

New Zealand.

Mr. W. C. Barry, M.R.C.V.S., Director Live Stock Division, Department of Agriculture, New Zealand, writes (5/1/37) :-

"So far as is known, no cases of cysticercosis in pigs or cattle have occurred in this Dominion at any time."

Phillipine Islands.

Schwartz and Tubangui (1922) obtained statistics from the Ascarraga abattoir, Manila, which showed that just over 1% of pigs were infected with C. cellulosa. This was the average over five years.

C. bovis is rarely found in the abattoir at Pandacan, Manila † (Schwartz, 1925), but native cattle are never slaughtered at abattoirs and their meat is thus never inspected. The incidence of T. saginata is considerably higher than that of T. solium. (Schwartz and Tubangui, 1922).

## D.

The Incidence of Cysticercosis in Swine and Bovines in the Americas.Canada.

According to Mr. George Hilton, Veterinary Director-General, Canada, measles in pigs and cattle is a very rare disease in Canada.

The Report of the Veterinary Director-General for the year ended March 31, 1935, gives the following statistics:-

Cysticercus bovis found at establishments under inspection.

44 Carcasses. (Bovine)

774 (Portions) of Carcasses. (Presumably infection was confined to heads, viscera, etc.)

Cysticercus cellulosa.

42 Pig carcasses.

12 (Portions) of Carcasses. (Presumably, ditto.)

During the year under report 1,350,370 bovines were slaughtered in Canada, and 2,862,125 pigs were slaughtered. Presuming that each of the measly "portions" came from separate measly animals, 818 measly bovines and 54 measly pigs were found during that year, reflecting a very low percentage.

It is, however, interesting to recall that during the years 1920-32 Dr. Unger found 16 out of 4652 bovines of Canadian origin to be measly at the abattoir at Basel in Switzerland, representing a percentage of .34.

### United States.

In submitting a tabulated statement showing the numbers of each species of animals slaughtered, by years, from 1926 to 1935, <sup>in which</sup> ~~were~~ the number of carcasses of each species condemned on account of cysticercosis, <sup>is given,</sup> Dr. J. R. Mohler, Chief of the Bureau of Animal Industry, United States Department of Agriculture, writes (2/11/36):- "Inasmuch as all infested carcasses are not condemned on account of slight cases of infestation being passed after prescribed freezing or sterilization, this does not supply information upon which percentages at which the condition prevails may be determined."

	<u>Cattle.</u>		<u>Swine.</u>	
	<u>Slaughtered.</u>	<u>Condemned.</u>	<u>Slaughtered.</u>	<u>Condemned.</u>
1926	10,098,121	129	40,442,730	76
1927	10,049,589	169	42,650,443	71
1928	9,040,028	121	48,347,393	57
1929	8,284,324	123	47,163,573	61
1930	8,280,778	131	46,688,860	98
1931	8,215,203	99	44,047,458	58
1932	7,974,502	103	45,852,422	21
1933	7,735,588	125	45,698,053	20
1934	9,652,952	149	45,773,196	35
1935	12,809,448	257	34,413,317	38

Since the "Lightly" infested carcasses are not given in Dr. Mohler's summary, we may, according to general observations presume that at least ten times the number of measly ~~bovine~~ bovine carcasses shown were treated by freezing, etc. Multiplying thus the number by ten, 2570 measly carcasses out of approximately 12,000,000 were found in 1935, or roughly

1 in 5000, - still a very low incidence.

According to Ransom (1911), the average percentage of C. bovis at that time was ~~0.6~~ 0.6. Later (1913), Ransom stated that 1% of all cattle slaughtered in the United States were infected with C. bovis. (Journ. of Agric. Research. Vol 1. p.15).

According to Price (1925), C. cellulosa is frequently found in Texas in pigs. Price points out that this is understandable considering the large Mexican and Negro populations.

#### Central America.

According to Hall (1927), the incidence of C. cellulosa in swine in Central America is astonishingly high, the parasite occurring in from 5 to about 30 per-cent. of swine, usually in gross infestations. As a result of rigid sanitation caused by a campaign against hookworm in Panama, Dr. Mattatall, according to Hall, reported that at the Panama City abattoir the incidence of C. cellulosa dropped from 15% to 5%. According to Hall "the occurrence of T. saginata in man in the Central American countries shows the concomitant presence of C. bovis in cattle. Dr. Mattatall, however, finds the C. bovis to be a very rare parasite at Panama City."

Nauck (1931) wrote that C. cellulosa was a common disease in Costa Rica.

#### West Indies.

According to Cameron (1930), C. bovis is occasionally found in the West Indies. C. cellulosa is sometimes seen, most frequently in the Southern Islands.

Brazil.

No definite data have been obtained from Brazil, but Palais (1933) refers to the occurrence of T. saginata, which would suggest a corresponding frequency of C. bovis.

Argentine.

The incidence of C. bovis and C. cellulosa is relatively low in the Argentine, as is shown by the subjoined table forwarded by Señora A. Andrieu, Chief of the Sanitary Police, Buenos Aires.

The figures show the number of cases found and the numbers per 10,000, as observed at the principal abattoirs and frigorificos during the five years 1932-1936.

