence can no longer be hidden.

How to overcome these difficulties will be considered later.

(B) *Recurrence of Recrudescence of East Coast Fever.*—As previously indicated, it is a very common experience in the Union for East Coast fever to reappear on farms or in localities from which it had previously been eradicated. This has been of such frequent occurrence that most of us are afraid to declare an area free from infection unless or until a period of four or five years had elapsed from the last known cases.

Quite a common interval after which re-infection is discovered is two or three years.

The same trouble has also been experienced in other parts of South Africa; for instance, in Southern Rhodesia. In 1924 Edmonds (Southern Rhodesia) wrote a long memorandum on this aspect of the East Coast fever problem. He, among many others, ascribed this re-infection to the " salted " ox, which is believed to be a " carrier " of the parasites in the same way as some human beings retain malaria infection for many years.

From our extensive observations during the past few years, we believe that such recrudescences could be explained quite simply and without resorting to any new theories. The following are worth recording:—

(*a*) *Salted Ox Theory.*—Superficially examined, the salted ox theory could be used to explain many difficulties, but on closer investigation it has not been possible to find one genuine instance where recrudescence of the disease could be traced back to a salted animal. Recent experiments carried out by Du Toit also provide strong evidence against this theory. What is more, we have the important example of Pretoria district, where the disease raged during the period 1919-1922, where many animals undoubtedly recovered, and which has remained free of infection ever since.

(*b*) *Undiagnosed Cases.*—The first point to discuss here is the matter of mild cases of the disease that end in recovery without a diagnosis being made. That many recoveries take place there cannot be the least doubt. Only two instances need be given here. On one particular farm, where we were anxious to enforce the slaughter policy, the owner was very much against it, his reasons being that most of his cattle were recovering and salted cattle were worth a great deal to him. It was thought that the animals were suffering from some other disease, probably anaplasmosis. To prove this our inspector was instructed to obtain and forward for examination gland smears from all sick animals. Our examination showed that the farmer was right and that many of his cattle were recovering from the disease. In this particular instance the recoveries amounted to 50 per cent.

The second instance occurred in our own field experiments carried out on a grossly infected farm. Our cattle were on daily temperature and smears were taken regularly from all sick animals showing a rise in temperature. A total of 229 cases of East Coast fever occurred on this farm and of these 29 or about 13 per cent. recovered. It should be stated that many of our animals were in very poor condition and in many cases the cause of death had to be put down to weakness and poverty. It is thought that the percentage recoveries would have been higher if the cattle had been in better condition.

In the Union it is not the usual practice to take smears from sick animals on infected farms, and it is quite conceivable that recoveries may take place during the quarantine period without a diagnosis of East Coast fever having been made.

During the long quarantine period on an infected farm, decomposed smears are not uncommon, and I have no doubt that in the past not enough notice had been taken of such cases. In this way a case of East Coast fever could easily have been missed during the quarantine period.

(c) *Failure to Detect Infection on "Clean" Farms.*—Recurrence of East Coast fever does not always occur on the same farms from which the disease had previously been eradicated, but more often on other farms in the ame locality or district.

Failure to diagnose the disease in these cases is commonly due to the fact that, owing to the scarcity of ticks, only one or a few odd cases of the disease will occur during the period of intensive supervision. When the disease breaks out on a farm, short-interval dipping is enforced not only on the infected farm but also on other farms in the locality. The result is that ticks are greatly reduced in numbers and, to start with, there may be only a few infected ticks. For the reasons previously given, a diagnosis of the disease may not be obtained immediately.

What is more interesting still is that the scarcity of ticks may be natural to the particular locality. What I am thinking of here are high veld farms or farms situated on the fringe of the high veld. During the last two years, at least two instances have come to our notice where it was difficult to explain the recurrence of East Coast fever on certain low veld farms and where we succeeded in locating the infection on farms situated some little distance away on the fringe of the high veld. On the latter, brown ticks are very scarce, and, although East Coast fever infection is present, very few cases of the disease occur. It was only by close checking of all cattle for some months that we were able to demonstrate the presence of the disease on these farms.

In all these cases it becomes quits clear how the disease may make its reappearance in the previously infected locality and why an interval of two to three years is quite common. In the case of the undiagnosed cases in the previously infected locality short-interval dipping is relaxed as soon as the quarantine period is over, ticks increase in numbers, and after the next case of East Coast fever (which will now most likely go undiagnosed) there will be quite a number of infected ticks. As soon as this has happened and the infected ticks find hosts, several cases of East Coast fever will occur and the diagnosis will then be made. In the case of infection on the high veld, movement will take place to the low veld area as soon as quarantine from the latter has been removed. Should there be a sick animal included in such a movement, the infection will be conveyed to the ticks on the low veld farm. Here the disease cannot smoulder for long, and a new mysterious outbreak of East Coast fever will be diagnosed.

