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REPORT

ON THE

INFECTIOUS AND CONTAGIOUS DISEASES IN
STOCK PREVAILING IN EUROPE;

TOGETHER WITH

DIRECTIONS FOR INOCULATION FOR PLEURO-PNEUMONIA.

BY

ALEXANDER BRUCE,

CHIEF INSPECTOR OF STOCK FOR NEW SOUTH WALES.

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*New South Wales, Chief Inspector
of stock*

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LIVE STOCK.

(REPORT OF CHIEF INSPECTOR, ON INFECTIOUS AND CONTAGIOUS DISEASES.)

IN accordance with instructions, bearing date the 31st December, 1872, I obtained while in Europe all the information I could with respect to the infectious and contagious diseases affecting or likely to affect our Live Stock, and have now the honor to submit the accompanying Report on the subject.

In regard to the length to which my Report extends, I have to explain that all the diseases alluded to,—with the exception of Pleuro-pneumonia,—are quite unknown in Australia; and I considered it necessary to give such descriptions of them as would not only put our stockowners in a position to judge of the expediency of the measures proposed for protecting them against the introduction of these scourges, but would also enable them,—should it ever unfortunately happen that any of these diseases obtained a footing in the Colonies,—to recognize and deal with them at once. The diseases alluded to are “Cattle Plague,” “Foot and Mouth Disease,” and “Small-Pox in Sheep.”

I might, perhaps, have also described the nature, symptoms, and treatment of the incurable affection of “*Glanders*” in horses, as it is not only the most formidable of all diseases to which horses are liable, but one that is communicable to the human subject. There has, however, as yet never been any law in the Colonies dealing with infectious diseases in horses, and I shall at present content myself with calling attention to the urgent necessity there exists for legislation in that direction, in order that all imported horses may, like other stock, be subjected to inspection by a duly qualified Veterinary Surgeon, and pass a reasonable quarantine, previous to their being permitted to come into contact with the horse stock belonging to the Colony.

ALEX. BRUCE,
Chief Inspector of Stock.

THE UNDER SECRETARY FOR LANDS.

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LIVE STOCK.

REPORT by the Chief Inspector of Stock on the Infectious and Contagious Diseases in Europe affecting or likely to affect the Live Stock in Australia.

I.—PLEURO-PNEUMONIA.

1.—NATURE.

Pleuro-pneumonia in cattle, like all other constitutional diseases, has its seat in the first instance in the blood, being febrile in its earliest stages, but becoming typhoid in its second and third or last stages, with a specific termination in disease of the lungs and pleuræ, the changes in which (in the shape of inflammatory exudation) hold the same relation to the true disease that the eruption in small-pox does to the blood state in that disease.

The best authorities are in favour of not regarding this as a local disease originating in and confined to the lungs and pleuræ. It is, therefore, properly speaking a misnomer to call it pleuro-pneumonia, for it may never reach the second or third stages and affect the lungs, but exhaust itself in the first or febrile stage; and it is upon this fact that the efficacy of inoculation is based.

2.—CAUSE.

It has now been settled beyond all question that the cause of pleuro-pneumonia is infection or contagion conveyed, either directly or indirectly, from the diseased animal to the sound.

3.—SYMPTOMS AND POST MORTEM APPEARANCES.

The course of the disease is generally divided into *three* stages.

First Stage.

In bush cattle the first noticeable symptoms of pleuro-pneumonia, which may be only temporary, are either an unusual amount of coughing in a mob when on camp, especially after nightfall, drooping of the head or ears, an apparent loss of spirit, lagging behind the mob, disinclination to feed, a staring coat, a

feverish eye, pale and slimy nostrils and inside of mouth,—or generally the appearance that tells a person accustomed to stock that an animal is not altogether right.

In dairy cows, again, without or along with any of the above symptoms in a more apparent degree, may also be observed a decided and unaccountable deficiency in the yield of milk, tenderness of the teats, a refusal of food, or any change in their customary habits or behaviour.

In this stage, generally speaking, beyond the symptoms of fever, no decided *post mortem* appearances are discernible; but in some few instances there may be found congestion and inflammation of portions (generally the points) of the lungs, or of either of them, and inflammation of the pleuræ, with effusion of lymph on the inside of the ribs and diaphragm.

Second Stage.

The symptoms here in bush cattle,—in addition to those of the *first* stage in an aggravated form,—may be all or any of the following, namely, a stiffness in the fore-parts, a decided disinclination to move, a drawn-up and cramped appearance when standing, especially noticeable to the practised eye at a distance, a sudden and almost instantaneous stopping on being allowed to do so in driving, a hard, sharp, and frequent cough when moved out of a slow walk, and sometimes even when standing, with now and then a discharge of frothy phlegm from the mouth, a heaving of the sides, and decided symptoms of affection of the lungs, the nostrils inflamed and filled with slime, and the muzzle covered with drops of clear moisture, the eye protruded, feverish, and watery, a rapid falling off in condition, or a disinclination in the animal to lie down, and when it does it rests on the affected side.

In milch cows the more noticeable symptoms of the *second* stage of the disease, in addition to those given, are sometimes a sudden purging, a falling off in the quantity of and a yellowish tinge in the milk, want of appetite, especially for green food, difficulty in swallowing, apparent thirst, grunting while turning in the stall, or tenderness under pressure along the back and loins.

A *post mortem* examination of an animal in the *second stage* of the disease will in most cases show a small quantity of fluid of a bloody tinge in the cavity of the chest, effusions of lymph on the insides of the ribs, pleuræ, and the diaphragm; great inflammation of the pleuræ, and sometimes attachment of the lung to the ribs. But the chief and unmistakable symptom of this stage of pleuropneumonia is to be found in the lungs. At this stage of the disease a portion of each of the lungs, or what is more frequently the case, from a third to three-fourths of one lung,—generally the right—is hepatized, or (what is commonly called) “marbled,” while the rest of the lung is only partially hepatized or congested,

and the whole of the other comparatively sound, exhibiting, it may be, only some slight traces of inflammation. The hepatization will be found to have changed the light healthy consistency of the lung to a heavy, liver-like substance, which, when cut into, exactly resembles a brown marble with white or greyish streaks running through it in all directions. The hepatization increases the weight of a lung *ten, twenty*, and sometimes even *forty* fold.

Third Stage.

In the *third* or last stage the disease assumes a more typhoid form, and the animal appears to suffer less pain,—so much so that a person unacquainted with the deadly leaden hue which the eye now assumes, imagines that a recovery has commenced. In this stage the animal will generally stand up under a tree, emitting, when moved, a low sound between a grunt and a moan; and it will frequently charge when approached or disturbed. The back will be raised, the head protruded, and the eye, which is now sunk, will assume a deadly appearance; the droppings will be black and scanty; the cough, which is now comparatively soft and faint, will be frequent, with expectorations of bloody mucus; the tongue swells and protrudes, and there will sometimes be a thick ropy discharge from the nose and eyes; hoven will not unfrequently occur; respiration will become impeded and difficult; and the animal will speedily sink and die.

In milch cows, besides these symptoms the following will be observed:—The grunt will be increased, the breath will stink; they will frequently grind their teeth; there will be great restlessness as death approaches; while the skin and horns will be cold, and the pulse accelerated to twice its natural speed.

The *post mortem* appearances here are the same as those described in the *second* stage, but in a much more aggravated form. Thus, in the *dry* form, where pneumonia prevails, the whole of one lung and a portion of the other will be hepatized. In the more badly diseased lung, the hepatization, where it has first commenced, will be darker and more gangrenous in appearance. Around the outside of this lung, and attaching it to the ribs, there will be a coating of coagulable lymph (a straw-coloured, fatty looking substance), which sometimes extends to the pleuræ; while in the cavity of the chest there will be a considerable quantity of serum,—a fluid of a bloody tinge. In the *wet* form, where pleurisy prevails, a very much greater quantity of serum will be found in the chest,—sometimes nearly a bucketful; and floating in this serum will be shreds of coagulable lymph, frequently covering the pleuræ, which when exposed are found to be highly inflamed. One of the lungs will be found to be more or less diseased and covered with lymph. In the *combined* form the disease (both *dry* and *wet*) again—where pneumonia and

pleurisy equally prevail—along with considerable hepatization of one of the lungs, and sometimes, though rarely of both, a large quantity of serum will be found in the cavity of the chest; while a sort of adhesive inflammation will be set up, and portions of lungs, pleuro, and diaphragm are found attached in one diseased mass to the ribs.

4.—AUSCULTATION AND PERCUSSION.

With quiet cattle, these tests (auscultation and percussion) can be employed for the purpose of ascertaining whether or not they are affected.

(1.)—*Auscultation.*

Although the changes caused in the chest and its organs by pleuro-pneumonia exist before any marked symptoms show themselves in the living animal, they are generally indicated by certain sounds which, to the practised ear, disclose the true state of the lungs and the other organs affected.

One or other and sometimes all of the following indications will present themselves on applying the ear to the side of the animal's chest:—(1st) The healthy breath murmur. (2nd) The *crepitus*. (3rd) The absence of sound. (4th) The sawing, rubbing, or friction sound. (5th) The deep gurgling and irregular sound.

- (1.) The natural sound which meets the ear applied to the side of the chest of a healthy animal well conveys the idea of that which is actually taking place,—of air entering a vast number of minute cells; and is what may be termed a smooth, soft, bellows-like murmur.
- (2.) When, again, one of the lungs is affected, and the disease is confined to that organ, the breath sound in it is louder and coarser than usual, and conveys the idea of the lung becoming impermeable to the air. This is the case; for, as inflammation of the substance of the lung progresses, the air enters the cells with difficulty, owing to the lymph being poured into them and also into the spaces between them. Then the air, forcing its way into the cells under these circumstances, gives rise to the peculiar rushing and crackling sound termed *crepitus*, which is very distinct, but only heard during inspiration.
- (3.) As the disease progresses, some portions of the lung emit no sound whatever—neither the healthy murmur nor the *crepitus*—and this arises through the effusion of lymph involving the air-cells and substance of the lung, in the silent portions of it, in general destruction. By this time a peculiar blowing or rushing sound will be detected in other parts of the chest.