<u>Year.</u>	<u>Bovines. (C. bovis).</u>		<u>Pigs. (C. cellulosa).</u>	
	<u>Cases.</u>	<u>No. per/10,000.</u>	<u>Cases.</u>	<u>No. per/10,000.</u>
1932	204	0.92	11	0.25
1933	461	1.97	67	1.04
1934	1,322	5.06	343	3.77
1935	2,254	8.50	342	3.74
<u>1936</u>	<u>1,671</u>	<u>5.48</u>	<u>860</u>	<u>8.71</u>
Total	5,912	4.58	1,623	4228.

Chile.

Señor Rogelio Montero, Chief of the Meat and Animal Sanitation Department, Santiago, supplies the following statistics showing the incidence of C. cellulosa in swine as observed at the Santiago abattoir.

<u>Year</u>	<u>Condemned</u>	<u>Total Inspected.</u>	<u>Percentage Measly.</u>
1933	3,242	77,199	4.2
1934	3,410	89,042	3.8
1935	3,880	98,653	3.9
1936	3,493	92,862	3.8

Señor Montero states that no statistics are available of the incidence of C. bovis in Chile, but this is quite an uncommon disease.

The Incidence of Cysticercosis in Swine and Bovines in Africa.Tunis.

At the abattoir at Sousse, Coussi (1933) found the incidence of C. bovis (average for 5 years) to be 2.25%.

According to some of the older writers, e.g. Alix (1887), it was formerly estimated that 5% of bovines in Tunis were infected with C. bovis.

Senegal.

At Dakar, Teppaz (1923) estimated the incidence of C. bovis at approximately 10%.

French Guinea.

Claverie (1928) found that approximately 50% of bovines were infected with C. bovis in French Guinea.

Sierra Leone.

Mr. J. Martin, Director of Agriculture, Sierra Leone, supplies the following data in respect of the incidence of Cysticercus bovis as observed at the abattoir at Freetown. Mr. Martin states (letter dated 1st February, 1937) that there are no other centres in Sierra Leone in which cattle are slaughtered to any extent.

1931.	-	2818	bullocks	slaughtered	-	2	measly	-	0.0709%
1932	-	2904	"	"	-	1	"	-	0.0343%
1933	-	4593	"	"	-	20	"	-	0.435%
1934	-	4460	"	"	-	18	"	-	0.403%
1935	-	4274	"	"	-	6	"	-	0.140%
1936	-	3278	"	"	-	10	"	-	0.305%
Total.	-	22327	"	"	-	57	"	-	0.255%

It may here be mentioned that Maplestone (1924) found 3.2% of 500 inmates of Freetown gaol to be infected with T. saginata.

#### Abyssinia.

It is not known to what extent infection with T. saginata occurs among Abyssinians at the present time, or what the present incidence of C. bovis is in that country, but about forty years ago, according to several writers (Leuckart, Neumann, von Ostertag, etc.), practically 100% of the Abyssinian population considered "a *Taenia saginata* one of their most treasured possessions," and correspondingly, it is presumed that a very big percentage of bovines must have been measly.

#### Kenya Colony.

Cysticercus cellulosae is a relatively uncommon parasite in pigs in Kenya, but it does occur sporadically. For instance, in Nairobi abattoir in 1934, four pigs were condemned out of 1,959 pigs inspected, whereas in 1935 C. cellulosae was not detected at Nairobi abattoir, "but one case of extremely heavy infestation was diagnosed at the Veterinary Research Laboratory." (Daubney, 1936.)

A steady increase in the incidence of C. bovis, as observed at the Nairobi abattoir, is reflected in the subjoined table.

The Medical Officer of Health, Nairobi recently informed the Stock Owners' Conference that were the standard raised so that any animal with a single viable Cysticercus was condemned, the percentage of condemned cattle would be increased by 4.7 in the case of grade cattle and by 7.4 in the case of native cattle. (Note, cattle are not condemned unless 6 viable measles can be demonstrated in the carcass.) If all measly cattle were thus to be condemned at Nairobi,

the incidence of C. bovis would be in the vicinity of 25%.

Table from the Seventh Annual Report of the Medical Officer of Health, Nairobi.

Oxen Slaughtered and Condemned for Measles.

" YEAR	Grade			Native			Total.		
	" Killed	" Condemned	" %age	" Killed	" Condemned	" %age	" Killed	" Condemned	" %age
"	"	"	"	"	"	"	"	"	"
"	"	"	"	"	"	"	"	"	"
"	"	"	"	"	"	"	"	"	"
1927	5634	-	-	5178	-	-	10812	490	4.5
1928	4907	-	-	6827	-	-	11734	740	6.3
1929	4151	-	-	7617	-	-	11768	975	8.2
1930	4214	277	6.5	7243	683	9.4	11457	960	8.3
1931	4306	388	9.0	9375	1227	13.0	13681	1615	11.8
1932	3054	321	10.5	11044	1568	14.1	14098	1889	13.3
1933	2924	326	11.1	12968	2158	16.6	15892	2484	15.6
1934	4531	600	13.2	10264	1820	17.7	14795	2420	16.3
1935	4806	495	10.2	9007	1894	21.0	13813	2389	17.2

Uganda.

