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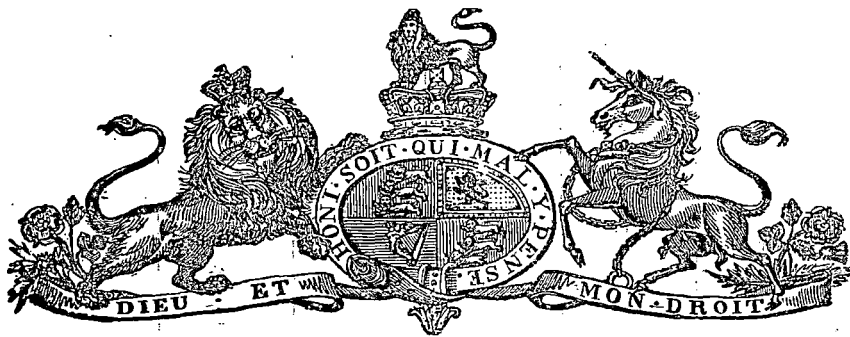
1884.

PARLIAMENT OF TASMANIA.

TUBERCULOSIS IN RABBITS :

REPORT BY ARCHIBALD PARK, M.R.C.V.S.

Presented to both Houses of Parliament by His Excellency's Command.



REPORT ON TUBERCULOSIS IN RABBITS, BY ARCHIBALD PARK,
M.R.C.V.S.

SIR,
I HAVE the honor to submit for your consideration the following Report on Tuberculosis in Rabbits.

In accordance with instructions received from yourself, I joined Mr. Anthony Willows, M.R.C.V.S., New South Wales Government Veterinarian, at Ellenthorpe, near Ross, on the 5th January last. We were occupied up to the 8th, and subsequently from 21st to 23rd ultimo, in investigating numerous cases of the disease, being kindly assisted by W. T. H. Brown, Esq., and his sons.

On two separate occasions 50 rabbits were destroyed, making a total of 100, in order to ascertain what per-centage of diseased animals existed. On the first occasion 37 were affected with Tuberculosis, and 13 perfectly healthy, one of the diseased rabbits also having Fluke. On the second occasion 39 were found to be diseased, and 11 free from the malady, but two being affected with fluke, one of the 39 being badly affected with Tuberculosis and Fluke.

The annexed Table will show the order in which the rabbits were killed, and will be a further guide in determining the general distribution of the disease.

Healthy.	Tuberculous.	Tuberculous, very bad.	Tuberculous and Flukey.	Flukey.	Total.
2	1				
	5				
		4			
1			1		
	4				
3		1			
	2				
		2			
1		2			
	5				
*6					
	1				
	5	4			
13	23	13	1		50

<i>Healthy.</i>	<i>Tuberculous.</i>	<i>Tuberculous, very bad.</i>	<i>Tuberculous and Flukey.</i>	<i>Flukey.</i>	<i>Total.</i>
	1	1			
1		1			
	4	1			
2		1			
1		1			
	2	2			
	1		1		
	1	1			
	3				
*2		1			
1		2		1	
	2				
				1	
1	1				
		4			
1		1			
	1	7			
9	16	22	1	2	50

* Each of these numbers were taken from a nest.

Mr. Brown stated that the disease had first made its appearance five or six years ago near a shepherd's hut, and was supposed to be chiefly confined to about 15 acres of land, but during the above-named period had gradually extended over about 200 acres. On the occasion of our second visit we found it occupying a much larger extent of country, meeting with diseased rabbits over a direct line of about three miles.

This type of Tuberculosis is of a low or sub-acute form, situated only in the liver, which is not one of the vital organs. The liver may suffer from disease longer than any of the vital organs, and the disease in this situation is not so susceptible to be communicated to rabbits in association by infection or contagion; for it is questionable if it possesses either of these properties until the last stage, and the Tuberculous products become broken down, depositing the germs of the disease from the bowels. When rabbits frequent in numbers the same burrows, *then* infection or contagion may follow.

There seems no doubt that the disease is hereditary, as young rabbits taken from the nest were found to be well marked with the affection, but more particularly those that had apparently been out in search of food. This appears to fully prove that surrounding circumstances, taken in connection with a constitutional taint, have a tendency to develop the disease, proving most fatal to rabbits under half-grown, or say within a period of three to four months.

I have been acquainted with this peculiar form of disease for upwards of 20 years in Scotland; but, through never having engaged myself in a particular or special examination of the disease, I cannot say to what extent it may have prevailed amongst the *young* rabbits, having only observed it in those full-grown. It does not appear to have been considered that there was the least likelihood of the disease exterminating the rabbits, for of late the Game Laws have been altered, making the ground game the property of the tenant, fully showing that there can have been no diminution there, in spite of the disease.