- (4.) If the course of the disease be towards pleurisy, after the *crepitus* is noticed, other sounds conveying the idea of sawing are emitted. This arises through the pleuræ becoming inflamed and covered with lymph, which dries on their surface; and their coats being thus rough, uneven, and dry, emit these sounds on coming into contact, instead of gliding smoothly and noiselessly over each other as they do when they are free from disease. These sounds differ from the *crepitus* in another respect—they are heard during both inspiration and expiration.
- (5.) As the disease advances towards termination the sounds become very equivocal, resolving themselves into a deep gurgling and irregular noise, caused by the cavity of the chest becoming filled with serum.

(2.)—*Percussion.*

This is another mode of ascertaining whether or not an animal, which exhibits no outward symptoms of being so, is diseased—*i.e.*, by striking the side of the chest with the knuckles, or any other hard substance of similar weight.

On striking the chest in this way, when the lung has become solidified, and only when it is so, the sound emitted is dull and flat, and not sonorous and booming as it is when the chest and its organs are free from disease.

The same dull, dead sound is elicited when the animal is affected with pleurisy, and the extent of the gathering of water in the chest can be traced by the extent to which the chest fails to emit the healthy sounds when tested in this way.

5.—INQUIRY IN GREAT BRITAIN.

With the view of eliciting information from the Veterinary Profession in Great Britain and Ireland, with regard to pleuropneumonia, and the best mode of dealing with it in Australia, I addressed a letter, of which the following is a copy, to the London "Veterinarian":—

(1.)—LETTER TO "VETERINARIAN."

"The Editors of 'Veterinarian,' London.

"Gentlemen,

"Having been instructed by the Government of New South Wales to collect all the information I can obtain in England and on the Continent with respect to the infectious or contagious diseases presently affecting or likely to affect the live stock of the Australian Colonies, and as pleuropneumonia is now prevalent not only in New South Wales but also in all the other Australian Colonies, I am anxious to obtain the opinion of the Veterinary Profession in Great Britain as to the best mode of dealing with that

disease, and especially as to whether or not inoculation is a preventive against it. I consequently forward this communication for insertion in your journal.

To show the importance of this question to the Australian Colonies, and how the matter stands there at present, I will, with your permission, state here, as concisely as I can, the number and value of the cattle stock in the four principal Colonies; how pleuro-pneumonia was introduced there; how it spread; the losses it has occasioned; the steps taken to stay its spread; and the result of inoculation as practised in the Colonies.

The number of Cattle, and annual return from them.

The cattle in the four principal Colonies stood, in 1871, as follows:—

South Australia	...	...	...	...	143,463
Victoria	...	...	...	...	776,737
New South Wales	...	...	...	...	2,014,883
Queensland	...	...	...	...	1,076,630
					<hr/> 4,011,718 <hr/>

Taking the 'cast' of fat cattle annually sent to the market in these Colonies at one-eighth of the total number—a fair average return from breeding and fattening runs in Australia—this would give 501,463 head as the annual 'cast'; and these at (say) £7 each, would make £3,510,251 as the value of the annual return from the cattle stock of the four principal Colonies.

The cattle of the four Colonies are included in the above estimate, as they are all equally interested, it being quite impossible to prevent the cattle of one Colony from mixing or coming in contact with those of the adjoining Colonies. This arises both from the way in which the cattle are kept and moved about, and from the circumstance that a great deal of the inland carriage is still done by bullock teams. Thus the cattle in the Colonies are still in many cases depastured on open runs, and are kept from straying principally through their attachment to the run on which they have been bred. Though this attachment is generally strong enough to keep cattle from leaving the runs, and even portions of the runs, on which they were bred, still, they sometimes do stray, and, if infected, would spread the disease. With store cattle (cattle which have been purchased and put on a new run) the case is very much worse. Their attachment to the run on which they were bred induces them for months, perhaps for years, after they are placed on the new run, to return to their old one, although the two runs may be hundreds of miles apart, and, perhaps, in different Colonies. If they are infected when they leave, they of course spread the infection as they go. Even when the runs are enclosed, infectious and contagious diseases are certain to spread through the mobs of infected cattle and infected bullock teams passing through them. All *bonâ fide* travelling cattle, whether as mobs of store cattle or teams of working bullocks, can be depastured on any Crown Lands within half a mile in New South Wales, or a quarter of a mile in Victoria, of the road by which they are travelling; and as the land on which they have this right of depasturing is seldom or never fenced off from the rest of the run, the travelling cattle not only go on the same ground as those belonging to the run, but frequently mix with them. If, therefore, the travelling stock are infected (and they are very apt to become so, even if they were sound when they started, passing, as they often do, through 200 or 300 miles of country), they are certain to infect the cattle on the run through which they travel.

From what has been said, it will be gathered that it is quite impossible to maintain a perfect quarantine of the cattle stock in any of the Australian Colonies, or between one Colony and another. This is the great difficulty

which is encountered in the Colonies in dealing with infectious and contagious diseases in cattle, and one which must be kept constantly in view in proposing any measure for staying the spread of these diseases.

Introduction and spread of Pleuro-pneumonia in Australia, and the losses caused by it.

Pleuro-pneumonia was introduced by a cow brought from England by Mr. Boadle, of the Plenty District, in Victoria, and landed in Melbourne in 1858.

When the disease was first discovered among Boadle's cattle, steps were promptly taken to eradicate it. All the cattle on the farm were paid for by private subscription and destroyed, and the farm placed in quarantine. Unfortunately, however, the quarantine was not strictly maintained, and a greedy, ignorant neighbour, who owned several teams of working bullocks, which he usually employed in carrying on the roads, seeing the good grass in the infected paddocks, put his cattle into them during the night, and removed them at daybreak. They soon became infected; and as he shortly after sent his teams on the roads, on a trip right to the border of the Colony, they spread the disease in all directions as they went. His other cattle again mixed with his neighbours', and thus set it afloat around his own farm.

In this way the disease soon spread to the other Colonies, and it is now more or less prevalent in them all, and likely to be so, without fresh legislation; for travelling stock are so frequently affected, that no sooner has a fresh race of animals grown up, which have neither had the disease nor been inoculated, than they are infected by cattle travelling through their runs.

The losses caused by the disease during the thirteen years it has prevailed (it did not spread to any great extent till 1860) cannot be estimated at less than 30 to 40 per cent. of the whole number of cattle—that is, about 1,404,097 head, which, at (say) only £6 a head, makes the total loss to the Colonies, through this disease, amount to about £8,500,000.

Steps taken to eradicate the disease, and their result.

On its being discovered that the infection had spread beyond Boadle's farm, an Act was passed by the Victorian Parliament, empowering the Government to destroy diseased stock, and quarantine those which were infected. They did so for a time; but, as it was soon discovered that the disease had obtained too firm a footing to be eradicated, the Government shortly ceased to take any further action with respect to it, and the Act was allowed to lapse.

In the meantime the neighbouring Colonies had passed Cattle Disease Prevention Acts, and issued proclamations prohibiting the introduction of cattle from Victoria; but the attempt was futile, for, as has been already said, it was found to be quite impossible to establish a thorough quarantine, and the infection very shortly spread to all the adjoining Colonies. There, too, attempts were made to stop the disease by destruction and quarantine of the infected stock, but with the same result, for they failed and soon were discontinued, after a great number of cattle had been destroyed and large sums of money wasted in the payment of expenses and compensation.

Inoculation for Pleuro-pneumonia, and the result.

Upon the failure of these attempts to stamp out pleuro-pneumonia, which was caused, as has been explained, through the impossibility of maintaining a perfect quarantine, stock-owners began to look round for some other means of combating the disease. They saw at once that their cattle were too wild, and of comparatively too little value to be doctored; they therefore turned to inoculation, which was recommended by Mr. Cleote, of Zandoliet, Cape

Colony, in a letter published in the Sydney and Melbourne papers of December, 1861; and the first to make the attempt was Mr. Thomas Mitchell, Little River, Victoria. Shortly afterwards (about the middle of January, 1862) the Messrs. M'Laurin, of Yarra Yarra, New South Wales, and other owners in their neighbourhood, also tried inoculation, with decided success. The reports of these experiments, which were published from time to time by the Government of New South Wales, speedily induced other stock-owners in all the Colonies to try the operation; and inoculation, as a preventive for pleuropneumonia, is now generally practised throughout Australia, and, as the stock-owners report, with decided success.

There have certainly been frequent instances of the failure of inoculation; but these, the stock-owners state, could always be traced to one or other of the following causes:—

1. *To the cattle being badly diseased when operated upon.*—In most cases the owner did not inoculate until he was thoroughly alarmed, and he did not become so until he lost perhaps 15 or 20 per cent. of his cattle by the disease. The consequence was, that when he did inoculate, *three-fourths* at least of his herd were diseased, although they, perhaps, did not appear to be so; and the operation would require to be a cure, as well as a preventive, to be thoroughly, or even moderately efficacious under such circumstances.

2. *To the use of improper virus.*—The directions first received for selecting the right sort of lung and virus were very vague and meagre, and a great deal of virus which was worse than useless, in fact actually deleterious, was used by those who were most anxious to perform the operation correctly. It was at first no uncommon thing to see virus taken from the lung of an animal which had died of the disease, and which was, of course, quite unfit. Through a sadly mistaken economy, virus was frequently also taken from animals in the last stage of the disease, and likewise from portions of the lung in a far too advanced stage. Virus, again, which has become stale and putrid through keeping was frequently used, out of ignorance or carelessness. Not only was a great deal of virus which was thoroughly unfit used in those ways by owners and others who were most anxious to perform the operation correctly, but many pretended professional inoculators, who knew little or nothing as to how the operation ought to be performed, and who did not care what sort of stuff they used, so long as they made, as they often did, from £5 to £10 a day, went about from station to station inoculating, and it was quite impossible that in their case the operation could be attended with success.

3. *To a wrong mode of operating.*—The first instructions on this head also were very defective, or rather erroneous. They directed that a piece of the diseased lung should be inserted under the skin of the tail. To perform the operation in this way without injuring the animal requires the greatest care and nicety of operation, and these were seldom or never bestowed upon it. The consequence was that the tail was lacerated, frequently to the bone, and dangerous swellings and sloughing ensued. In other cases, again, a rag and tie were used to keep the piece of lung attached to the tail, and in this way inflammation and sloughing in the tail or rump were almost certain to be induced. Even after better information had been obtained, and considerable experience acquired in taking the virus and inoculating, the operation was frequently badly performed through carelessness and haste.