The Acting Director of Veterinary Services gives the following statistics reference to the incidence of C. bovis at the Kampala abattoir for 1935:-

Cattle Slaughtered	4336
Condemnations - Hearts	685
Tongues	248
Quarters	140
Complete Carcasses	58.

It is difficult to understand these figures, but on the presumption that measles were found in 685 ox hearts (ignoring the tongues, quarters and carcasses), then 685 out of 4336 bovines were measly, or 15.8%. Including the possible number of bovines in which measles ~~were~~ may only have been found in the tongues, or in a quarter, or in a carcass, and not in the heart, it can be concluded that from 15% to 25% of the Ugandan cattle are infected with Cb bovis. The Director states that the percentage of infected carcasses amongst Western Province cattle is higher than amongst Eastern Province stock, both

areas might be termed "Native Reserves" as there are no European owned stock farms in either area.

### Tanganyika.

In 1916 von Ostertag referred to the wide distribution of C. bovis in both British and German East Africa, before the war. He also mentioned the frequency of T. saginata infection in those territories among natives, owing to their habits of eating imperfectly cooked meat. Von Ostertag quoted Veterinary Officer Manleitner, who found a very high percentage infection in cattle in Aruscha; Veterinary Officer Meyer, who found two bovines out of 14 measly in Shirati; whereas in Muansa Veterinary Officer Gartner found no measles in 24 bovines examined. In Bukoba, von Ostertag estimated that 90% of bovines were infected. In general, infection ranged from 1 to 10%, or higher.

At that time (about 1916) no definite survey had been made of the incidence of C. cellulosa in pigs, but von Ostertag mentioned that most of the pigs consumed before the war were imported from the Union of South Africa, where the percentage infection in pigs was said to be very high, according to von Ostertag.

Hammer (1922) states that during his period of service in German East Africa he found approximately 15% of bovines measly in the Uhehe Highlands. Hammer's pre-war findings coincided very nearly with present day statistics from Tanganyika.

Captain HJ. Lowe, M.R.C.V.S., Veterinary Research Officer, Mpwapwa, supplies the following tables showing the monthly percentages measles found at various abattoirs from January to August 1936.



Only when more than 2% of cases were found, were these included in the returns. According to Capt. Lowe, practically all the beef consumed in the Territory is derived from native-owned animals, that is from Native Reserves.

During the period under report only one pig carcass was condemned (during May, at Iringa), and a total of 398 pigs were slaughtered at all abattoirs.

Tanganyika Territory - Abattoirs at which more than 2% of bovine carcasses were sterilised for C. bovis.

1936. - Percentages.

<u>Abattoir.</u>	<u>Jan.</u>	<u>Feb.</u>	<u>March.</u>	<u>April.</u>	<u>May.</u>	<u>June.</u>	<u>July.</u>	<u>August.</u>
Tukuyu	16.1	-	6.6	-	-	-	2.8	9.1
Iringa	14.9	15.1	15.5	12.6	21.6	8.1	11.7	14.3
Moshi	9.4	7.4	8.0	6.6	9.1	13.5	11.8	7.0
Dar-es-Salaam	9.1	12.4	13.2	13.0	10.8	8.8	9.3	9.2
Morogoro	8.5	8.3	6.0	9.3	-	3.8	3.4	3.4
Kondoa	6.9	-	-	-	-	11.1	6.2	-
Aruscha	6.5	-	6.2	6.6	8.8	-	2.5	3.6
Singida	4.3	6.2	5.2	11.1	6.6	-	-	3.8
Dodoma	3.4	4.6	4.7	6.1	6.1	4.6	6.6	9.1
Korogwe	2.5	-	-	3.2	-	3.0	-	-
Mpwapwa	-	16.6	14.3	18.4	11.1	18.6	3.2	3.6
Musoma	-	3.3	4.5	10.5	3.4	8.6	-	8.0
Mbeya	-	-	5.4	2.3	5.5	8.9	9.8	13.3
Songea	-	-	-	7.4	-	4.0	-	5.3
Tanga	-	-	-	-	-	2.3	-	3.4

Judging from these monthly returns, it would appear that Iringa, Moshi, Dar-es-Salaam and Mpwapwa draw their slaughter cattle from the centres of heaviest infection.

Belgian Congo.

Prof. Rubray, Rector of the Royal College of Veterinary Medicine at Cureghem-lez-Bruxelles, Belgium, kindly supplied the following statistics, relative to the incidence of C. bovis, as observed at the abattoir at Stanleyville, from January to October 1936.

	<u>Bovines Slaughtered.</u>	<u>Infested with Cysticercosis.</u>	<u>Percentage Infested.</u>
January	69	6	8.7
February	72	5	6.9
March	78	4	5.1
April	75	7	9.3
May	<del>75</del>	<del>11</del>	14.7
June	70	6	8.6
July	63	10	15.9
August	68	4	5.9
September	68	5	7.4
<u>October</u>	<u>72</u>	<u>4</u>	<u>5.6</u>
Total for 10 months	710	62	8.7

### Angola.

Statistics of the actual incidence of infection with either parasite in pigs and cattle, respectively, are not available for Angola, but it is interesting to record that at Lisbon in 1933, 1934 and 1935 only 153 bovines were found measly, and of this number 151 were imported from Angola. The total number of bovines exported from Angola and slaughtered at Lisbon during those years was not given.