I am quite convinced that the disease has existed in Tasmania for the last 30 years. The following facts all tend to show this:—

Dr. Butler informs me that 33 years ago rabbits were as thick then as now, but disappeared for a time from various parts of the Colony. Messrs. Lewis, of Cambridge, also informed me that 13 years ago rabbits entirely disappeared from their estate on Lewis's Neck, and during the last five or six years the pest has appeared more numerous than ever.

Five or six years ago the rabbits entirely disappeared from "Shawefield"—at that time the property of the late Dr. Sharland—and "Wellwood" adjoining, from some unknown cause; but on visiting

Shawefield, in compliance with your request, a few day ago, I found 8 out of 12 rabbits affected with Tuberculosis, and the rabbits now numerous.

On Rotherwood, the property of W. K. Dixon, Esq., I found 5 out of 10 rabbits affected with Tuberculosis. While making the examination, Mr. Dixon, who was looking on, said, "Oh! that's the disease—why it has been in the Colony ever since rabbits were here!"

On Cawood 13 out of 27 were found to have the disease, three of that number being in the very last stage of Tuberculosis. On this estate trappers informed me that they had known it for several years.

On Norton Mandeville, Lawrenny, and the Hollow Tree, the properties of Joseph Clarke, Esq., his Manager, Mr. M'Killop, procured 28 rabbits, 22 being badly affected with Tuberculosis. Mr. M'Killop has observed this disease for more than a year past, while some of his men positively assert they have known it for over 30 years.

At Glenelg, the estate of John Downie, Esq., 10 out of 15 I found well marked with the disease. Here also it has been known for several years past. An employé named Bellinger informed me he had noticed it for upwards of four years.

I have also found the disease existing at Chiswick, Ross, C. W. Keach, Esq., Mona Vale, Merton Vale, and Trefusis. Here Mr. Headlam preferred phosphorised oats as a destroyer to Tuberculosis, with more decided results.

It is likewise reported from Mr. Charles Archer's property near Ellenthorpe, Dunrobin, Macquarie Plains, and Bloomfield. These four latter places I have not visited.

From the foregoing it will be seen that the disease exists throughout the greater part of the Colony more or less, and prevails to a greater extent than is generally known; also, that it is not at all likely to prove an effectual exterminator, but that other means, such as shooting, trapping, and the use of phosphorised oats must be employed, and, above all, *united action*,—then the pest may possibly be exterminated, or at least reduced to a minimum.

Experiments may be carried out showing that rabbits could be exterminated by the disease on a confined area; but I have no faith in the probable destruction of the rabbits where they are free to move about from place to place, for it must be apparent there would always be a per-centage of healthy rabbits which would keep up the average, and even increase the stock, were the disease alone relied on.

To catch rabbits for the purpose of inoculating with a view of being turned adrift to contaminate their fellows, I would strongly deprecate; it would be much better to knock such rabbits on the head at once, making sure of at least one less.

As to the possibility of the disease being communicable to stock, I would recommend a careful inspection of the animals slaughtered at the abattoirs, where numbers could be examined daily, in preference to trusting to the few that have already been inspected at Ellenthorpe.

I have the honor to subscribe myself,

Sir,

Yours obediently,

ARCHIBALD PARK, *M.R.C.V.S.*

Hobart, 14th February, 1884.

To the Chief Inspector of Stock, Hobart.

SUPPLEMENTARY REPORT.

SIR,

WITH a view of further inquiry into the subject of Tuberculosis in Rabbits, on the 27th February I visited Melton Mowbray and Woodlands; there I met Mr. Alfred Page, who informed me that diseased rabbits had been found on Woodlands for the last seven years, and, further, that during a certain portion of the year some of the diseased rabbits die off while others recover, as during the winter time no affected rabbits are found; unfortunately, Mr. Page's trappers were all from home, and we were unable to procure any rabbits for examination. After seven years' experience of the disease on Woodlands, consisting of about 5000 acres, no less than 54,000 rabbits were destroyed last year in three months, and still they are as thick as ever.

Mr. Alfred Dowling, of Kelvin Grove, has known the existence of the disease there for the last two years, and during last year destroyed on 3000 acres 38,000 rabbits.

I then visited Hutton Park, the property of John Bisdee, Esq., and examined 18 rabbits; 9 were affected with tuberculosis. Mr. Harold Bisdee informs me that diseased rabbits are less numerous than they were a month ago. This statement supports Mr. Page's opinion that rabbits get better or die off. On this estate and Lovely Banks, where I passed over, rabbits were very numerous.