4. *To the great heat of the weather when the cattle were inoculated.*—At certain seasons of the year the weather in Australia is by far too hot for an operation of this description when performed on quiet cattle; and it can easily be seen how very much worse it would be, and how many more cases there would be of mal-inoculation in such weather, with comparatively wild "bush" cattle, which are always heated and excited when driven into the yard, and almost maddened by the operation in the inoculating pen.

Notwithstanding that the first attempts at inoculation were made under these most unfavourable circumstances, a very large majority of the stock-owners in all the Colonies from the first expressed themselves strongly in favour of the operation, and that majority has since gone on steadily increasing. Thus, when the opinion of the stock-owners in New South Wales was asked in 1837, it was found that only in six districts out of thirty-four were they reported by the inspectors as "*not* in favour of inoculation," and in only one of these six districts did the owners express themselves decidedly against it. Again, in 1869, when the opinions of the owners in the same Colony who were possessed of 200 head of cattle and upwards were taken, it was found that, of the owners who had inoculated their cattle (and a very large majority of them did so), there were fourteen to one in favour of that treatment; and since then the number of its supporters has still further increased, for a good many who were then opposed to inoculation have tried it with such decided success as now to believe most implicitly in its efficacy.

From the answers received from the stock-owners, it would be gathered that those who were in favour of inoculation founded their belief in its efficacy on the following grounds:—

1. That in almost every instance where inoculation was properly tried the disease shortly disappeared from the herd, in a shorter or longer period according to the size of the herd, but always before *three months* from the date of inoculation.

2. That while the disease thus disappeared in a short time from the herds which were properly inoculated, it continued in those which were not inoculated for periods of from *two to six years*, according to the size of herd.

3. That cattle which had been properly inoculated when sound, with a few solitary exceptions, never afterwards became diseased, although they were frequently mixed, and sometimes even put in the same paddock with uninoculated cattle which were dying of the disease.

4. That where the right sort of virus was used, and the operation properly performed, and the weather not too hot, the deaths from inoculation never exceeded more than 2, and seldom more than 1 per cent.

Compulsory Inoculation.

One of the principal objects had in view in making the inquiry as to the efficacy of inoculation, to which reference has been made, was to ascertain whether any measure founded on the information contained in the owners' replies to this inquiry could be passed which would deal successfully with the disease. With this object in view, the opinions of the stock-owners were, at the same time, obtained as to the expediency of passing a measure into law which would, either directly or indirectly, make inoculation compulsory in every case where the cattle became infected, and a considerable majority of them expressed themselves in favour of legislating in that direction. As, however, the replies in favour of legislation were not so numerous as was expected, and as the opinions of the highest veterinary authorities of Great Britain were then opposed to the practice of inoculation, the Government of New South Wales have not yet introduced any measure making inoculation compulsory. There is no doubt but that the owners of cattle throughout that Colony are now more inclined than they were for legislation, but no reliable information has lately been received in the Colonies as to whether or not there has been any change in the opinions of the veterinary authorities in England on the subject of inoculation; and until an assurance is received of the change having occurred, there is little prospect of any action being taken of the nature indicated by the Government of any of the Colonies.

I have to apologize for the length to which my explanations have extended, but I consider it necessary—and I trust my readers will take the same view—

to go very fully into the subject, because, in asking an opinion on any question it is necessary that all the facts of the case should be fully stated; but especially because there seems to be so very great a diversity in the opinions held by the veterinary authorities in England and the stock-owners in Australia on the subject of inoculation. There is no doubt but that as a class our stock-owners are as thoroughly practical and as intelligent (and as a rule it was the most intelligent and best informed who inoculated) as the same class in any other part of the world, and it would be very strange if they are all making a mistake. If they are, the veterinary authorities in England would be doing good service by showing—as I trust they will, should they still disapprove of inoculation—how our stock-owners are deceiving themselves.

I trust that, under the circumstances, Messrs. Editors, you will not only afford the necessary space in your columns for this letter, but that you will assist me in other ways in obtaining the information I require.

I have, &c.,

ALEX. BRUCE,

Chief Inspector of Stock, New South Wales."

Although I was led to believe by a member of the veterinary profession that my request would be at once responded to, I am sorry to say that my anticipations were not realized. My letter did not elicit a single reply.

(2.)—INOCULATION IN LONDON DAIRIES.

In the meantime, however, I learned that inoculation as a preventive for pleuro-pneumonia was practised by some of the owners of stock without professional assistance, and this especially by dairymen in London and its suburbs. I therefore sent copies of the letter which appeared in the *Veterinarian* to the different agricultural papers, with the hope that some of those owners who had been practising inoculation would give me the results of their experience. Here again I was disappointed, as no response was made to my request for information; but although this was the case, the Editors of these papers, in bringing the subject of inoculation under the notice of their readers, expressed themselves generally in favour of its efficacy; and if their remarks on the subject, and the republication of the letter referred to, did not suggest the inquiry with regard to the practice of inoculation for pleuro-pneumonia in the London dairies which was afterwards carried out by Mr. Morgan Evans, at the suggestion of Professor Gamgee, late Principal of the New Veterinary College, London, when he found that of thirty-two dairymen who had inoculated their cattle there were thirty decidedly in favour of the practice,—they at any rate gave Mr. Evans considerable encouragement to persevere in his undertaking, and have also led stock-owners in other parts of the United Kingdom to give inoculation a trial.

Professor Gamgee, who has for years devoted his attention to the prevention of diseases in stock, although at first opposed to inoculation for pleuro-pneumonia, is now and has been for a considerable period a strong advocate for its practice, and I have to thank him for a great deal of valuable information, more especially

as regards the Continental treatment of this and other diseases in stock. It was through him also that I met with Mr. Priestman, veterinary surgeon, Caledonian Road, London, who has a large and increasing practice in inoculation among the dairy cattle in the city and suburbs. He, too, was at one time opposed to the operation, and only commenced it when he found that his ordinary practice, which had been principally among dairy cows affected with pleuro-pneumonia, was leaving him through the dairymen inoculating their cows and thus saving them from infection. Mr. Priestman has within a comparatively short period inoculated about 1,000 cows with uniform success.

I was introduced by Sir Charles Cowper to Dr. Williams, Secretary for Her Majesty's Veterinary Department, London, and to Professor Brown, Chief Inspector of Stock for that Department; and both gentlemen afforded me every assistance in their power in obtaining the information I required. With respect to inoculation, Professor Brown, although his predecessor in office had always been strongly opposed to that operation, admitted to me in December last that the belief in its efficacy was gaining ground in England, and that the best course which could be adopted with infected cattle in Australia was to inoculate them. This change of opinion has no doubt been brought about to some extent by the weight of professional opinion on the Continent, and by the reports of the success of inoculation in these Colonies; but it is more especially due to the proof obtained by Mr. Evans and others of its efficacy in the London dairies, to which allusion has already been made.

(3.)—LAW IN GREAT BRITAIN WITH REGARD TO PLEURO-PNEUMONIA.

In Great Britain, the law as it now stands requires that all cattle infected with pleuro-pneumonia should be slaughtered, and the owner is allowed compensation at the rate of one half of their value, up to but not exceeding £20 a head. As, however, the carrying out of the Act, instead of being intrusted, as it is in these Colonies, to a central authority, is left to the different Local Boards throughout the country—who, in the majority of cases, are Magistrates of towns and boroughs, and who, of course, have no interest in nor care for the health of stock—the provisions of the Act are seldom enforced, and the law is all but a dead letter, while pleuro-pneumonia is nearly as rife as ever throughout the length and breadth of the land.

It is to this cause, coupled with the fact that it was optional for these local authorities to put in force the regulations relating to foot and mouth disease, that that ailment was allowed to spread as it did all over Great Britain, and that it has not been completely eradicated. It will thus be seen that the mode of dealing with infectious diseases in stock in these Colonies is far more thorough and effective than that followed in Great Britain.

6.—INQUIRY ON THE CONTINENT.

(1.)—VETERINARY COLLEGES ON CONTINENT.

Having obtained all the information available in England with respect to pleuro-pneumonia, I next turned my attention to the Continent, and I soon saw that it was upon the veterinary authorities there that I would have to depend for the most reliable information respecting pleuro-pneumonia and the other infectious diseases to which stock are liable, as well as the best mode of dealing with these diseases. The reason for this is, that while the advancement of veterinary knowledge and the prevention of diseases in stock have in Great Britain been left almost entirely to private enterprise and individual effort, in I believe every State on the Continent of Europe veterinary schools and colleges have been established for many years and liberally endowed by the different Governments; and that many of the professors at these colleges are men of the very highest standing, who know the anatomy of the animal and their work generally as well as the best medical men know the human subject and the proper treatment of disease. In this way all the different diseases affecting animals on the Continent are fully studied and mastered, while the different sorts of treatment are carefully tested, and their value ascertained.

(2.)—INTERNATIONAL VETERINARY CONGRESS.

This was the course which had long ago been adopted on the Continent with regard to pleuro-pneumonia and its treatment by inoculation, although the fact was not known in Australia. Thus, I found that so far back as 1863, a resolution was passed by the First International Veterinary Congress—held at Hamburg in July of that year, at the suggestion of Professor Gamgee of London—“*That all cattle suspected of being infected with pleuro-pneumonia should be inoculated*”; and that while not a single voice was raised against the efficacy of inoculation, some of the members of the Congress—which included such men as Professors Gerlach and Hertwig of Berlin, Röhl of Vienna, Nicklas of Munich, Haubner of Dresden, Hering of Stuttgart, and Gamgee of London—went so far as to propose that a law should be passed making the operation compulsory in all such cases. There have since that time been several meetings of this Congress, at one of which upwards of 170 veterinary surgeons, from all parts of Europe, were present; and the opinions expressed with regard to inoculation for pleuro-pneumonia all went to show that the faith in the efficacy of that operation is every year becoming more and more firmly established on the Continent.

(3).—RESULT OF PERSONAL INQUIRY ON THE CONTINENT RESPECTING INOCULATION.