### Madagascar.

Detailed statistics from this French African Island Colony have from time to time been published, and from these data it has been possible to compare relatively early and recent percentages of C. cellulosa and C. bovis.

Geoffroy (1906) stated that the percentage of measly pigs found at Tananarive in 1905 was 7.01.

Poisson (1926), and also at the Pan-African Agricultural and Veterinary Conference at Pretoria in 1929, stated that in

Madagascar the pig is especially reared by the people of the Centre of the Island (hovas and betsileos). At about that time the incidence of C. cellulosae in pigs, as observed at various abattoirs and meat canning factories was:-

At Diego-Suarez	4-5%.
At Tamatave	10%.
At Tananarive	12-15%.
At Antsirabe	12-20%.

In the districts of the bramble fields in the high plateaux, it was said to have been even higher.

Buck, Lamberton and Randriambeloma (1935) found that 13% of 4500 pigs examined at the abattoir at Tananarive, that year, were measly.

A geographical map giving a survey of the incidence of porcine C. cellulosae on the Island in 1928, was kindly donated by Dr. H. Poisson, Retired Veterinary-Director-General, now domiciled in Tananarive. This map gives the following percentages:-  
Diego-Suarez 2.40; Tamatave 10.41; Tananarive 9.76; Antsirabe 12; Ambositra 12; Ambohimahasoia 12; Fianarantsoa 13; Tuléar 2; Majunga 6-7.

An extract of the Archives of the Veterinary Service (kindly supplied by Dr. Poisson) gives the following percentages of C. cellulosae as observed in Madagascar in 1936:-

(1) Central Region:-

Tananarive	- 9.47 at Municipal Abattoirs
	7.10 at Androrosy and Ambohimanarina
	11.84 at Factory at Soanierana
Antsirabe	- 12.25 at Municipal Abattoir and Factories.
Fianirantsoa	- 21.20

(2) Eastern Region:-

Tamatave	- 7.35 (Mean average)
Factory of Society Rochefortaise	- 8.82 (Come from Centre and taken to Tamatave)
City Abattoir	- 5.89 (Come from Centre and taken to Tamatave)

(3) North-West Region:-  
Majunga - 6.92

(4) Northern Region:-  
Diego-Suarez (Abattoir and Factory) - 3.03.

According to Poisson (1928) between 1912 and 1927 only occasional sporadic cases of C. bovis were observed at the various abattoirs in Madagascar. Dureiux (1934), stated that C. bovis had been found at abattoirs on the Island since 1917, but the maximum percentage is 3%. In 1936, according to an extract of the Archives of the Veterinary Service 0.19% of bovines slaughtered at the abattoir at Tananarive were measly.

Portuguese East Africa.

According to Dr. Joao Botelho, Abattoir Inspector and Municipal Veterinary Officer, Lourenco Marques, the average percentages during the last 3 years have been:-

Cysticercus cellulosae in pigs 3.6  
Cysticercus bovis in cattle 3.15.

Northern Rhodesia.

The Medical Officer of Health, Ndola, kindly furnished the following statistics showing the number of cases and percentages of C. cellulosae and C. bovis observed at the Ndola abattoir during the years 1932 to 1935

(1)

Year	<u>Cysticercus cellulosae</u>		Page
	<u>Pigs slaughtered</u>	<u>Pigs infected</u>	
1932	122	7	5.7
1933	250	21	8.4
1934	535	17	3.1
1935	493	23	4.6
Total	1400	68	Approx. 5.0%

(2)

Year	<u>Cysticercus bovis</u>		Page
	<u>Cattle slaughtered</u>	<u>Cattle measly</u>	
1932	1164	65	4.7
1933	1217	49	4.0
1934	1652	18	1.0
1935	1961	22	1.1
Total	5994	154	2.7

The Medical Officer of Health attributes the reduction in the percentage of infested animals to the fact that butchers now purchase slaughter stock from ranches having a "clean" record, and as far as possible avoid the purchase of animals from ranches which are known to be foci of infestation.

### Southern Rhodesia.

It has been very difficult to obtain reliable statistics of the incidence of cysticercosis from Southern Rhodesia, since few of the townships, with the exception of Salisbury and Bulawayo have properly controlled abattoirs in which authentic statistics are kept.

The Abattoir Superintendent, Salisbury, informs me that the average annual percentage measles in pigs is about 3%, and in bovines about 2%.

The Superintendent of the Municipal Abattoirs, Bulawayo, has forwarded the following data, relative to observations at Bulawayo for the last five years ended June 30th, 1936.

Swine. (1) Number of measly carcasses 1454  
 (2) Percentage these figures represent 6.7  
 (3) It is estimated that 1148 (or 80%) of these measly pigs are of native origin.

Bovines (1) Number of measly carcasses 230  
 (2) Percentage these figures represent 0.38  
 (3) It is estimated that 180 (80%) of these measly bovines are of native origin.

Judging from the available statistics from Southern Rhodesia, it would appear that C. bovis is not a common parasite in that country. This may be attributed to the fact that probably a large percentage of slaughter stock, even of native origin, may be raised under semi-ranging conditions, under which they do not come in contact with humans.

South-West Africa.