On the 28th February, at Dennistoun, near Bothwell, I examined 52 rabbits from various parts of the estate and found 41 affected with the disease. Many were affected with worms (the *ascaris lumbricoides*), which had pierced the walls of the stomach and intestines and lodged in great numbers beneath the peritoneum. Also the *cysticercus pisiformis*, which produces the *tania serrata* in the dog.

Having taken rabbits from various parts of this estate, it may be interesting, if not an advantage, to show the different numbers killed, and the several proportions of affected animals, as follows; viz.—

	12 killed,	8 affected.	
20	"	18	"
4	"	2	"
2	"	1	"
7	"	6	"
7	"	6	"
<hr/>			
TOTAL.....	52	"	41
<hr/>			

giving an average of 80 per cent. of diseased rabbits.

On Dennistoun rabbits do not appear to be very numerous. I rode over a considerable portion of what Mr. Mandeville looks upon as the worst parts, and found very little trace of their workings. No notice had been taken of this disease until about six weeks ago, and, so far from being aware that it existed, Mr. Mandeville was very anxious to have it introduced with the view of exterminating the pest; but I now find a higher per-centage of diseased animals on this estate than any other place visited.

But little doubt need be entertained as to the existence of this form of disease throughout the whole Colony, where it has prevailed for many years, although not noticed by stock-owners or rabbiters. And, further, this latter investigation only strengthens the opinion I have already expressed,—viz., that rabbits, are not at all likely to be exterminated by the disease.

I have the honor to be,
Sir,

Yours obediently,

ARCHIBALD PARK, M.R.C.V.S.
Hobart, 1st March, 1884.

To the Chief Inspector of Stock.

New South Wales.
Colonial Secretary's Office, Sydney, 23rd May, 1884.

SIR,

I HAVE the honor, at the instance of my Colleague the Secretary for Mines, to transmit herewith, for the information of your Government, a copy of the Report of the Government Veterinarian of this Colony on the Rabbit and Cattle Diseases of Tasmania.

I have the honor to be,

Sir,

Your most obedient Servant,

The Honorable the Premier of Tasmania, Hobart.

ALEX. STUART.

1883-4.

LEGISLATIVE ASSEMBLY.
NEW SOUTH WALES.

RABBIT AND CATTLE DISEASE IN TASMANIA.

(REPORT ON.)

Ordered by the Legislative Assembly to be printed, 7 May, 1884.

The Government Veterinarian to The Minister for Mines.

Department of Mines, Stock Branch, 24 March, 1884.

SIR,

I HAVE the honor to submit to you the following report of my investigations into the prevailing diseases of the rabbits and cattle of Tasmania, in obedience to the written instructions herewith attached.

Upon my arrival at Ellenthorpe Hall, on the 5th of January last, where I had proceeded for the purpose of reporting upon the alleged disease amongst the rabbits on that estate—publicly stated by Bruni, the pastoral correspondent of the *Australasian*, to be tuberculosis,—I learned that in 1880 the rabbits upon a part of one particular paddock were first observed to die from some cause uniform in its manifestations and result.

The centre from which this disease apparently originated consists of about 10 acres of grazing land, the soil of which is an admixture of red clay and gravel, and, like the surrounding country, is elevated and undulating on its surface, dry in nature, and generally stony in character; it is bounded on the north, east, south, and west by irregularly elevated bush country; the flowing water of this part is confined to one comparatively small creek which has its origin in the western tier of hills, from whence it pursues a circuitous course, and although it has occasionally been slightly flooded from extraordinary causes, no results have accrued from this temporary overflow worthy of comment; fairly grown wattle, peppermint, and gum trees abound in this district, and the grasses natural to it are of the varieties known as bush, kangaroo, and silver, in combination with ordinary bush herbage. From the time this rabbit disease was first observed the infected area and adjacent land have been regularly grazed by sheep, in company with some cattle, and since it made its first appearance amongst the rabbits no attempt whatever has been made to keep them down, the disease unaided having effected this, although this part formerly contained a great many rabbits, and has constantly been invaded by varying quantities of strangers during all seasons of the year from a thickly infested rabbit country situated beyond its eastern boundary. This district, with its immediate surroundings, is in such a satisfactory sanitary condition as not to favour the development of any disease.