I also found this to be the case from personal inquiry in Belgium, Holland, Germany, Austria, France, and Italy, in November and December last. Through the kindness of Sir Charles Cowper, Agent General for the Colony, I was accredited by the Foreign Office, London, to Her Majesty's Ambassadors in the Countries I have mentioned; and on presenting my credentials at the different Embassies, I was at once favoured with introductions to the heads of the veterinary departments in these Countries. These gentlemen, in every instance, took great pains to supply me with the information I required, and gave me an opportunity of studying the diseases with which I was unacquainted—while, with regard to pleuro-pneumonia and its treatment, they, one and all, expressed themselves decidedly in favour of inoculation; and on learning from my letter to the "Veterinarian" the manner in which our cattle are kept and managed, strongly recommended its practice in Australia. In fact, they went so far as to say that no veterinary authority on the Continent of any note now disputed the efficacy of inoculation.

(4).—TREATMENT OF PLEURO-PNEUMONIA IN GERMANY.

I further learned from Professor Müller, of Berlin (to whom, as well as to Director Röhl, of Vienna, I am under particular obligations for the information and assistance they afforded me), that the general practice in Germany is,—when an outbreak occurs in such places as the Beetroot Sugar Factories, where large numbers of cattle are fattened off on the refuse of the beet, and where there are, of course, frequent changes of stock,—to kill the diseased animal and inoculate the others. This practice is also generally followed in the case of outbreaks of pleuro-pneumonia in the large dairies where fresh cows are being constantly introduced. When, again, an outbreak occurs on a farm in a breeding district, where changes of stock are comparatively few, it is usual to kill off the whole herd on the farm and place the land and premises in quarantine, the owner receiving compensation to the extent of the *full* value of the stock destroyed—not as in England a niggardly allowance of *one-half* the value of the animal slaughtered, which tends to defeat the object for which the law is passed. This course is adopted, as it is considered better in such cases, especially as the amount required for compensation is small, to stamp out the disease at once and remove all risk of allowing the infection to spread to the neighbouring herds.

7.—DIRECTIONS FOR INOCULATING.

(1.) *Yards and Pen for inoculating.*

On a station where the number of cattle does not exceed 2,000 or 3,000, and where a spaying bail and forcing yards are already erected, the herd might be inoculated in the bail, although only half the number would be got through in a day that could be operated on in a proper innoculating pen. The cost of a proper pen would be soon repaid by the saving of time in inoculating, and by the convenience it would afterwards be, when branding store stock brought upon the run, as well as in many other ways in working in the herd.

Where, therefore, the herd is large, it would save time and expense to erect a small forcing yard, with a five railed six-foot high pen, eight or ten panels in length, and two feet six inches wide in the clear. The posts should be round, mortised through and through, with the mortises worked close to the inner side of the post, so as that when put up, the sides of the post do not project further into the pen than the rails; and they should be three feet in and eight feet out of the ground, with caps on each pair across the pen. A pen made of round rails will be found more convenient and safe to work at, than if they were split, less liable to injure the cattle, and less costly in erection. The pen should of course be logged, and have the proper gates and fastenings at each end. In such a yard and pen, five or six hands could inoculate from 500 to 600 head a day.

In whatever way the operation is performed, or whatever sort of pen is used in inoculating, the tail ought to be kept steady; and where cattle do not pack so closely in the pen that they cannot move, short round rails should be put through the pen behind them at every other post; and if they are very small, their heads should be secured to a rail of the pen by a leg-rope.

(2.)—*The Virus.*

The virus is to be taken from the lung of a young beast in the *second* stage of the disease.

To select an animal in this stage, perhaps the surest plan in bush cattle is to gather up a mob in which there is reason to believe the infection exists, although none of them show any signs of being diseased, and drive them at a comparatively sharp pace for one, two, or even three miles. If any of them are affected, they will, after going a mile or two, begin to pant and blow, and perhaps to cough, and drop behind the mob, thereby showing that they are touched in the lungs. An animal behaving in this way when the disease is prevalent is almost certain to be a proper subject, and will give the right sort of virus. This is seldom to be obtained from one that shows signs of being diseased when not disturbed.

In quiet cattle, again, a veterinary surgeon or person accustomed to examine this class of cattle will be able by auscultation and percussion to pick out the right subject, if any of them are affected.

If the selection is a correct one, very little of the lung will be firmly hepatized, and none of it should be dark or mortified-looking; but while a portion of it has only reached the inflamed or congested stage, there will be found a soft jelly-like part which has quite recently become hepatized, and is plainly charged with quantities of lymph—*i.e.*, clear virus. The part indicated will be known also by the comparatively bright light colour and fleshy appearance of the brown portion of the hepatization or marbling. This is the part to be used, and the virus when extracted should have but a very slight tinge of blood. The part of the lung thus selected is to be placed in an earthenware dish, and to be cut up in small pieces, when the greater portion of the virus will flow from the lung and can be poured off. The pieces may then be put into a cloth of open texture, and the virus still remaining in the lung gently expressed from it. The operation of collecting the virus should be carried out in as cool a place and the virus exposed to the air as little as possible. The whole virus thus obtained should be filtered through a piece of fine muslin into a clean bottle in the first instance, and then through a thin layer of powdered charcoal. This is the plan adopted by the best authorities in Germany, and it has only to be mentioned to recommend itself to those who intend to perform the operation, as they ought to do, with nicety and care.

Lymph or matter taken from the part inoculated after it has assumed a sort of pustulous head has been found to be fully as active and apparently as effective as virus taken from the diseased lung; but the quantity of lymph procurable in this way is comparatively small, and only enough to operate on a few head, even when a great many cattle have been inoculated. Sufficient virus or lymph could therefore, never be procured in this way to inoculate a herd of bush cattle.

Virus taken from the *newly hepatized portion* of a lung in a too advanced—the *third* stage of the disease—has been used with good effect so far as the protection of stock inoculated is concerned; but a very much larger percentage of excessive and dangerous swellings are certain to result from the use of such virus than when it is taken from a lung in the right stage of the disease, and it should never be used unless where it is impossible to obtain the right sort of lung.

Some owners, again, have inoculated with the serous fluid found in the cavity of the chest, in cases of hydrothorax—the wet form of the disease. As, however, hydrothorax is more properly a sequence than a stage of pleuro-pneumonia, and as hydrothorax

may arise from other causes, this fluid can contain little or none of the proper virus, and must be comparatively useless for the purpose of inoculation. There is certainly, in the dry form of the disease, a small quantity, and only a small quantity, of virus almost always obtainable in the cavity of the chest near the lung; but unless the inoculator has had considerable experience in selecting virus, it would be safer to use only what can be procured from the lung in the stage already described.

While in Europe I had the pleasure of meeting Dr. Willems, of Hasselt, Belgium, who was the first to propose inoculation for pleuro-pneumonia, and I am indebted to him for a great deal of valuable information as to the proper mode of inoculating. He directs, in obtaining the right virus, "to take the serous matter which floats upon the liquid expressed from the infected lung in the *first* or *second* stage of the disease, as the virus "most easily obtainable for inoculation." To obtain the virus in this way, however, the temperature would require to be lower than it generally is in Australia, and the process would besides entail great care and considerable delay. It will be found better, therefore, to adopt the plan of filtering the virus recommended above, which ensures its perfect purity and the total absence of anything that would be deleterious in the shape of the fleshy part of the lung or even of the blood—without incurring the delay and requiring the care which the other process necessitates.

(3.)—*Preservation of the Virus.*

Too great care cannot, in a climate such as ours, be bestowed in keeping the virus perfectly sound and inodorous, in order that it may be thoroughly efficacious. If exposed in the least to the air in the summer season it will become putrid in less than twenty-four hours, and it will do so in two or three days when carefully corked and kept in a comparatively cool place. If it becomes putrid it is useless; for we know that medical students, in dissecting bodies—such as those in which death has resulted from erysipelas—may do so with impunity, although their hands are very unsound, after putridity has set in, while a short time after death inoculation from such bodies of the slightest scratch would be most dangerous, if not fatal.

Many attempts have been made to preserve virus, but with indifferent success; and it appears very questionable whether the articles sold as "Preserved virus or lymph," or under some more high-flown appellation, be not worse than useless. It *might* perhaps be possible, by using comparatively large glass tubes, to preserve virus in the same manner as vaccine lymph is saved—by filling the glass tubes and hermetically sealing them. But this mode has not yet been adopted, and practically speaking it is not necessary; for any owner requiring to inoculate his cattle before the disease has shown itself among them, can always obtain a supply of virus on its coming within a day's ride of his station.

A good practicable mode of keeping virus sound for a time is to fill the bottle—which should be thoroughly clean and provided with a good cork—in which the virus is to be put with the fumes of sulphur, and then to pour the virus into the bottle, carefully corking and sealing it before the fumes are all expelled. By adopting this plan and keeping the bottle in a cool place, *i.e.*, a cellar, old well, or hole dug for the purpose, with a wet cloth constantly around it, so as to keep the temperature as low as possible, virus can be preserved, at any rate, several days longer than it would otherwise be, which is a great advantage in inoculating a herd. Another, and perhaps a better mode is to pour some oil on the top of the virus, which excludes the air and keeps the virus fresh till required, when the oil can be poured off—the bottle being kept in a cool place and wrapped in a wet cloth as already directed.

Some of the advocates for the preservation of virus also modify or weaken it; indeed they cannot accomplish their so-called preservation without doing so. But it must be apparent that this intentional modification or weakening of the virus is very absurd, when it is considered that the chief object to be aimed at, in carrying out the operation of inoculation, is the certainty of its taking effect; for if it fails in only a few cattle, the disease is kept alive in the herd, and the benefit of the inoculation is to a great extent lost. Since it is all but impossible to say from the appearance of bush cattle after inoculation whether or not it has taken a proper effect, it is much better rather to over-do than under-do the operation, and make the matter a certainty, even at the expense of a few losses through excessive swellings. The losses from inoculation when properly performed, with unmodified virus never need exceed 2 per cent.—they are generally less; and it is believed that with the modified article the percentage is as great, while the operation must undoubtedly fail in innumerable instances. Glycerine and white sugar are the ingredients used in modifying and preserving virus; and there is no doubt but that the preservation is complete, whatever the effect on the efficacy of the virus may be. Some owners, I believe, regularly preserve virus in this way, and inoculate their calves at weaning time; and this plan recommends itself in as far as it involves very little trouble and *may* in many cases be effective; but calves should never be inoculated at the time they are cut.