Windhoek is the only centre in South-West Africa from which any statistics could be obtained. According to these statistics, in 1931, 1100 pigs were slaughtered at the abattoir, of which number only 1 was infected with C. cellulosa. Since then no cases have been found.

(Note, von Ostertag in 1916 alleged that before the war it was frequently found that 50% of the pigs exported from the Cape to German South-West Africa were measly. This high percentage almost trebles those from the centres showing the extreme maximum incidence at the present time. It will be noticed that but a few Transvaal and Orange Free State centres give a return of over 10% infection in pigs, so that von Ostertag's estimate appears almost fantastic.)

With reference to the occurrence of C. bovis, the following data are given:-

In 1933,	of 3816	bovines	slaughtered,	10	were	infected.
" 1934,	" 3821	"	"	12	"	"
" 1935,	" 3874	"	"	3	"	"
" 1936,	" 2687	"	" in 9 months	8	were	infected.

The remarkably low incidence of C. bovis in South-West Africa may be explained on similar lines to that of Southern Rhodesia. In the next survey (that of Bechuanaland Protectorate), it will be observed that Mr. Hay found no cases of C. bovis among cattle from Ngamiland and Ghanzi, areas comprising vast open ranges, remote from human habitations, and bordering on South-West Africa.

It will be recalled that Dr. Unger found 3 out of 321 cattle imported from South-West Africa measly at Basel (Switzerland) in 1923 and 1924. (0.94%).

Bechuanaland Protectorate.

The only abattoir in this Territory is situated at Lobatsi, from which centre export beef is forwarded. Mr. W. Hay, Government Veterinary Officer in charge of meat inspection at this abattoir states that no pigs are slaughtered there, and that 1.05% of bovines are found to be measly. No measly cattle have been found among those originating from Ngamiland and Ghanzi. Commenting upon Mr. Hay's report, the Chief Veterinary Officer of the Bechuanaland Protectorate writes (24/11/36):- "Our experience at Lobatsi shows that measles is not evenly distributed but occurs in batches of cattle, which fact has led to the reasoning that only cattle in areas thickly populated by natives contract measles."

Basutoland.

The Principal Veterinary Officer, Basutoland, writes (letter dated 30/10/36):- "It is impossible to estimate even the approximate number of cases met with on post-mortem examination throughout the Territory. The Territory is occupied by natives only and pigs are raised exclusively for domestic purposes. Pigs are either kept in sties or allowed to range. The latter virtually become village scavengers and about 10% of these are infected, whereas 2% of the former are infected. In connection with cattle, I am afraid I am unable to furnish any data because we have no meat export trade."

Union of South Africa.

These statistics given in the following tables, showing the percentages of C. cellulosa and C. bovis at the various abattoirs in the Union, were obtained as the result of a personal questionnaire to the respective

Abattoir Directors or Superintendents, Medical Officers of Health, Health Inspectors, or Town Clerks of the centres, all of whom very kindly supplied the data given. There are, unfortunately, some centres from which most evasive replies were obtained, and a few, including fairly large towns, from which no replies whatsoever were obtained. Consequently, since it was my policy to include only first-hand authentic information in this survey, reference to the subjoined tables and the "incidence maps" will show the exclusion of some very important centres bordering on, or close to, Native Territories. If suitable statistics had been kept at these excluded centres, it is possible that some very interesting information may have been presented.

Cape Province.

<u>Abattoir.</u>	"Average No. of Cases per Year"		Average %age.		"Average "years"
	" <u>C. cellulosa</u> ."	" <u>C. bovis</u> ."	" <u>C. cellulosa</u> ."	" <u>C. bovis</u> ."	
Aliwal North	4	14	0.5	1.5	1
Beaufort West	1	1	0.67	0.25	5
Bedford	-	-	2.75	1.5	5
Burghersdorp	-	4	-	0.87	1
Cradock	11	5	2.49	0.75	5
Cape Town	292	492	4.26	1.12	5
East London	438	408	7.69	5.69	3
Fort Beaufort	8	33	9.29	6.1	6
George	11	3	2.61	0.53	6
Graaff-Reinet	19	-	3.33	-	4
Kimberley	59	88	1.68	1.22	10
Kingwilliamstown	32	92	4.7	5.2	6
Mafeking	23	41	6.67	2.67	3
Malmesbury	16	2	4.27	0.52	5
Middelburg	14	23	2.9	0.94	5
Mossel Bay	1	1	1.37	-	1
Paarl	-	-	3.33	1.75	-
Port Elizabeth	170	653	1.76	7.29	5
Queenstown	50	11	3.3	0.67	5
Riversdale	13	7	0.8	3.0	1
Stellenbosch	7	29	1.58	2.44	4
Swellendam	22	24	3.0	4.0	-
Uitenhage	20	10	3.0	0.6	5
Upington	-	5	-	0.89	1
Vryburg	4	2	7.0	0.3	5
Worcester	11	4	1.97	0.61	5



Natal.