Taking the 10 acres primarily infected as a centre, I carefully and uniformly examined the rabbits, live stock, and general nature of an area of the adjacent country extending from this centre, and comprising about 1000 acres; excepting that the extended area is bounded on the south by open, light, sandy grass land, and that about 100 acres of it has been regularly cultivated, it differs in no material condition from the more limited region previously described.

During my investigation I passed over the whole of the extended area in a methodical manner, accompanied by gentlemen with their guns and dogs; during five days 100 rabbits, fairly selected from every portion of the extended infected area, were killed in my presence, and every rabbit we discovered was destroyed if possible until the hundred were obtained; most of these were shot, a few were killed by the dogs, and in two instances young rabbits in their nests were destroyed; ninety-five of these were common grey, three were black, and two were blue fawn. *Post mortem* examinations of this hundred rabbits:—Forty-six were from half-grown to full sized, and fifty-four were from three weeks old to half-grown; thirty-five of the forty-six were diseased from tuberculosis in one or other of its stages, the remaining eleven showed no indications of this disease; of these thirty-five, twenty-eight were in the first stage of the disease, and seven were in the second or third stages; of the fifty-four not half grown, forty-one were diseased from tuberculosis, and in thirteen there were no indications of this disease; of the forty-one diseased ones, eleven were in the first stage of the disease and thirty in the second and third stages.

These rabbits did not present any external peculiarities from which a direct inference could be drawn as to their normal or abnormal state,—excepting when the disease was far advanced, when their bodies were much emaciated, and their abdomens were enlarged and pendulous, palpitation proved this increase in bulk to depend upon a firm, unyielding mass which occupied the antro-inferior portion of the abdominal cavity, but entirely free from such dropsical effusions as result from parasitic affections; upon free incision into the abdominal cavity consistent indications of the disease when in its first stage were always apparent as frequent minute caseous tubercular depositions, varying from the size of a pin's head to that of a hemp seed, distinctly isolated from each other, and infiltrated into that part of the proper tissue of the liver which is in apposition with its fibrous envelope, the so called "Glisson's capsule." These depositions in every case studded the external surface of the liver irregularly, without in any way impinging upon the biliary ducts; and in this stage no other part of the body showed any indications of disease.

At the commencement of the second stage—that is, so soon as softening of the tuberculous deposit commenced, the pathognomonic appearances were distinctly diagnostic, but unique; at this stage the liver had attained such dimensions that immediately upon cutting into that region of the abdominal cavity which it naturally occupies, it mechanically protruded through the incision thus made, and exposed upon its every aspect nodular enlargements from the size of a shot to that of a large pea, of a yellow rather than a grey tint, which to my mind resulted in part from the presence of bile imperfectly secreted by this organ only yet partially destroyed by structural disease, and in part from the retrograde changes consequent upon the partial breakdown of the centres of the tuberculous deposits; further examination of the structure of the liver proved that its whole substance was infiltrated by similar

depositions to those observed upon its surface; within these caseous and purulent depositions, which resulted from the retrograde changes that had already taken place, were small quantities of the salts of the blood, which caused some calcification, as evidenced by a distinct gritty sensation when those morbid growths were incised.

When the disease was thus far advanced, the mesenteric glands were invariably involved, and by carefully cutting open and cleansing the intestines, numerous limited infiltrations of tubercle were discovered between the muscular coat and serous lining membrane.

No other evidences of positive structural disease were apparent to the unaided senses, although the microscope occasionally showed tubercle elements in the lungs.

The lungs of every rabbit examined in this advanced stage were pale and flaccid, and wasted to less than half their natural size; so marked was the atrophy which resulted from the continuous compression occasioned by the pressure of the liver, which had assumed such enormous proportions. As an example, I will mention to what extent this existed in one of the worst diseased rabbits killed. The carcass, skin, and kidneys, without other viscera, of a little rabbit about six weeks old, weighed just 13 ounces, and its liver, which was one mass of broken-down tubercle, alone weighed 5 ounces. The last ravages of this disease, as exemplified in several cases, are worthy of comment. In these the liver was pale, softer, and more or less collapsed from ulceration of the walls of the biliary ducts, as well as such interstitial tissue as before separated the larger tuberculous deposits from each other. These, which had broken down and were more or less purulent in character, had become confluent and passed freely from one cavity to another, and also into such of the smaller ducts as communicated with each other; this progressive ulceration soon extended to the large biliary duct, which at once became inundated with the diseased products. These then passed into the gall bladder, through the cystic duct, and through the terminal portion of this, the ductus communis choledochus, and from thence into that part of the anterior portion of the small intestines termed the duodenum; the excessive quantity of the morbid matter necessary to destroy the important organism with which it had been in contact now entered the main channel of the digestive apparatus, and was at once taken up by the selecting absorbents peculiar to the alimentary tract, and conveyed directly into the portal and probably into the general circulation. The most apparent evidences of septicæmia, or the blood-poisoning which followed, existed in the bowels, and occasioned severe superpurgation, which had evidently been very violent for some time prior to death, and of which the traces were unmistakable.