If after being allowed to stand in a cool place the virus coagulates, it will again become liquid by shaking.

The supply in use should be kept in comparatively small quantities in small wide-mouthed bottles, which should also be provided with air-tight corks or stoppers, and be left as seldom open as possible—only while the thread is being saturated.

(4.)—*Time and Mode of Inoculating.*

Where the disease has broken out in a herd, the cattle should be disturbed as little as possible. In inoculating, they should therefore be quietly mustered and yarded in small mobs, and they should on no account be unnecessarily rushed or knocked about in the yards or inoculating pen. Unless when the disease is making rapid progress in a herd, cattle should never be inoculated in very warm weather, as there would then be considerable risk of serious loss through gangrenous swellings. "Generally speaking, "the weather in the height of summer is too hot for an operation "of this description, even when performed on quiet cattle; and it "can easily be seen how very much more likely it would be for "these swellings to occur at that season of the year in the case of "comparatively wild 'bush' cattle, which are always heated and "excited when yarded, and almost maddened by the operation in "the inoculating pen."

Dr. Willems says, on this point—"The most favourable time for inoculating is spring or autumn. The strong heats of summer especially are very injurious. This precaution is strongly recommended by the Honorable President of the Netherlands Commission."

The safest and most efficacious mode of inoculating is to use what may be termed an elongated spaying needle, from five to six inches in length, with the point but slightly curved or turned up, and ground as thin as possible,* and to draw a thread of soft twine, cotton-wick, or worsted, of two thicknesses, well saturated with virus, twice through the upper or outer side of the tail, about $1\frac{1}{2}$ inch from the tip; and having done so, without drawing the stitch tight, to cut off the thread, leaving about 1 inch out of the incision at each end, like a seton, twice inserted and left untied. The double insertion renders the effect of inoculation much more certain—a most material matter, since it is so difficult to discover whether or not the virus has taken effect—while experience has proved that this mode of operating does not increase the risk of bad swellings. The tail should be closely clipped with a sheep-shears around the proper spot; and in operating the needle should be carefully inserted just deep enough to reach the blood and no farther; in fact, the least possible grip or hold is sufficient; and every care should be taken not to lacerate the bones or any of the larger muscles of the tail. If the needle is put in at too great a depth, bad swellings and perhaps deaths are certain to follow.

Some operators use a needle or instrument with the eye near the point and a handle like that of a bradawl. They thread this with short pieces of soft twine, worsted or candlewick, which have been saturated in virus, and inoculate by pushing the needle

* Needles of the right description can be obtained of Messrs. Lassetter & Co, Sydney.

through the tail, placing their finger on one end of the thread, and withdrawing the needle leaving the thread in the wound. This is no doubt the handiest as well as the quickest mode of operating with the thread; but is by no means so exact or safe as that with the elongated spaying needle; for with it, and using the forefinger as a guard, while he leaves only about a *fourth* of an inch of the point of the needle extending beyond his finger, the operator can make an incision at the exact depth he requires, and the tail is seldom or never wounded deeper than it ought to be, even when the animal—which not unfrequently happens—is very unsteady. With the handled needle or instrument, again, no guard whatever can be applied, as its point must protrude for 3 or 4 inches beyond the operator's hand; and, if the beast is at all restless or sometimes even when it is quite steady, he must make a much deeper incision than he ought to do, and thus induce dangerous swellings. Besides this instrument is comparatively thick and broad, and must wound the tail to a much greater extent than can be safely done in inoculating.

It will be obvious that the tail of the animal is the proper place to inoculate, not only from being the portion of the body with which it can most easily dispense in case of any bad effect following the operation, but chiefly because it is the most remote from the more vital organs of the animal.

The operation should, like spaying, be steadily and carefully performed, and not bustled or hurried over as cutting and branding generally are.

To economize virus, only about three or four inches of the thread should be saturated at a time, and it should be so for every head of cattle.

A spaying needle may be used when the proper inoculating one cannot be obtained, but the longer is the better, both on account of the operator being able to hold it more firmly and steadily in his hand, and from its making a better opening, whereby a healthy discharge of virus is encouraged.

Making a slight incision in the tail and placing a drop of virus in the wound, or using a grooved inoculating knife, is a more expeditious mode than the needle and saturated thread, but it is not nearly so certain, as the blood from the wound is apt to carry off the virus before it has done its work; nor is it so safe, for as clean wounds in cattle are apt to close, the comparatively clean wound thus made in inoculating with the knife not unfrequently does so, and the discharge stopping, dangerous consequences ensue. This the thread, by acting as a seton, to a great extent prevents.

Dr. Willems' mode of inoculating is as follows:—"The operation is performed upon one of the front sides of the extremity of the tail, by means of two punctures with a lancet, distant from one another two or three finger widths. The operation is per-

formed by just scratching the skin, somewhat after the same manner as vaccination is practised on a child. This being done, the animal is let go to his usual run, without further care. As soon as the part becomes visibly inflamed, it is necessary to cause it to discharge, by administering three or four grammes (*i. e.* 40 to 60 grains) of sulphate of magnesia, according to the animal's strength."

It will be observed that Dr. Willems inoculates with the knife or lancet, and not with the thread or seton, as here recommended. A little consideration, however, will show that the circumstances under which cattle are inoculated in Belgium are very different from those in which they are operated upon in these Colonies, and that a different mode of inoculating should be adopted. In Belgium, the cattle after being inoculated can always be seen and examined twice a day, and the necessary medicine can be administered to them to promote the discharge from the inoculation wound, which is so essential to the safety of the operation and the freedom from excessive swellings. This, with all but an exceedingly small proportion of our cattle, and especially with ordinary "bush" herds, is of course entirely out of the question. It is necessary, therefore, that the mode of inoculating should be such as will be the most likely to promote this discharge; and it has been found, as might have been expected, that the thread or seton does this much more effectually than the knife or lancet. The former mode should therefore be adopted in preference to the latter.

(5.)—*Apparent Effects of Inoculation.*

On some of the cattle in a herd the effect of the operation begins to be observable about the 5th day, and in the majority of them between that and the 18th or 20th day. On some, again, the effect is not noticeable till the 25th or 30th, or even the 40th day, while in some no effect whatever is perceptible.

The perceptible effect following inoculation, in those cases where no dangerous or fatal consequences follow, will range from an apparent stiffness in the tail, with a barely perceptible increase in its thickness, to an enlargement of half its natural girth. This swelling, however, most frequently amounts to an increase in the thickness of the tail of barely a fourth of its ordinary girth, and the seat is usually immediately above the inoculation wound, extending for two or three and sometimes four inches upwards, growing gradually thicker as it ascends.

Shortly after these swellings are observable, scabs begin to be formed around the inoculation wounds; and where the swelling is at all considerable, the scabs sometimes quite encircle the tail, while in other cases they are only of small extent. Under these scabs are collections of matter, greater or less, according to the size of the scab and the extent of the swelling.

Dr. Willems says, in regard to the effects of inoculation:—
 “When inoculation is practised, as we have just described, the lips of the little wound which have just been caused to discharge first become dry and then covered with a slight crust adhering to the surface. Then usually after a period of incubation of sixteen days—rarely before, frequently after—an inflammatory swelling or tumour manifests itself around the spot where the inoculation had been effected, hard, hot, painful to the pressure, generally well rounded or circumscribed in shape, involving, in exceptional cases, a large extent of tissues, which often become gangrene. In ordinary cases this swelling develops into a kind of pustulous head (which shortly bursts and becomes covered with thick crusts, which stick together), but sometimes fall off, leaving a sore of an ulcerous nature, which eventually exhausts itself and heals up completely.”

“It is important, for an inoculation to be effected successfully, for the operator to carefully observe this head, or rather inflammatory boil. Although animals upon which the local symptoms have not been observed (after an operation as above) may be safe,—it is very prudent, nay even necessary, to submit them to a re-inoculation three or four weeks after the first attempt of which the results had not been apparent.”

Although in operating on the great majority of our cattle it will not be possible to carry out the portion of Dr. Willems’ instructions which direct re-inoculation where the effects of the operation are not observable, it is so in regard to cattle running in moderately sized paddocks, and especially with respect to stud-herds; and in their case they should be strictly followed.

(6.)—*Remedies for Excessive Swellings.*

As excessive swellings and gangrenous gatherings not unfrequently follow inoculation, even when properly and carefully performed, it is necessary to consider how these may be best counteracted. If the cattle are quiet, and can be inspected and handled, they should be so twice a day for a month at least after they are operated on; and if the tail near the part where the needle entered, or anywhere else, appears to be dead or mortified, it should be cut off at the first sound part immediately above where it appears to be dead.

When, however, serious swellings take place at the butt of the tail, experience shows that it is better not to cut the tail off close or near to the rump; but blood-letting, by making longitudinal incisions in the under side of the tail near to the butt, as well as cutting it off at the sound part above and nearest to the spot inoculated, have a beneficial effect. It will be seen on considering the subject that cutting the tail off close to the rump, where both the bone and muscles are comparatively large, and where of course

the operation would be attended with very much more pain—greatly increases the inflammation, while it has little or no effect in relieving the obstruction caused by the swellings, as they are generally seated in the rump; and that the effect of cutting the tail off close to the rump would rather be prejudicial than otherwise.

When taken at an early stage, while small and soft—only just noticeable as beginning to swell or puff, and not larger perhaps than half the size of a hen's egg—these gatherings at the butt or cheek of the tail may generally be counteracted by inserting a pledget of tow well saturated with a mixture in equal proportions of butter of antimony and Venice turpentine, in an incision made with a good-sized pocket-knife in the swelling, right through the centre, till the sound flesh be reached at the back. The mouth of the incision should be downwards so that the discharge may readily run off. This dressing should be renewed *three* or *four* times, at intervals of two days. To be thoroughly certain in its effect, this remedy must be applied while the gathering is comparatively small and soft, and while it has not reached the hard and indurated stage; and the utmost vigilance will be necessary to catch it at the right stage, as it frequently passes in less than twenty-four hours from the one to the other. Thus, if to-day a slight swelling, or, more properly speaking, a mere puffing, is noticed at either side of the butt of the tail, where it joins the rump, the chances are, if it is not treated as recommended, that by the same hour next day, or perhaps even next morning, a hard, indurated, gangrenous swelling, some three or four inches in circumference, will have gathered at perhaps both sides of the tail, causing the animal great pain, and seriously interfering with the fœcal and, it may be also, with the urinal passages.