Summarizing the position in the Union, I have no hesitation in saying that lack of complete success in eradicating East Coast fever must be ascribed very largely to our *failure in diagnosis and locating the infection.*

6. Proposed New Policy for the Union.

The fundamental scientific principle to be applied to disease eradication is *accurate diagnosis* followed by treatment on sound lines. This principle is as true in the case of East Coast fever as it undoubtedly is in other infectious diseases.

As previously stated, I have no doubt whatever that our failure to eradicate the disease in the Union has been due almost entirely to failure in diagnosis.

This being the case, it is essential, if success is to be achieved, that *our efforts be largely concentrated on the diagnosis of the disease* and locating the centres of infection. The difficulties in the way have been fully discussed, and at this stage it is necessary, therefore, to suggest ways and means of overcoming them. It is largely a question of sound organization, which must be kept at the pitch of perfection, and which must make provision for the following:—

(*a*) *An accurate* census of all cattle must be kept officially in all East Coast fever areas. All stock owners cannot be relied upon to keep an accurate check on the numbers of their cattle and, as a result of this, to report promptly all cases of sickness or death.

To achieve this object, we have the necessary regulations which require owners to have their cattle looked after properly and to bring them up for counting and inspection at times fixed by the local officer.

In East Coast fever areas our inspectors are required to carry out this checking of cattle at regular intervals and to account for all decreases and/or increases in their numbers. This checking is done mostly at the dipping tank, but in clean districts, where inspectors have to control large areas, supervision of the actual dipping is not insisted upon and inspection of cattle at the kraals or other convenient places is permitted.

(*b*) Where a death occurs, the owner has to report the fact immediately and procure a fresh organ smear. If our inspector is not far away, or if a police station is nearby, the organ is taken to one of these officers, who is required to make and forward the smears to the laboratory. It is not always easy to obtain fresh smears, but every effort is made to do so. Where several decomposed smears are received from a farm, it must be looked upon with suspicion and placed under temporary quarantine until such time as all suspicion is removed.

(*c*) Special attention must also be paid to highveld farms if they are situated anywhere near East Coast fever infection. In their case the checking of cattle has to be even more accurate, since otherwise failure in diagnosing the odd case of East Coast fever that might occur is likely to be the result.

(*d*) Microscopic diagnosis offers no difficulties provided good fresh smears are available. It is true that in the Union we find Koch's granules in cattle that are not suffering from East Coast fever, but such cases are rare.

Where the difficulty arises is when decomposed smears are submitted for examination; a great deal of time has to be wasted on such smears, and this becomes a serious matter when thousands of smears have to be looked at at our different laboratories. This smear work in the Union has grown into formidable proportions, but it forms an essential part of the East Coast fever campaign.

(*e*) Having located the disease on a farm, we have to decide on the eradicative method to be employed.

If the cattle are to remain on the farm, and short-interval dipping is resorted to, checking of cattle and obtaining smears from sick and dead animals become even more important.

In the Union we enforce fencing of the farm and branding (with a quarantine brand) of the cattle.

If the infection is already well established and the cattle cannot be kept away from the infected kraals or pasture, we can make up our minds that the job of killing all infected ticks will be a matter of eighteen months or longer, usually about two years.

Here we experience the imperfections of the dipping system, which is bound to be interrupted by climatic and other conditions over which we have *no* control.

Handdressing is an essential part of the process and those of us who have had experience of it will appreciate the tremendous task thrown on the owners, his assistants, and our inspectors, who have to perform this work continuously over long periods.

During this long period, many things may go wrong on the farm; cattle may stray to adjoining properties, illicit movements may take place, with the result that infection is spread elsewhere.

Stress should be laid on the possibility of animals recovering from the disease without a diagnosis having been made. Decomposed and undiagnosible smears during the long quarantine period are not uncommon, and I am afraid in the past have been responsible for recrudescences of the disease. At present we do not remove quarantine from an infected farm until 15 months have elapsed after the last death from East Coast fever was recorded or decomposed smear was received. In other words, there must be clear and definite proof that no infection is present on the farm before quarantine is removed. Even then the previously infected farm and surrounding area are still closely observed for the succeeding year or two.