Histological examinations.—I made the most careful microscopic examinations of every product that could exercise any influence upon or be in any way connected with the disease under consideration, and these examinations in every case showed a complete uniformity of diseased elements, and indubitably confirmed the positive existence of tuberculosis.

There was present in every rabbit thus examined miliary, caseous, and broken-down tubercle, which had often undergone calcification, but not to such an extent or so consistently as is usually observed; large giant cells, irregular in outline and containing a number of nuclei, were always present in continuity with a varying-sized zone of small-celled tissue, together with evidences of fatty degeneration, and the elements consequent upon calcification, with such other *débris* as resulted from complete or partial disintegration of the tissue of the organism thus diseased; the broken-down tubercle, which had assumed a purulent appearance, consisted nearly entirely of very distinct multinucleated and branched cells particularly well defined and characteristic of this form of tuberculosis.

The process of softening is one of the modifications of tubercle, whether calcification has or has not taken place.

No parasites whatever existed in any of the rabbits killed, excepting in four instances, in which a few flukes were found in the biliary duct, where their presence had not induced any change in the texture with which they were in contact.

I was able to glean a complete history of the infected area, with regard to its exact pastoral and agricultural results during the past eleven years, with full particulars of the nature, age, and actual condition of the whole of the live stock depastured upon it; but a description of these prior to the appearance of the rabbit disease seems uncalled for. Less than a tithe of this area has recently been cultivated, and live stock have only had access to this portion when the special crops, resulting from such cultivation, were secured from the probable damage these animals would be likely to occasion. Practically speaking, the infected area consists of permanent pasture, of a carrying capacity of 1½ acres for one sheep, by which animals it has always been closely and regularly grazed, in conjunction with a small number of cattle. During the time I was investigating the rabbit disease, 2200 ewes and wethers with a few lambs were depastured upon it. This flock consisted of 900 two-tooth sheep, about 300 culls, and of the remainder some had four and some had six permanent incisors, and all were bred upon this land. The young sheep had been continuously in their present situation during the past ten consecutive months, and the aged sheep for two years; all these have regularly grazed and have been nearly entirely confined to the district under consideration. These sheep I carefully inspected upon two occasions, and all of them were free from any indications of disease. All the sheep required for household consumption at Ellenthorpe Hall have been entirely and invariably fattened upon and taken directly from this area. I made *post mortem* examinations of numbers killed for this purpose during my visit, and found all of them quite free from disease of any description. Since May, 1879, eight sheep per week have on an average been killed for consumption upon the estate, and by cautious inquiry I learned of the three men, whose veracity is currently reported to be above suspicion, and who have killed and dressed them all during that time, that all these sheep were always found in good condition and healthy, without any suspicion of internal disease, and that, excepting the occasional presence of a few flukes in the ducts of their livers, nothing irregular was observed. The ten head of cattle grazing upon this area were, when I twice inspected them, in a healthy condition.

Cause.—There is no doubt in my mind but that this form of specific tuberculosis, which is recorded as that to which rabbits are naturally most subject, under the appellation of *Hepar Tuberculosis*, originated amongst the rabbits through their contamination by the products of scrofulous inflammation resulting from a chronic disease frequent amongst the cattle of Tasmania, and of which I report fully further on.

In a pathological sense tuberculosis and scrofula are inseparable, as proved long since by Chauveau, Gerlach, and others, who produced tuberculosis by feeding animals on scrofulous products. The marked susceptibility of rabbits to the former disease render them unconditional victims of a malady invariably fatal, although acquired from a disease which in its original subject only gives rise to chronic inflammatory action of a peculiar type, powerless to directly arrest the vital functions with which it so seriously interferes.

In my opinion this form of tuberculosis is confined to the liver, because the germs of the disease probably only originally gained access to the rabbits' system through the medium of their food, contaminated by the excretions of diseased cattle, and perhaps of other rabbits, and are then injected in the alimentary tract, from which these germs are taken up through the villi of the intestines; and as the blood capillaries lie outside the lacteal or lymphatic radical, which they surround in each villus, it is probable that the blood-vessels carry off the greater part of all the soluble nutrition (excepting actual fat) from the alimentary canal, and as all the blood brought to the capillaries of the stomach and intestines is gathered into veins that unite in a single trunk, the portal vein which proceeds directly to the liver, where it breaks up into an immense multitude of capillaries which ramify through the substance of that organ, and thus the germs of this disease may gain direct access to the liver without having ever entered the general circulation, and when once established as a constitutional peculiarity this condition is reproduced through systematic influences.