Although "bush" cattle cannot be inspected and handled like quiet, broken-in stock, they should, where practicable, be kept in a paddock for a month after they are operated upon, and be examined once at least every day; and if they appear to be at all swollen at the butt of the tail they should be brought in and treated as suggested. Even when turned out on an open run after being inoculated, cattle should be as closely watched for a month afterwards as possible. By putting on a few additional hands, who would go carefully through the cattle for this purpose, many deaths would be prevented.

Where the cattle are worth the trouble, they might be cured, even after the swellings have reached a dangerous length, by ripping open the skin and cutting away the gangrenous gathering, when the proper dressing could be applied and the skin sewed up; or, what is nearly as effectual and much less troublesome, these gatherings might be well opened and scarified to a good depth, so as to allow the blow-flies to get into the incisions and work

there for a few days, when it will be found that the greater portion of the gangrenous matter will have been separated by the maggots from the sound flesh, and can be removed with a pincers. When this is done, the maggots can be expelled with turpentine and a dressing kept on till the wound be healed up.

Dr. Willems says, with respect to this part of the subject, that “the animals inoculated ought to be looked after carefully for from the 5th or 6th day after the operation; and immediately a swelling is observed surrounding the spot operated on, make in it a long and deep incision, causing the blood to flow freely, and exciting the sore to suppurate, by introducing a tow plaster of some irritating substance, such as black soap or blistering ointment. Mons. Mazure, Veterinary Surgeon at Valenciennes, introduces deeply into the sore an iron heated to a white heat.

“Immediately the end of the tail is observed to mortify, cut it off at the sound part, and this is the surest way of stopping the spread of the gangrene.

“Such are the observations and practical suggestions—the results of long experience—which we confidently offer to those who study inoculation for pleuro-pneumonia. In following them, they will avoid the serious accidents often resulting from the *mode* of inoculation itself, and which in reality should only be attributed to the ignorance and inexperience of the operator.”

In inoculating, care should be taken that none of the virus gets into wounds or scratches in the operator's hands or arms, as threatening and rather dangerous results have sometimes followed where the virus was allowed to remain on wounds for any length of time.

8.—OTHER TREATMENT THAN INOCULATION.

With respect to the many sorts of treatment tried for the cure of pleuro-pneumonia without success, and the thousand and one specifics said to have been discovered for the purpose, but which all have failed, Dr. Willems says:—“An innumerable host of means, both interior and exterior, to combat pleuro-pneumonia, have been puffed up and used, such as tartar-emetic, nitre, camphor, sulphate of iron, purgatives, bleeding, blistering, setons, &c., &c.; but they have all terminated, so to speak, with negative results.”

II.—CATTLE PLAGUE.

1.—NAME, HISTORY, AND CHARACTERISTICS.

The proper name for this affection is "Steppe Disease," its true home being in the Steppes of Russia. It is known in Germany as "Rinderpest," and in England as "The Cattle Plague." It can be identified as existing so long as 1,400 years ago; and there is little doubt but that the greater part of the deadly outbreaks of disease in domestic animals, and of the tremendous losses of stock which have frequently occurred in Europe, from time immemorial up to the present date, have been caused by this horrible scourge. The cattle plague almost always followed the course of the great Continental wars, and generally carried off more stock than the invading armies. This is only what was to be expected in outbreaks of such a highly infectious and deadly disease, the average percentage of deaths in animals attacked with the cattle plague being even now, under the most skilful treatment, rather over than under 80 per cent.

2.—NATURE.

The cattle plague is a highly contagious fever, with inflammation and specific lesions in the alimentary canal, which correspond with those of typhoid or enteric fever in man. It is most infectious, and its germs may be conveyed to sound stock in hundreds of ways.

Incubation.—The period of this extends from twenty-four hours to ten days, and the attack from five to fourteen days.

3.—SYMPTOMS.

In the first stage, some of the symptoms are to the unpractised observer very much like those of foot and mouth disease; but in cattle plague the internal heat increases by from 2 to $2\frac{1}{2}$ degrees Fahr. The visible membranes, especially around the eyes and on the nose and lips, are dry, red, and hot, but the redness is partial and patchy; the animal shivers, it has often a short husky cough, its coat stares, it loses its appetite, its secretions are arrested, &c., &c.

In the second stage, there will be drooping head, distressed look, hanging ears, failing pulse, strong catarrhal symptoms, incessant grinding of the teeth, and eruptions on the nose, lips, mouth, and tongue, with a copious flow of saliva from the mouth, fetid breath, laboured breathing, painful cough, arched back, intense thirst, tender loins, &c., &c.

In the third stage, there will be eruptions spreading over the nose and face, round the coronet and between the clefts of the hoof; ulcers and tumors forming on different parts of the body; finally paralysis and death, putrefaction setting in, as it were, previous to death.

4.—TREATMENT.

No treatment is of any avail, and all the best authorities recommend the immediate and thorough destruction of the diseased stock and every particle of fodder likely to contain the infection, in order to ensure the eradication of the disease.

5.—CATTLE PLAGUE IN ENGLAND.

The first outbreak of cattle plague in England on record was in 810, the next in 1225, the next in 1714, the next in 1745, which raged for several years, and carried off great numbers of stock; the next in 1769, which also caused heavy losses; the next in 1835, a very serious one; and the last in 1872, which was speedily and vigorously dealt with, and stamped out with comparatively little loss.

For the future, so far as England is concerned, the regularity and certainty with which the officers of the Veterinary Department, London, are now supplied with telegraphic information by Her Majesty's Ambassadors and Consuls, as to the prevalence of cattle plague and other diseases among domestic animals on the Continent, and the system of inspection adopted at the ports where the foreign stock are landed, almost preclude the possibility of the introduction of that disease; and it is at any rate certain that, if it should by any chance evade the notice of the Inspectors, it will be speedily stamped out.

6.—CATTLE PLAGUE ON THE CONTINENT.

From what has been said it will be gathered that there are some parts of the Continent which from time immemorial have never been free from cattle plague, and that it has frequently decimated the stock in almost every Country in Europe. It is always more or less prevalent in the Steppes of Russia, and the same may almost be said of the adjoining provinces of that Country and of the Danubian Principalities, and to some extent of the north-eastern portions of Austria. Notwithstanding the vigilance of the Customs and Veterinary authorities in Prussia, cattle plague has been frequently introduced into that Country, but every invasion of the disease has been promptly and rigorously attacked, and the infection speedily eradicated.

In Austria, again, although similar regulations are in force, they have not been so successfully carried out. This has no doubt been in a great measure attributable to the more extended border which Austria has to protect; to its territory lying more adjacent to the Steppe Country; and to the cattle in Austria and Hungary being in much larger herds and less under control.

There were several outbreaks of cattle plague in both Prussia and Austria while I was in England, but I was unable, on account of the prevalence of cholera in these Countries, to visit them until the cold weather set in and the cholera had abated. I reached Berlin in the end of November last, when I found that the latest case of cattle plague in Prussia (which had occurred at Oppeln, in East Prussia), had shortly before been effectually dealt with. I then heard of an outbreak at Kirchdorf, in Upper Austria; but there again I was too late, as the infected cattle were killed and buried two days before my arrival, and all I saw was the newly made graves where the stock were buried and the guard of soldiers around the infected ground. I waited in the neighbourhood for some days, but no further outbreak occurred, and I had to leave without seeing an animal affected with the disease.

I see by the latest accounts from Home, that a serious outbreak of cattle plague has occurred in Switzerland, most likely from infection from Upper Austria.

III.—FOOT AND MOUTH DISEASE.

1.—NAME, HISTORY, AND CHARACTERISTICS.

This disease is of unknown origin. It is known in England as the "Epidemic," "Demic," "Tic," "Blisters," and "Foot and Mouth Disease"; in Scotland, as the "Murrain"; and professionally as "Vesicular Aphtha." It is a blood disease arising from animal poison. It is not indigenous to Great Britain, and is always more or less prevalent on the Continent. It is also common in Asia. Foot and mouth disease is highly contagious, and communicable from one animal to another like pleuro-pneumonia or cattle plague; but unlike these affections, one attack of foot and mouth disease does *not* ensure the animal from second or subsequent attacks, should it again come within reach of the infection.

2.—NATURE.

Foot and mouth disease assumes the form of an aphthous eruption on the gums, mouth, and tongue, and also on the feet of the animal attacked. It attacks cattle, sheep, goats, and pigs,

and even wild animals. This and cattle plague are the most infectious diseases in stock. In both diseases the infection has been often wafted across a road, and carried considerable distances in men's clothes; while numerous instances are on record where stock which merely crossed the track of diseased animals have become infected.

The *incubation* varies from twenty-four to ninety-six hours, and the attack from ten to fifteen days. In aggravated cases the disease may last a month or more, and in that case there will be sores and ulcers on the animal's body.

The average deaths directly attributable to the disease range about 2 per cent.

3.—SYMPTOMS.

These are shivering, dulness, staring coat, cough, loss of appetite, fetid breath, frequent movement of the jaws, vesicles on the gums, lips, tongue, red membrane of the mouth, great discharge of mucus from the mouth, smacking of the lips, champing of the jaws. Accompanying these, but sometimes without them, are lameness and great heat, and tenderness around the hoofs and between the clefts; and in the females, eruptions on the teats and udders. In sheep and pigs, the disease falls very heavily on the feet, and they frequently lose their hoofs altogether.

4.—TREATMENT.

The best treatment is rest, gruel, mash, and a cooling lotion for the mouth.

5.—FOOT AND MOUTH DISEASE IN GREAT BRITAIN.