By far the best and safest procedure is, however, *to remove all cattle from the infected farm* and to keep it free of cattle for a period of at least 15 months. In the Union such cattle could nearly always be removed by rail to a quarantine abattoir and in this way it costs the State very little. Slaughter, with compensation is provided for in our Stock Diseases Act, and, as prices go to-day, owners receive reasonable compensation from the State.

By carrying out this procedure, there is no difficulty whatever in eradicating East Coast fever from any farm. The only precaution to be taken is to insist on the farm being properly fenced and to make sure that no cattle are brought or allowed to stray on to the infected farm.

The further advantage is that in the long run this method is undoubtedly more economical to the State and indirectly to the stock owners. Fewer inspectors are required and intensive supervision will only be necessary for a comparatively short period. In addition, the chances of the disease being spread are reduced to a minimum, and here, again, the State may avoid a great deal of expenditure. East Coast fever eradication is largely a question of economics, and there is not the least doubt that as the position stands at present in the Union the slaughter policy will save the State thousands of pounds. I have previously referred to the success achieved in the Transvaal during the past two years; this success is due to the adoption of the system explained here.

CHART I, SHOWING OUTBREAKS OF EAST COAST FEVER IN THE UNION.

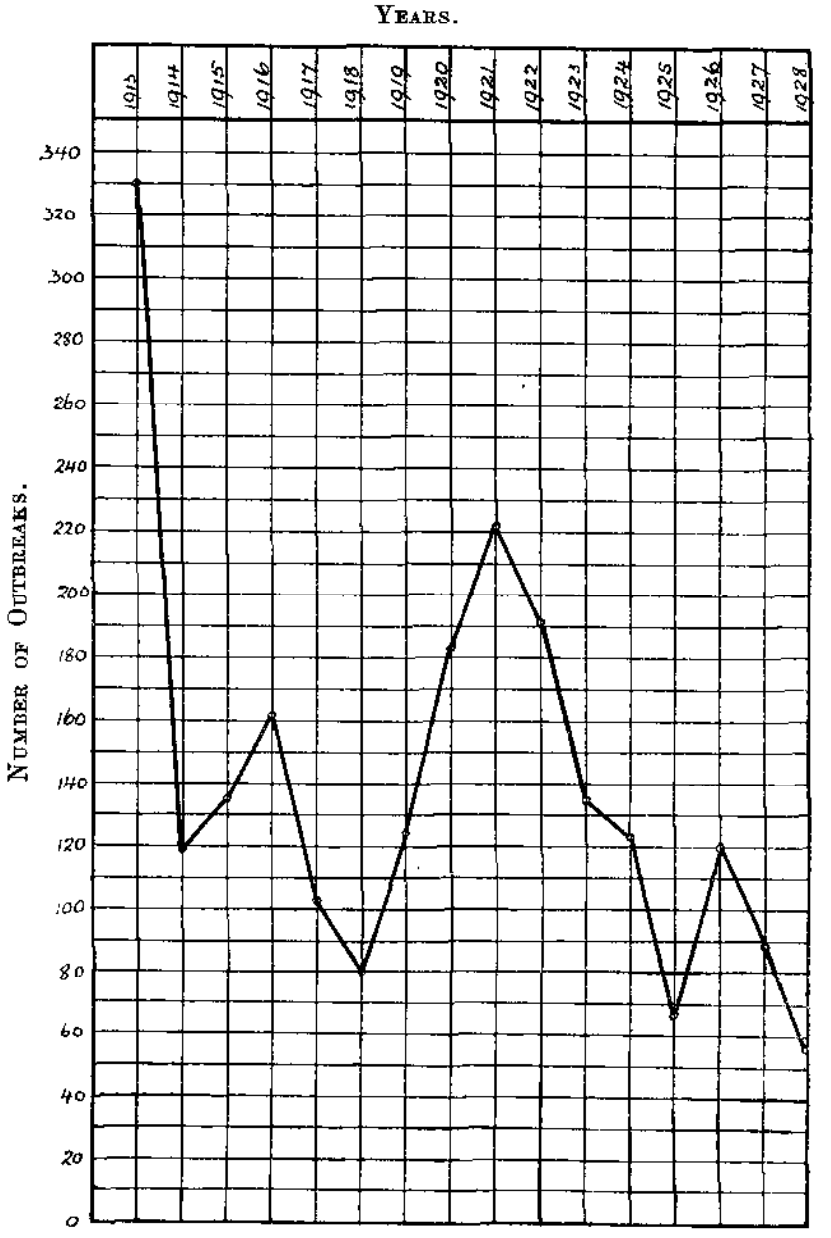

CHART II, SHOWING OUTBREAKS OF EAST COAST FEVER IN THE TRANSVAAL.