Abattoir.	Average No. of Cases Per Year.		Average %age.		Average
"	<u>C. cellulosa</u>	<u>C. bovis</u>	<u>C. cellu-</u>	<u>C. bovis</u>	Years.
"	"	"	<u>losae.</u>	"	"
Dundee	7	62	2.70	5.80	5
Durban	998	928	5.16	2.68	10
Greytown	3	27	1.69	3.84	5
Ladysmith	-	-	2.0	4.0	-
Newcastle	20	7	2.45	0.158	-
P. Maritzburg	43	4 77	1.77	5.3	5
Vryheid	8	59	2.9	4.3	10
"	"	"	"	"	"
"	"	"	"	"	"
"	"	"	"	"	"
"	<u>Orange Free State.</u>		"	"	"
"	"	"	"	"	"
Bethlehem	32	38	15.2	2.13	5
Bloemfontein	74	443	2.13	4.87	2
Brandfort	1	12	1.69	5.0	-
Clocolan	9	8	9.0	2.01	3
Fauresmith	-	3	-	-	2
Ficksburg	135	7	25.0	1.09	10
Frankfort	6	12	5.03	2.01	-
Harrismith	9	-	4.51	-	3
Heilbron	1	1	0.88	0.08	3
Kroonstad	41	10	4.262	0.45	5
Lindley	6	5	6.0	2.10	2
Parys	13	11	5.5	1.51	4
Senekal	21	12	25.07	2.0	10
Wepener	3	-	9.43	-	5
Winburg	8	1	4.44	0.3125	8
"	"	"	"	"	"
"	"	"	"	"	"
"	<u>Transvaal.</u>		"	"	"
"	"	"	"	"	"
Barberton	-	-	-	5.31	-
Boksburg	-	81	-	1.22	2 1/2
Brakpan	77	69	4.27	0.71	3
Germiston	32	260	1.04	1.48	5
Johannesburg	3148	834	4.42	0.75	11
Klerksdorp	30	24	4.91	1.37	1
Krugersdorp	80	190	6.10	1.46	4
Lichtenburg	5	2	19.48	0.18	3
Middelburg	30	30	11.49	3.04	8
Nelspruit	10	43	6.41	2.03	1
Nigel	43	90	5.02	2.80	1
Pietersburg	219	68	4.95	2.97	3
Potchefstroom	111	41	15.30	1.23	5
Retoria	595	297	7.85	1.98	11.
Randfontein	31	198	3.96	2.30	4
Rustenburg	53	98	10.12	5.11	4
Springs	25	146	3.91	1.20	5
Volkstrand	12	1	5.0	1.06	1
Witbank	20	80	8.97	2.75	6

Average No. of Carcasses per year.

	C. cellulosa	C. bovis.
Cape Province	1276	1952
Natal	1079	1560
O.F.S.	359	563
Transvaal	4521	2551
Total for Union	7235	6626

Figures in above tables obtained from 59 abattoirs in respect of C. cellulosa  
 " " " " " " " " " " " "C. bovis  
 " " " " " " " " " " " " average %age.

## Discussion.

In a note which was compiled by Mr. H. H. Curson towards the end of 1936, for a Native Affairs Departmental Bulletin, and accompanying which two tables and graphs were supplied, the position in the Union is very clearly defined. The statistics given in the tables of Dr. Curson's note, are subjoined hereto, and are in respect of the nine principal abattoirs in the Union, plus that of Kingwilliamstown, which town borders on the Transkeian Territories. Reference to the graphs shows a steady increase in the numbers and percentages of measly bovines and pigs, from observations at the respective abattoirs. Undoubtedly the steady increase in the incidence may be due to general better inspection technique, but also, it may be possible that a larger percentage of slaughter stock is derived from native areas.

The accompanying "Incidence Maps" may not be quite indicative of the actual incidence of infection in the various areas. For instance, no details were obtainable from abattoirs in, or close to definite native areas, such as Eshowe, Kokstad, Umtata, Grahamstown, Kuruman, Zeerust, Waterberg, Lydenburg, or Zoutpansberg. Yet, the abattoirs at Durban, East London, Port Elizabeth and Johannesburg obtain a fairly large percentage of their slaughter pigs and cattle from those areas. For the smaller centres, the figures and percentages may be accepted as almost truly indicative, since stock slaughtered at the smaller abattoirs are generally reared in the same districts. At the Bloemfontein abattoir we were able to trace definite "black" areas of origin during the past three years. Thus, in consignments from Theunissen in the Orange Free State, and also from Thaba 'Nchu and Tweespruit, we frequently found a fairly large percentage of infected cases. Mr. W. A. Dykins, M. R. C. V. S., the author's colleague in Durban reports

(letter dated 21st September, 1936) "the incidence of measles in cattle in the years under review has increased, and regarding pigs the converse seems to be the case. I do not think any special significance should be attached to the latter, as farmers and others who have doubts about their pigs do not consign them to abattoirs where efficient meat inspection is in vogue, so, in my opinion, the low incidence gives rise to a wrong impression." Mr. Dykins adds that the cattle with the highest infection come from native areas such as Swaziland, Gollel, Candover, Mkuzi, Richmond and Ixopo, and attributes this, naturally, to "absence of proper sanitary measures."

In another letter, dated 20/6/36, Mr. Dykins stated: "I definitely find that the highest percentages of measles are to be found amongst cattle ex native areas, such as Swaziland and the portions of Zululand contiguous thereto. A high percentage is frequently met in animals from the Midlands of Natal, and actually from the so-called well managed farms."