The first well-authenticated case of foot and mouth disease in Great Britain occurred in 1839. It then spread with great rapidity, and the outbreak which was a very severe one, lasted for several years. Since then there have been frequent outbreaks. Those of 1852-4-5, 1862 and 4, being the most serious until that of 1869 occurred. In that year the disease soon became widely disseminated and only began to abate in the beginning of 1873. It is estimated by good authorities that this visitation cost the Country more than £40,000,000, although the direct death rate of the disease seldom exceeds 2 per cent. The loss mentioned was caused principally by the great waste in the condition of the fat stock which were so generally affected, and through cows casting their calves when attacked, and never breeding again. This latter feature of the disease was particularly noticeable in the case of highly bred cows; and some of the owners of pure herds have had to dispose of 50 per cent. of their cows to the butcher, which were regular breeders before they were attacked, and many of which they could have sold at prices ranging from £100 to £1000.

On my arrival in England in the beginning of July last I made particular inquiry as to the prevalence of this disease, and found that it had nearly died out. Professor Brown then informed me that he only knew of a few cases in the whole kingdom. This diminution of the disease arose partly from the operation of the regulations promulgated under the Contagious Diseases (Animals) Act, although they had been put in force in an exceedingly partial and ineffective manner—partly through the usual cessation in the traffic of store stock during the winter months,—and partly through the outbreak having in many instances exhausted itself. While I remained at Home I made constant inquiry with regard to the existence of the disease in the different parts of the country which I visited, but did not meet with a single case; and during the whole time I only heard of one outbreak other than those mentioned by Professor Brown.

Again, in August last I was informed by that gentleman that he was not aware of the existence of a single case of foot and mouth disease in the Country; and on leaving London for this Colony in the end of December last, he stated that there were only two or three cases of the disease, so far as he was aware, in the whole of Great Britain and Ireland,—that, in fact, the Country was then freer of foot and mouth disease than it had been for five years previously.

6.—FOOT AND MOUTH DISEASE ON THE CONTINENT.

This ailment is generally very prevalent on the Continent. It was, however, less so than usual last year, and I could hear very little of it either in Belgium, Germany, or Austria. There the time of the Inspectors is so much taken up in protecting the stock in their charge from cattle plague and pleuro-pneumonia that comparatively little attention has as yet been devoted to the eradication of this disease.

IV.—SMALL-POX IN SHEEP.

1.—NAME, HISTORY, AND CHARACTERISTICS.

This disease is described by Professor Armatage, in his edition of "Clayter's Cattle Doctor," published in 1870, as follows:—

"*Synonyms*.—Sheep-pox is known by various appellations. In technical language it is termed "*Variola ovina*," and in the vernacular "*Small-pox*." It is the "*Schafpocken*," "*Schafpocken-seuche*," and "*Schablatern*" of the Germans. In France it is known as "*Claveau*" or "*Clavelée*"; but "*Rugeole*" and "*Picotte*" are terms employed to denote small-pox. In the Italian language it is called "*Vajuolo pecorino*."

"*History*.—This affection was not seen in Great Britain before the year 1847, when it was imported from the coast of Denmark, and from Holland, and probably also at the same time from Spain.

Extensive outbreaks occur annually on the Continent, which are more or less aggravated by the trade carried on, and the calls for extensive movement of stock towards the ports of embarkation. Russia, Prussia, and Austria probably suffer most; Greece is seldom free; and Germany, Hanover, and Saxony have occasionally suffered; while Holland, Friesland, Belgium, and particularly France, in consequence of large importations annually made, have become powerful centres of the malady. In Russia it is said to be stationary, and travelling westwards to Holland we have received it from thence.

"Small-pox has proved fatal in sheep to the extent of 20 to 40 per cent. in France, while in England the mortality amounted to 50 per cent.; and this may be looked for under conditions which characterize epizootic affections when introduced to the stock of a clean Country far removed from the home of their birth.

"We have but imperfect records in reference to this malady, but from what has transpired we may not be unreasonable in believing that small-pox had visited this Country before the memory of the present generation. Since 1567, when first accounts were written, outbreaks of more or less intensity have occurred over the Continent, from which scarcely a nation has not at some time or other suffered very acutely. Spain and Portugal have had cause to regret that Africa offered such facilities by its close proximity, as diseased sheep have readily passed thence by the Straits of Gibraltar and spread dismay around."

2.—NATURE.

"A malignant and specific variolous fever peculiar to sheep, and occurring but once as a rule in the life-time of the individual. It is rarely communicated to other animals, but when it does occur in them, its characteristics are those of mildness and evanescence.

"Sheep-pox spreads rapidly by contagion and infection, and from frequent observation it has been decided that a healthy flock is not secure from attack at a distance of 500 yards from affected animals. Like the poison of cattle plague, that of small-pox may be carried in the clothes of persons, in fodder, in the skins of other sheep and animals, in hair and wool, &c. Dogs, vermin, and game also become carriers of the contagion. In pastures, stables, railway trucks, in fact wherever diseased sheep are allowed to go, the virus is left behind and communicated to all that follow.

"Where it is the practice to house the sheep, a heavy mortality occurs, which increases in proportion to the amount of overcrowd-

ing that is allowed. It spreads rapidly in a flock, and few escape; while the major portion die under these conditions, which are considerably modified when the animals are allowed their liberty as means of reducing actual contact.

3.—SYMPTOMS.

“Sheep-pox is characterized by a period of incubation which may vary from a week to a fortnight. During this there are no signs of disturbance, and the animal comes under the head of ‘infected.’ Certain conditions tend to modify the incubation stage, and delay the appearance of symptoms. When the disease is induced by inoculation, the earliest manifestations may occur about the third or fourth day, but may be delayed some weeks. Hot weather and confinement to close warm situations eminently favour their development; but cold, exposure, and other conditions conducing towards a healthy tone of the system will retard them, and delay their appearance until the fifteenth or even the twenty-fourth day.

“The first signs are those of dulness succeeded by febrile shakes: this is the period of invasion. The skin, particularly of those animals but slightly covered with wool, exhibits a ‘flea-bitten appearance,’ each spot becoming more inflamed and enlarged, and forming what is known as a papula: this is the eruptive stage. The papula then are elevated and transparent from the *eighth* to the *tenth* day, and are filled with a clear liquid which speedily appears turbid, denoting a change from the papular to the pustular stage. The swelling is white at first, but with the changes just noticed assumes a yellow colour and opaque appearance, while the surrounding parts are very pale. Shortly, the elevation becomes diffuse and the pustule dries up; over which a scab is formed, which, when it falls off, exposes a depression in the skin.

“The constitutional symptoms run very high at times, in accordance with the amount of eruption that takes place. In these cases the papula are very abundant and unite—a condition which is termed confluent. The eyes discharge a purulent secretion; they are blood-shot, and intense thirst tortures the poor creature. The breathing becomes quick, discharge also flows from the nostrils, the mucous membranes assume a blue appearance, breath becomes fetid, and with the cutaneous exhalation is almost unbearable. These symptoms suffer modification or aggravation, and the animal dies about the *eighth* day after the eruptions appear, but before the formation of lymph has taken place. It may, however, occur earlier or even later; and mild cases that are limited to slight fever and a rapid transition of changes, may exhibit approaching convalescence in fifteen days—others are delayed for a month.

"Irregular forms are observed, such as the non-appearance of eruption. The fever is intense, strength gone, internal swellings take place, and profuse diarrhoea carries off the animal. The mucous membranes become the seat of the eruption, especially those of the respiratory and digestive organs, when imminent danger is manifest. The animal breathes through the mouth, and the tongue is protruded. Sometimes the disease affects the joints, and the hoofs slough off; and the healing of wounds becomes very difficult if the scabs are too precipitately removed. At other times the vesicles fill with blood, or become receptacles for gaseous accumulations, which result from the process of decomposition, analogous to that observed in cattle plague and other malignant affections.

"The *post mortem appearances* of small-pox are somewhat as follows:—The body is considerably swollen from early decomposition, and gives off a very fetid odour; the eyes and nose are usually closed by dry discharges; scabs of dried pustules stud the lining membranes which, with the skin and other affected parts, exhibit the characteristic eruptions. If the wool has not been detached during the intolerable itching which occurs before death, it now easily comes off—sometimes it absolutely falls off. *Vari* or nodules occur in the skin and all parts of the body, and are readily seen during the removal of the integuments. These are characteristic, and serve to form a sure guide to the affection when other signs on parts of the body are absent. Those nodules also occur upon the mucous membranes of the digestive track. Sometimes they assume the character of yellowish or red spots, and at others ulceration has progressed to some extent. Besides these, the tissue beneath is infiltrated with serum, particularly in the extremities; lymphatic glands are enlarged, inflamed, and covered with red spots.

4.—TREATMENT.

"The treatment of small-pox, in all parts and of whatever kind, has hitherto been attended with results no less mortifying than that which was adopted in cattle plague. Medicines, so far as we at present know, throughout the world, have no power of destroying the poison or cutting short its progress; but while animals are allowed to live they breed the poison, and other animals serve to propagate and spread it farther and wider."

5.—SHEEP-POX IN ENGLAND.

As already stated, the *first* recorded outbreak of sheep-pox occurred in 1847. It was extremely fatal, the deaths in several instances ranging up as high as 75 per cent. It spread over a con-

siderable part of the country, and only ceased in 1850, principally through slaughtering the infected sheep.

The *next* attack occurred in 1862, and continued for several months.

The *third* visitation was in June, 1865. Active measures were at once adopted, and the disease was stamped out with the destruction of the flock first affected.

The *fourth* outbreak occurred in January, 1866, and was eradicated in the same way.

The *fifth* and *sixth* outbreaks occurred later in 1866, and the attacks were so very mild that the slaughter of the affected sheep was not resorted to. They were placed in strict quarantine, and the disease shortly disappeared.

Since then there have been no outbreaks of sheep-pox in England, although no less than *thirteen* different lots of sheep, shipped from the Continent, have been seized and slaughtered by the Inspectors at the ports of debarkation as being infected with small-pox—the last in 1871.

6.—SHEEP-POX ON THE CONTINENT.

From what has been said, it will be gathered that visitations of sheep-pox are not infrequent in almost every Country on the Continent. Last year, there were comparatively few outbreaks. The only ones of any importance were those in the North and North-eastern Districts of Germany.