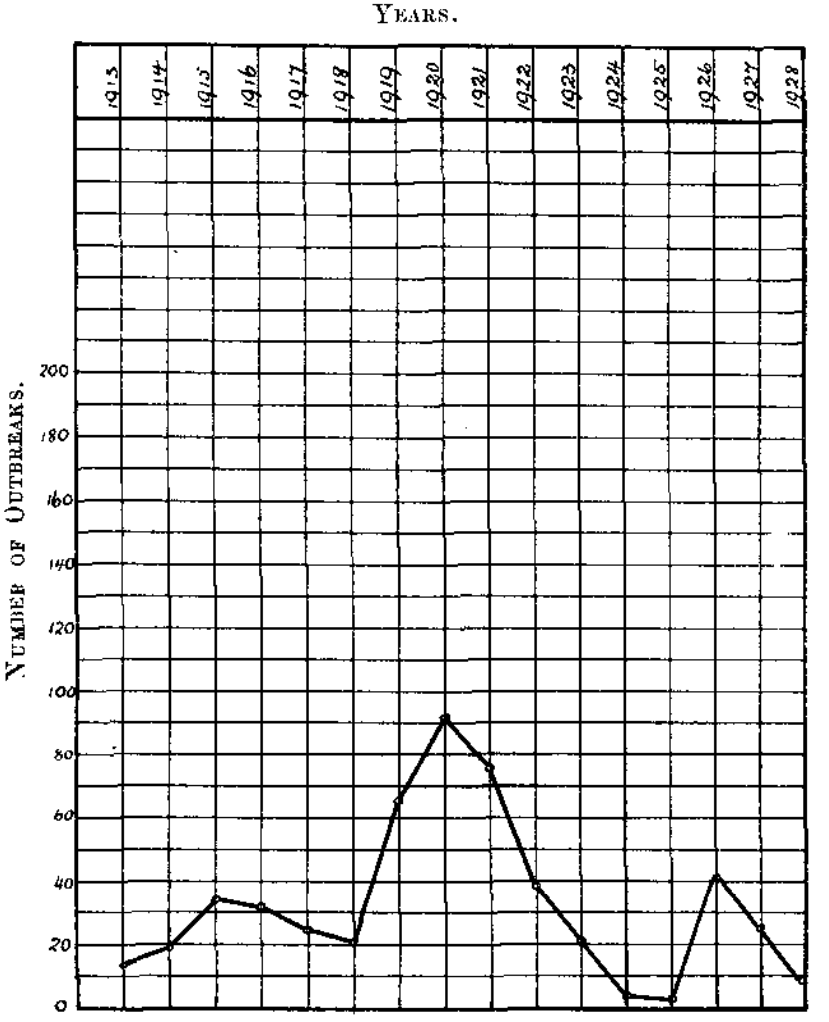

CHART III, SHOWING OUTBREAKS OF EAST COAST FEVER IN NATAL.