The Town Clerk, Newcastle, writes (17/11/36): "The greatest number of cases at this abattoir have been in pigs and cattle purchased in or near the Utrecht (Natal) District. As regards percentage infection at East London, Dr. P.W.Laidler, Medical Officer of Health, writes (11/1/37): "A large proportion of the stock was from native areas."

Mr. H.J.Lubbe, Abattoir Superintendent, Graaff-Reinet, writes (19/11/36): "We have had no records of measles in bovines at this abattoir. As regards the origin of measles in swine, farmers in this District allow their swine to run wild amongst the prickly pears, which we have here in abundance. Sanitary conveniences are provided on most farms for the Europeans only, the natives being allowed to use the veld."

Mr. H.A. Waterston, Health Inspector, Mafeking, writes (30/12/36):-  
 "The percentage infection in pigs was very high in 1933 and 1934, as most pigs slaughtered at that time were brought from Native Reserves." (The percentages given for 1933 and 1934 were 7 and 8, respectively).

Mr. C.J. Grobler, Health Inspector, Malmesbury, writes (27/10/36):-  
 "It will be observed that the incidence of measles in bovines is comparatively low. This is due to the fact that, as a country town, local butchers must of necessity slaughter from a reserve, that is, selected stock and not direct from rail or the open market as in large centres. In purchasing stock, butchers steer clear of coloured areas and native territories, for instance Queenstown and vicinity. Local supplies of bovines are very limited and are obtained from as far afield as Okanja and Gobabis in South-West Africa, from the Eastern Province and from Namaqualand; consequently the recorded incidence of C.bovis at this abattoir cannot be taken as a criterion for the Malmesbury area, where it is of very rare and doubtful occurrence, while pigs are bought and raised purely locally, and C.cellulosae is fairly rife."

Mr. J.L. Marais, Health Officer, Middelburg, Cape, writes (12/12/36):  
 "Most cases of measles found here, during the past five years have been in oxen from the Transkei. No cases of measles have ever been found here in cattle bred in the Middelburg District."

Mr. D. Benham, Health Inspector, Riversdale, writes (9/11/36):-  
 "All the oxen infected came from the same part of the district, and since the butchers have stopped buying from that area, I have not found any measly carcasses."

Mr. L. Becker, Abattoir Superintendent, Swellendam, writes (24/11/36):

"Pigs coming from areas exclusively or predominantly inhabited by coloured people, or from farms along the main arterial roads, are obviously treated with suspicion, even by the butchers of towns of the size of Swellendam."

Mr. G.P.Louw, Health Inspector, Upington, writes (31/10/36):-

"In the last 10 months, one case of C.bovis was definitely of native origin, four others came from South-West Africa."

Mr. C.M.de Jager, Abattoir Superintendent, Volksrust, writes (26/10/36)

"The majority of bovine cases of measles are animals purchased from natives, especially from the Lowveld."

Mr E.J.Scallan, Health Inspector, Rustenburg, writes (27/10/36):-

"We have farmers in the district who speculate in cattle and pigs and purchase these animals from natives and sell them on the sales or to the butchers as their own."

Mr. F.R.Carter, Abattoir Superintendent, Potchefstroom, writes

(30/11/36):- "About 15 per-cent. of cattle slaughtered here are of native origin, and about 75 per-cent. of cattle bought from native areas are condemned. Most of the pigs slaughtered at this abattoir are drawn from native areas." Mr. Carter stated that when he first arrived at Potchefstroom 10 years ago, the highest condemnation of meat was 50000 lbs. weight. During the first 8 months of his service he condemned 40,000 lbs, weight, and nowadays the condemnation weights are less than half that amount. Mr. Carter states that "the butchers are now very careful where they buy their stock."

The Abattoir Superintendent, Nigel, states (28/10/36) that the majority of pigs slaughtered at that abattoir are obtained from farmers in the locality. It has been his experience, however, that the majority of pigs of known native origin have been infected with measles.

Mr. D. Arnold, Abattoir Superintendent, Krugersdorp, writes (10 /11/36): "Oxen slaughtered here are bought all over the country, but the principal sources of supply are the Johannesburg Market, parts of the O.F.S., and Rustenburg. From Rustenburg we get about 30<sup>0</sup> oxen per month and to my mind about 60% would be of native origin."

The Town Clerk, Barberton, writes (27/10/36):- "In such centres as Sabie, Noordkaap, Sheba, Eureka, Louws creek, Hectorspruit, Komatipoort, Kaapsche Hoop, Nelshoogte, animals are slaughtered in abattoirs where no post-mortem examinations are made. It has been conclusively proved in the Barberton Municipal Abattoir, that the incidence of measles (Cysticerci) in cattle is on the increase. During the past six months, of all those slaughtered, the percentage infested was as high as 5.31."

Mr. P.G. Joubert, Health and Meat Inspector, Fauresmith, makes the following observation in regards to the origin of infected bovines at various abattoirs where he formerly served in the Cape, (letter dated 29/10/36):- "Much depended on the vicinity from which stock were obtained. For instance, it was noticed that bovines from the Eastern Province were the most frequently infested, with the Transvaal a good second and the Free State third. Measles disease was practically never found in stock brought from South-West Africa. Measles was common in pigs reared at the Cape."