As already stated, medical treatment has been found of little or no benefit for this disease; and inoculation has been resorted to as the only means (other than stamping out) for combating the disease; it alleviates the effects of the disease, and forces it to run its course within a specified time. The practice of inoculation is followed by all the highest veterinary authorities on the Continent.

Professor Brown speaks thus of the benefits of Inoculation for sheep-pox:—

“The argument against inoculation is the obvious one that it keeps up the disease in the infected district for a certain period, but the same statement might correctly be made of the negative course, which consists in allowing the infection to pass naturally to the susceptible animals.

“Experience justifies the conclusion that sheep-pox, when it appears in a flock, will extend gradually to nearly all the animals that have been exposed to its influence, and under these circumstances, if it is determined not to adopt the stamping-out system, it will be desirable to hasten the progress of the disease and moderate its virulence by having recourse to inoculation. The disease thus induced appears usually in a mild form, and is

attended with very little loss of life, while the animal is secured from a second attack as completely as it would have been if it had taken the malady in a natural way. Inoculation, to be successful, must be performed by a skilled person who is well acquainted with the character of the lymph which should be employed, and the means of introducing it into the animal's system. It has happened on some occasions when inoculation has been improperly performed, and especially when a bad quality of lymph has been used, that very serious effects have resulted. This, however, by no means detracts from the value of the operation when skilfully done.

"The inoculated flock will require all the veterinary care which would be given in the case of the animals having taken the disease in the natural way; and in the event of any of the inoculated animals having the disease in a severe form—which, however, is seldom to be apprehended—it will be desirable to isolate them, in order that they may be submitted to medical treatment.

"The advantageous results of inoculation are thus summed up in a report which was issued by Mr. Marson and Professor Simonds, in June, 1864:—'It gives security against a second attack of sheep-pox, it limits the period of the existence of the disease in the flock, it mitigates the severity of the malady, it saves the lives of many animals which otherwise would be sacrificed, and it controls the extension of the disease, as one confluent natural case does more to diffuse the poison than probably fifty ordinary inoculated cases would do.' The mortality from the inoculated disease when compared with the natural is on the average as *three* per cent. in the one case is to *five* per cent. in the other."

It will easily be seen from the foregoing description and statements that small-pox in sheep is like the analogous affection in the human subject—a foul, loathsome, and deadly disease; and that its introduction among our flocks would be most disastrous. No pains should therefore be spared to prevent such a calamity.

V.—ACTION SUGGESTED.

1.—PLEURO-PNEUMONIA.

From what has been said, it will be gathered that the efficacy of inoculation for this disease is now thoroughly established in Europe. It has long been so in Australia, and also in South Africa; and it has latterly been practised with decided success in the United States of America. I would, therefore, suggest, as I have already done on more occasions than one, that a law—

making inoculation compulsory in all cases where the cattle are *legally* infected, and prohibiting diseased animals from travelling—should be passed.

The legislation I would propose should contain some such provisions as the following:—

- (1.) The inoculation of all cattle legally infected should be made compulsory.
- (2.) Owners should give notice of the outbreak of the disease to their neighbours, to Inspectors, and to the public.
- (3.) None but properly qualified and licensed Inoculators should be allowed to inoculate for others.
- (4.) All inoculated cattle should be branded as such with a brand to be fixed upon.
- (5.) Properly inoculated cattle, on the expiry of *six weeks* from the last case of disease, should be allowed to travel; and such cattle should pass over infected ground without being deemed infected.
- (6.) Cattle which become infected, and are not inoculated, should not be allowed to leave their runs for *three months* after the last case of disease, nor travel over infected ground.
- (7.) Travelling cattle, if fat, becoming diseased, should be killed, and the balance of the mob taken to their destination by the roads least likely to spread the disease; while notice should be given to all owners of horned stock on the road that the mob was infected, in order that they may take their cattle out of the way of the infection.
- (8.) The owner of travelling stock should give notice of his intention to cross or pass along a run where stock of the same description are kept, if the road be not separated from the run by a sufficient fence.
- (9.) The drover should not abandon any infected travelling stock, nor leave the carcasses of any stock which may die undestroyed, under a penalty not exceeding £50.

It may be questioned whether such a measure as that here suggested would wholly eradicate this disease from our herds; but that it would reduce its ravages to *one-tithe* of what they now are is beyond all doubt, and it ought therefore to be enacted.

2.—CATTLE PLAGUE, FOOT AND MOUTH DISEASE, AND SHEEP-POX.

As these diseases can only be combated by isolating and destroying the infected stock, and as that course is quite impracticable in Australia, owing to the impossibility of maintaining a perfect quarantine, it is evident that *their introduction would bring utter ruin on the majority of our stock-owners, and inflict incalculable*

loss on all classes in these Colonies. No precautions should therefore be omitted to prevent such a calamity, and it was with this object in view that a prohibition against the importation of stock from all places outside the Australian Colonies was promulgated. While this is both a simple and effective safeguard, it is not one that can in all cases be always maintained, as it is necessary for the improvement of our stock that fresh blood should be periodically introduced. So far, however, as we are concerned, the necessary importations of fresh blood need not expose us to any danger, for all the importations we require for improving our stock can be obtained either from or through Great Britain.

Thus, all descriptions of *horses*, except the Arab,—which might be allowed to come from Arabia or India under special regulations,—can be got in Great Britain. Of *cattle*, again, there are no breeds which can benefit our own stock except those of Great Britain. And as regards *sheep*, all the breeds which it would be advantageous to import may also be obtained in England, except, perhaps, the few German merinos which some owners still continue to introduce, and these could come through England, subject to inspection by the English Inspectors and a probationary stay there of (say) *fourteen days*.

By the law of England Foreign Countries are divided, by Orders in Council promulgated as the occasion requires, into two classes—"scheduled" and "unscheduled." The "scheduled" Countries are those from which the officers of Her Majesty's Veterinary Department consider it dangerous, on account of the prevalence of disease, to admit live stock, and all animals coming from these Countries are slaughtered at the ports of debarkation. The "unscheduled" Countries, again, are those in which neither cattle plague nor any other infectious or contagious disease is known to exist, and from which it is considered safe to admit stock, subject to inspection and to a quarantine of twelve hours. To enable these officers to make this classification, they are regularly supplied by the British Ambassadors and Consuls in all parts of the world with telegraphic information as to the prevalence of diseases in stock. Under such a system as this, therefore, there is now very little risk of cattle plague foot and mouth disease, or sheep-pox, being introduced into England. Besides, arrangements might be made by which all stock from the Continent, intended for shipment to these Colonies, could be examined on the termination of their probationary stay, and immediately previous to shipment, by some properly qualified veterinary surgeon employed by the Colonies, and only allowed to be put on board on being certified by him to be free from disease. In fact, this course should be followed with respect to all stock intended to be shipped from Great Britain to the

Colonies, whether they have originally come from abroad or not. If it were the risk of introducing these diseases into Australia would be almost wholly removed; and if Great Britain and Ireland were free from foot and mouth disease, the prohibition now in force—so far as regards Great Britain and Ireland—might be removed, and stock from them admitted on their undergoing a safe quarantine in Australia.

As it is very essential, for the reasons which I have already stated, that the prohibition against the importation into these Colonies of live stock from Great Britain (which was principally aimed at foot and mouth disease) should not be continued any longer than is necessary, I suggested to Sir Charles Cowper the expediency of obtaining monthly reports from the Secretary of Her Majesty's Veterinary Department, London, as to the prevalence in Great Britain and Ireland of this and other infectious diseases in stock, for transmission to the Government here, with the view to action being taken for the withdrawal of the prohibition so soon as Great Britain and Ireland were free from foot and mouth disease, as they now are from cattle plague and sheep-pox. The suggestion met with his approval, and definite information on the subject may be expected by each monthly mail.

From no other part of the world (with the exceptions mentioned), should any stock whatever be allowed to be introduced into these Colonies; for while the animals that could be imported from other places would rather deteriorate than improve our stock, there is also very great risk that they would be the means of introducing malignant diseases among our cattle and sheep. This would be especially the case with stock from India and China, where cattle plague is now raging, and carrying off from 80 to 90 per cent. of the animals affected; and there cannot possibly be too great vigilance exercised by all the Colonies, but especially by Western Australia, South Australia, and Queensland, whose northern territory lies so near to Asia, in seeing that the prohibition is strictly carried out. If this is not efficiently done, we may find that foot and mouth disease, cattle plague, or some deadly disease peculiar to tropical Countries has been introduced by some comparatively worthless Timor pony, buffalo cow, pig, or goat, and is decimating our flocks and herds.

VI.—JOINT ACTION BY THE AUSTRALIAN COLONIES.

As has been already explained in my letter to the "London Veterinarian," it would be of comparatively little use for this Colony to enact any law for the eradication of pleuro-pneumonia,

or any other infectious or contagious disease in stock, unless *all* the Australian Colonies adopted similar measures and took simultaneous action; for, as has been already pointed out, cattle may be said to mix more or less from Carpentaria to Portland Bay, and would cross the boundaries of the different Colonies in spite of any number of boundary riders—travelling as they do by night as well as by day. It is therefore suggested, with the view of securing joint and simultaneous action by all the Australian Colonies, that the Chief Inspectors for these Colonies should be invited to meet in Sydney at as early a date as possible, on something like the same footing, and with the same objects in view as the veterinary surgeons from the different Countries of Europe met at the First International Congress at Hamburgh in 1863, viz.:—

1. To ascertain the extent of the prevalence of the different infectious and contagious diseases among our stock.
2. To trace the manner in which these diseases are introduced and disseminated; and
3. To decide as to the most effectual means of preventing their introduction and spread, and to convey to the several Governments interested the conclusions arrived at, with a view to the initiation of uniform legislation for the protection of our stock from disease.

And in order to render the conclusions of the proposed meeting as sound and practicable as possible, a veterinary surgeon from each Colony should also attend to assist the Inspectors in their deliberations.

I cannot conclude my Report without acknowledging how very much I am indebted to Sir Charles Cowper for so promptly placing me in the best possible position, both in England and on the Continent, to obtain information, and being always ready to afford me the benefit of his advice and assistance in the prosecution of my inquiries.

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