During my investigation I had abundant proof of the direct hereditary transmission of this malady in many instances. Young rabbits, varying in age from four to six weeks, were examined in the last stage of the disease; in some cases they certainly had not left their nests more than a fortnight, if so long. Although it is evidently congenital, I had not sufficient opportunity to demonstrate this fact.

This form of tuberculosis is of a less infectious nature and less active in the destruction of rabbits than that acute form of the same disease artificially produced by me, for in this the disease is established principally in the respiratory tract, when after a certain stage all the air expired by the diseased rabbits comes directly from a surface studded with the active elements of the disease, and next after this the principal seat in the acute form is the kidneys, from which the germs, so soon as the tubercle breaks down, pass off with the urine, consequently the associations of the rabbits become regularly and frequently contaminated, and in addition to these important seats general tubercularization of the entire system results; whereas that form of this disease now especially under consideration is not only slower in its course, from the fact that it only seizes upon the liver, which is not strictly speaking one of the vital organs, but as this organ is practically situated within an enclosed cavity the germs have but little opportunity to extend the disease by infection until the terminal stage, when the tubercle breaks down, flows into the bowels and is voided per anus, when death results from septicæmia, and the probabilities are that the active germs are destroyed with the victim's life, but this could only be proved by systematic experiments which I had no opportunity of carrying out. The diseased rabbits must invariably have died in burrows, holes, or some other hidden situations, for they were not found dead on the surface, and there were large numbers of blow-flies very frequently observed around many such places.

In spite of the sub-acute nature of this disease it is doing good service as a rabbit exterminator in Tasmania, which Colony it is likely to entirely clear of rabbits, if not allowed to die out, and if properly worked, for not only has it in its own quiet way, when left to chance, to a great extent rescued a district (formerly thickly infested and still subject to constant invasion) from the rabbit plague, but it is extending the area of its operation by a process of consistent if slow expansion. Of this I had a marked illustration, for upon one part of the infected area previously described all the rabbits caught were opened and found healthy four months prior to my inspection. A few rabbits caught upon land, the soil, vegetation and water of which are freely and permanently impregnated with salt, were fatally diseased from this form of tuberculosis. That this rabbit disease has been more or less prevalent in Tasmania in times past in conjunction with the prevailing cattle disease is probable from the testimony of many respectable persons who have been familiar with the latter disease all their lives, and who relate instances of disease in its general characteristics like this having completely cleared certain districts of rabbits, and which have for a few subsequent years remained clear of them but afterwards became again infested. My supposition that the rabbit disease originated from bovine scrofula is confirmed by the fact of observing occasional instances of commencing disease—perhaps two or three per cent. of the rabbits examined in four districts distinct from Ellenthorpe Estate, for the prevailing cattle disease is common in every part of Tasmania.

PREVAILING DISEASE OF THE CATTLE IN TASMANIA.

On the 8th of January last, in conjunction with Mr. Park, M.R.C.V.S., of Hobart, who throughout rendered me valuable assistance, I had the honor to receive orders from the Honorable the Premier of Tasmania to report upon the alleged cancer in the cattle of that Colony. In compliance with these orders, I beg to submit the following explanation of the nature of this disease, its causes and consequences; prefaced by such an account of its general history as was obtained by travelling more than 380 miles in order to hear the deductions of those persons who had most experience of it, to watch its influence during life, and to obtain sufficient diseased animals of an average type for *post mortem* examinations.

All the oldest colonists interrogated have, throughout their earliest experiences of live stock, been sufficiently conversant with this disease to recognize its existence by its simple external manifestations, and their explanation of its course and termination were evidently founded upon such facts as are only gained by long-continued personal observation, the tenor of which will be embodied; but their ideas as to its causation were generally so crude and conflicting as to be scarcely worthy of consideration. No one questioned had ever known an animal thus diseased to recover.

In all, ten animals were killed and submitted to the most careful *post mortem* examinations, and every kind of diseased product was carefully examined with a reliable and powerful microscope.