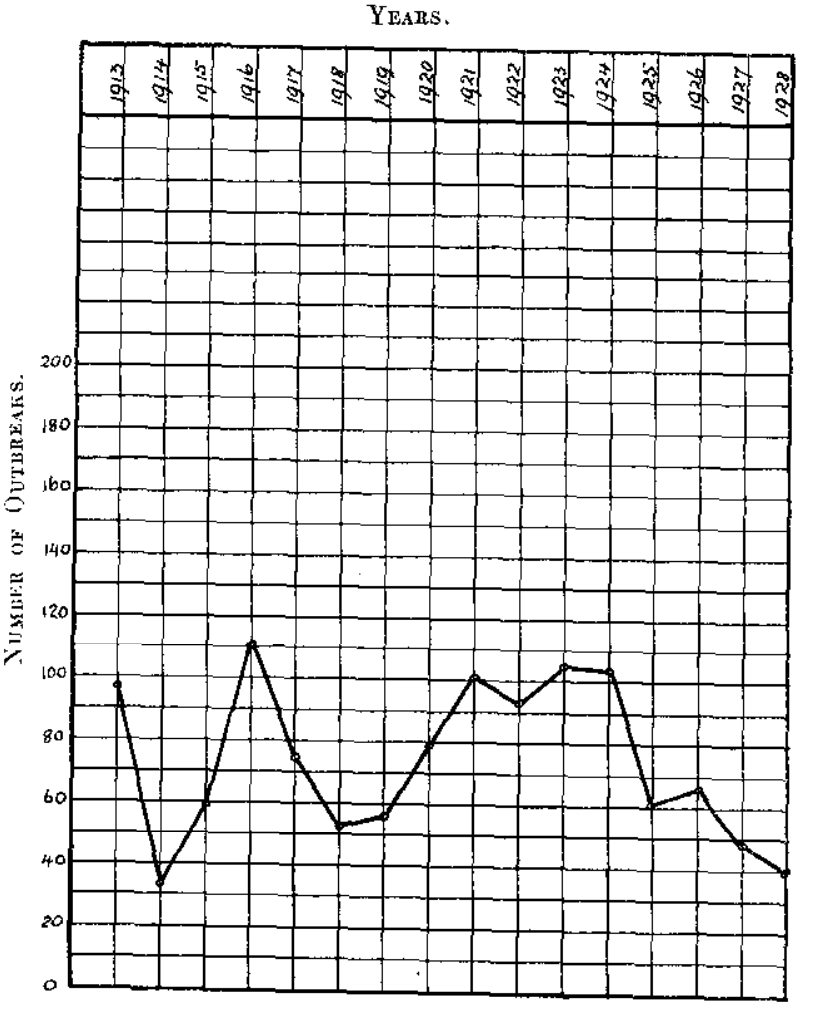

CHART IV, SHOWING OUTBREAKS OF EAST COAST FEVER IN THE RICHMOND DISTRICT.

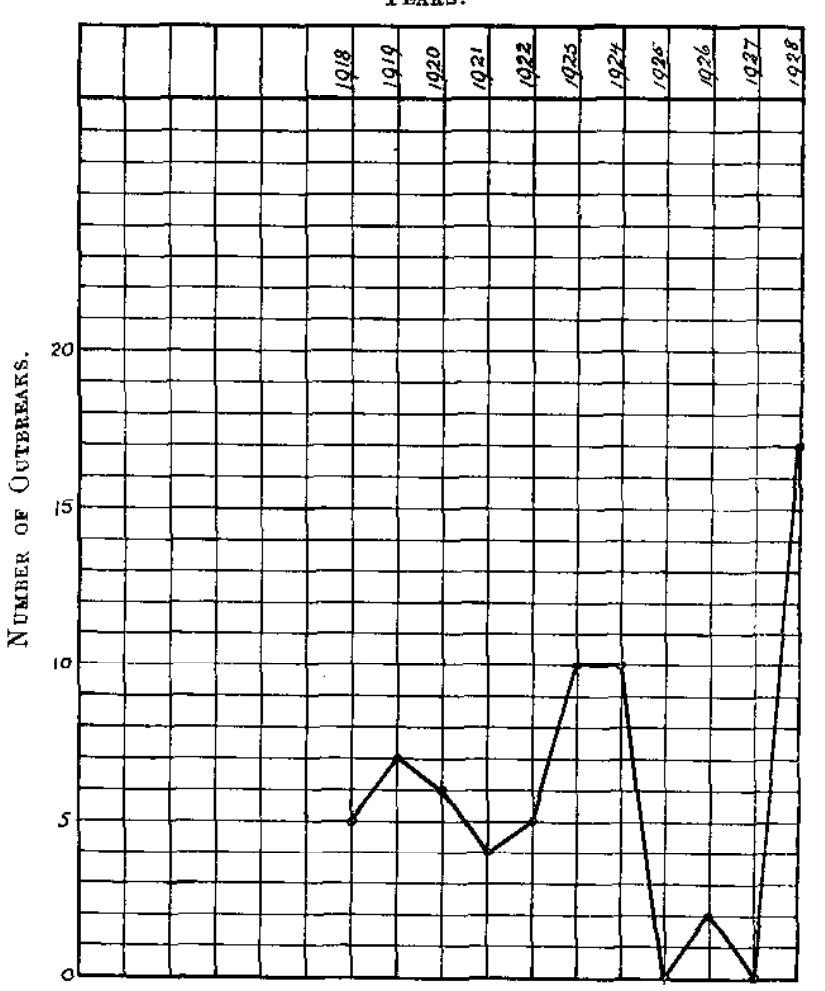

CHART V. SHOWING OUTBREAKS OF EAST COAST FEVER IN THE PIETERSBURG DISTRICT.