These cattle were of various sexes, breeds, ages, and in different stages of the disease, as shown below:—

No.	Sex.	Breed.	Age (about).		Time diseased (about).	
			Years.	mts.	Years.	mts.
1	Bull - - - - -	Pure Shorthorn - - - - -	3	6	1	3
2	Cow - - - - -	Crossbred - - - - -	5	6	1	2
3	Bullock - - - - -	Do - - - - -	8	0	3	9
4	Do - - - - -	Do - - - - -	7	6	3	3
5	Do - - - - -	Do - - - - -	7	0	3	0
6	Do - - - - -	Hereford - - - - -	5	0	1	9
7	Do - - - - -	Crossbred - - - - -	5	0	1	6
8	Do - - - - -	Do - - - - -	5	0	1	6
9	Do - - - - -	Devon - - - - -	4	0	0	5
10	Steer - - - - -	Crossbred - - - - -	3	0	0	6

The ordinary early evidence of this disease is the appearance of a swelling in the bones which form the upper or the lower jaw, more frequently in the latter, and, in the majority of cases, commencing in the region of the third and fourth molar teeth. This enlargement at first appears as a hard, somewhat diffused swelling; after a time it gradually becomes more defined, and develops very slowly as a hard bony tumour, the dimensions of which ever continue to increase from infiltration into this tumorous growth, and from ulceration of the surrounding structures, with which by its extension it is brought into apposition. The most apparent result of this progressive ulceration, to an ordinary observer, is the destruction of the skin and other tissue over the region of the diseased part which principally from this cause then presented the appearance of an ill-defined tumour, irregular on its surface, studded with small accumulations of matter of a fetid odour. This condition results more commonly when the lower jaw is the seat of the disease, for when the upper jaw is seized upon, the structures of which it then causes the decay, being of lower organization than those destroyed in the lower jaw, it appears more as a diseased bony expansion comparatively free from the softer depositions. As a rule there is but one external diseased centre in one animal, which increases so slowly that the general condition of the animal is often not affected for years, and then more from mechanical derangement than from specific causes. The ordinary concomitant symptoms of this disease are so palpable and so uniform that it is not necessary to mention them here.

Post mortem examinations.—Although some of the cattle killed had immense tumorous growths and had been diseased for years, none of them were really emaciated. Upon cutting into the external surface of the tumorous excrescence, the skin when not entirely destroyed by ulceration was hard, thickened, and adherent to the diseased tissue, which it covered, the whole exhibiting distinct evidences of long-continued inflammatory action of a very low type, and throughout was infiltrated with scrofulous products, which were softer than the adventitious tissue in which they were embedded; these varied in appearance from yellow speck-like depositions of caseous consistency, which thickly studded the incised surface, to accumulations more purulent in character, thinner in consistency, lighter in colour, and of increased dimensions—the retrograde changes consequent upon advanced disease. Section of the diseased bone showed that the proper bone tissue was exceedingly spongy and soft, that the finer osseous lamellæ

were broken down or absorbed, that the Haversian canals were obliterated, that the internal medullary tissue was completely destroyed, and that the salts of the blood were only present in very limited quantities. There existed throughout this diseased osseous structure similar invasions of scrofulous products to those observed in the surrounding diseased tissue. The mesenteric lymphatic glands were in every case enlarged and changed to a homogenous mass, dark in colour, and infiltrated with speck-like scrofulous or tuberculous deposits, which in some instances had undergone liquefaction. In each animal the liver was similarly diseased, for although the greater part of this organ was not involved, certain portions of the biliary ducts always showed thickening of a cartilaginous nature, with calcareous degeneration, which prevented osmosis of the secreted bile, from the retention of the solid elements of which and from the deposition of the salt of the blood biliary calculi, both large and numerous, resulted. On the surface of liver, immediately under Glisson's capsule, and occasionally in its substance, small yellow tuberculous deposits were distinctly seen, generally of small dimensions, but invariably present. In four of the animals killed well-marked scrofulous deposits were discovered in their lungs. In the lungs of four of the others there were evidences of the chronic inflammatory action peculiar to the scrofulous diathesis, but in the remaining two these organs were apparently healthy.

The oldest bullock had been diseased for nearly four years, and his kidneys were seriously involved, both the cortical and medullary substances were pale, soft, and friable, and infiltrated by large and well-defined calcareous depositions.

In every animal either the kidneys or pancreas was in an abnormal state. The smaller glands near the organs most diseased were always involved; but the result of this implication, both as to degree and extent, was irregular. In some of these cattle a limited number of flukes were occasionally found in the main ducts of the liver, but neither these nor the few other parasites observed in any way influenced the organism of the animal in which they existed.

Microscopic examination was carefully made of each of the abnormal products peculiar to this disease; these were of three varieties:—

The special elements diagnostic of scrofulous inflammation.

The elements resulting from the low inflammatory action caused in the organ or part by the irritation and contamination induced by the presence of the specific germs.

The formations resulting from the retention in that part of the organ implicated of some of the elements of the secretion selected (in parts of the organ less involved) for excretion.

Throughout the tumorous growths and in the mesenteric glands and liver of each of the ten animals killed, large giant-cells with many nuclei and in various stages of development were distinctly seen; these cells were also frequently observed in their lungs, kidneys, and in some other parts of their bodies; and although in these organs their deposition was irregular, these disease germs when present were always of uniform appearance.

The elements resulting from the destructive inflammation which the presence of the germs caused in the organ or part appeared as *débris* of the natural tissue, intermingled with pus cells and with the specific cells before mentioned, together with evidences of exudation of a fluid, poor in albumen, into the surrounding connective tissue. The formations, which principally resulted from an accumulation of the solid elements of bile, as biliary calculi, were common in those portions of the biliary ducts which had undergone calcareous degeneration.

Nature and cause.—Scrofula of cattle absolutely depends upon only one positive cause—"the presence of its specific germ"; but there are many determining influences which either favour, check, or arrest the propagation of this specific element. The fact that similar chronic disease of many organs of the body prevailed at the same time proves the existence of a blood disease, and the consistent presence of tubercule in the many organs thus diseased is actual proof of its real nature,—when all the collateral consequences and coincidents of the disease confirm this diagnosis. This malady is both hereditary and acquired. The principal cause of its frequency amongst the Tasmanian cattle is the transmission of the germs of this disease from breeding-cattle with a scrofulous diathesis to their progeny.

In and in breeding is only second to direct hereditary contamination, for when animals of consanguineous relationship breed together, not only is there the greater probability of them being constitutionally tainted from any disease common to such animals, but the vital powers of their progeny are so impaired that even if born free from actual disease they would be likely to become infected from such insidious forms of this malady as would be inert to more vigorous animals. This disease may be directly acquired by a healthy animal by contagion from one suffering from this malady when in an advanced stage, for if the germs of this disease enter the system of a healthy animal by injection or otherwise, this disease will be reproduced in that animal. Such a cause may at any time operate so soon as the actual diseased products contaminate the surroundings of other cattle.

That scrofulous matter given to animals with their food will reproduce in them this disease, or even produce tuberculosis, is a fact long since known to many pathologists.

The exciting causes which favour the development of this disease in any animal with a scrofulous taint are—insufficient nourishment, undue exposure to unfavourable climatic influences, injury to the face from external violence; (but this must not be confounded with those cases in which simple inflammation results from injury to a healthy animal and afterwards passes off by resolution); the inflammation of the alveolar cavities situated in the internal structure of the bones of the jaws, consequent upon the development of the last permanent molar teeth. It is a well-known fact that any inflammation, however simple in its nature, in a scrofulous subject, not only has a constant tendency to spread to the surrounding structures, but such exudations as result from this inflammation not being absorbed exercise a destructive influence upon the tissues with which they are in apposition.

This disease, as prevailing in all the cattle examined, is remarkable for the smouldering malignancy of its protracted ravages, which, although incapable of directly arresting the vital functions, ever continue to extend over them their destructive action, and further cause such mechanical derangement as ultimately insures the extinction of the victim seized upon.

This disease can after a time be stamped out by the thorough and consistent enforcement of the obvious prophylactic measures.

Under no circumstances whatever should any animal with scrofulous disease, or any animal to which such a suspicious taint directly or indirectly attaches, be permitted to breed.

In and in breeding should be carefully avoided, and the existing herds of cattle, after being purified from all associations with diseased animals, should be invigorated by the introduction of fresh strains of blood from healthy and vigorous progenitors.

Perhaps there is no objection to the direct fattening of cattle in the earliest stages of the disease, providing that such cattle are, during the fattening process, so circumstanced as to be unable to contaminate other cattle by contagion from their diseased secretions or excretions.

In accordance with the principles which now regulate the inspection of meat intended for human consumption in Europe, only the carcasses of cattle fattened in the earliest stages of this disease, which after death prove to be really nutritious and quite wholesome, and in which there are but comparatively slight deposition of the diseased products in the internal organs, it being carefully ascertained that there is no breaking up or softening of these depositions, and providing that every portion of these diseased organs or parts are completely removed from the carcass involved, then, and then only, should the remaining parts of such carcasses be permitted to pass into human consumption. But I am of opinion that the consumption of meat or milk from scrofulous or tuberculous animals is always dangerous.

I have, &c.

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