In his Annual Report for the year ended 30/6/35, Col. J. Irvine-Smith, Director of Abattoir Department, Johannesburg, makes the following observation. (page 3):- "Measles infestation (bladderworm) of export cattle from Natal ranges from 2.7 per-cent. to 60 per-cent., with an average of 4.05 per-cent."

T A B L E I.

GIVING TOTAL NUMBER OF CARCASSES DETAINED FOR MEASLES AT PRINCIPAL ABATTOIRS.

FROM DR. CURSON'S PAPER - "MEASLES IN CATTLE AND PIGS".

T o w n .	1925		1926		1927		1928		1929		1930		1931		1932		1933		1934		1935		1936	
	Total Measly		Total Measly		Total Measly		Total Measly		Total Measly		Total Measly		Total Measly		Total Measly		Total Measly		Total Measly		Total Measly		Total Measly	
	Ox	Pig	Ox	Pig	Ox	Pig	Ox	Pig	Ox	Pig	Ox	Pig	Ox	Pig	Ox	Pig	Ox	Pig	Ox	Pig	Ox	Pig	Ox	Pig
Port Elizabeth	260	235	397	225	201	320	356	310	440	252	577	144	551	109	492	124	905	134	670	292	647	193		
East London	72	419	44	484	55	571	281	450	193	530	215	463	108	274	127	276	184	324	391	521	440	474		
King Wms. Town	-	-	-	-	-	-	-	-	-	-	37	18	32	21	64	45	154	75	168	189	98	147		
Cape Town	-	-	-	-	-	-	-	-	-	-	-	-	425	386	474	301	422	209	604	315	534	251		
Kimberley	-	-	69	45	130	61	85	55	40	62	81	62	72	68	57	84	47	46	125	77	170	30		
Pretoria	168	490	201	480	219	475	321	444	298	569	315	682	301	624	318	634	301	817	378	667	443	664	-	-
Johannesburg	1084	3350	994	3698	1158	3300	892	3225	922	3569	806	3054	734	2232	518	2223	644	2571	732	3618	690	3788	-	-
Bloemfontein	116	132	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	504	93	382	56
Durban	-	-	382	978	620	744	661	790	613	898	811	1224	-	-	870	1113	1118	893	1217	1457	1635	1052	1450	831
Maritzburg	-	-	-	-	-	-	192	91	268	79	313	88	371	61	343	37	329	48	530	52	557	48	625	31

For the percentage these carcasses represent see Table II.

T A B L E II.

T o w n .	1925		1926		1927		1928		1929		1930		1931		1932		1933		1934		1935		1936	
	% Con-demned.		% Con-demned.		% Con-demned.		% Con-demned.		% Con-demned.		% Con-demned.		% Con-demned.		% Con-demned.		% Con-demned.		% Con-demned.		% Con-demned.		% Con-demned.	
	Ox	Pig	Ox	Pig	Ox	Pig	Ox	Pig	Ox	Pig	Ox	Pig	Ox	Pig	Ox	Pig	Ox	Pig	Ox	Pig	Ox	Pig	Ox	Pig
Port Elizabeth	2.6	4.6	3.9	3.0	1.9	3.2	3.1	3.2	3.6	2.5	5.4	1.4	5.8	1.2	6.1	1.4	10.8	1.5	7.2	2.8	6.5	1.7	-	-
East London	.9	11.7	.5	11.3	.6	11.6	3.3	10.5	2.3	12.2	2.8	12.1	1.7	7.1	2.3	6.2	3.3	7.2	5.4	9.1	5.9	8.4	-	-
King. Wms. Town	-	-	-	-	-	-	-	-	-	-	1.3	2.6	1.9	1.1	4.6	3.6	9.2	4.4	8.7	9.8	5.7	6.7	-	-
Cape Town	-	-	-	-	-	-	-	-	-	-	-	-	1.1	4.3	1.2	5.2	.95	3.8	1.3	4.4	1.1	3.6	-	-
Kimberley	-	-	1.1	2.6	1.9	2.4	1.1	1.8	.47	1.4	.9	1.3	.9	1.1	.8	1.1	.7	.8	1.8	2.4	2.5	1.3	-	-
Pretoria	-	9.25	1.3	7.34	1.3	7.32	1.6	6.29	1.8	9.09	2.0	8.97	2.0	7.07	2.4	6.97	1.9	7.53	2.3	8.51	2.4	7.95	2.7	-
Johannesburg	1.05	6.02	.95	6.49	1.03	4.58	.81	4.5	.78	4.88	.72	4.36	.67	3.06	.48	2.89	.61	3.22	.62	4.41	.57	4.20	-	-
Bloemfontein	1.14	7.47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.5	3.7	4.6	1.8
Durban	-	-	1.3	8.4	1.8	4.7	1.8	4.5	1.5	4.6	2.1	5.9	-	-	2.2	4.9	3.5	4.1	3.6	6.4	4.7	5.1	4.1	3.0
Maritzburg	-	-	-	-	-	-	2.3	2.4	2.9	2.5	3.3	2.8	4.2	2.1	4.1	1.1	3.9	1.5	5.6	1.7	6.04	2.8	7.0	1.7

CHART 1 (Pigs)  
Illustrating Total Number of Carcasses containing Measles  
(See Table I.)

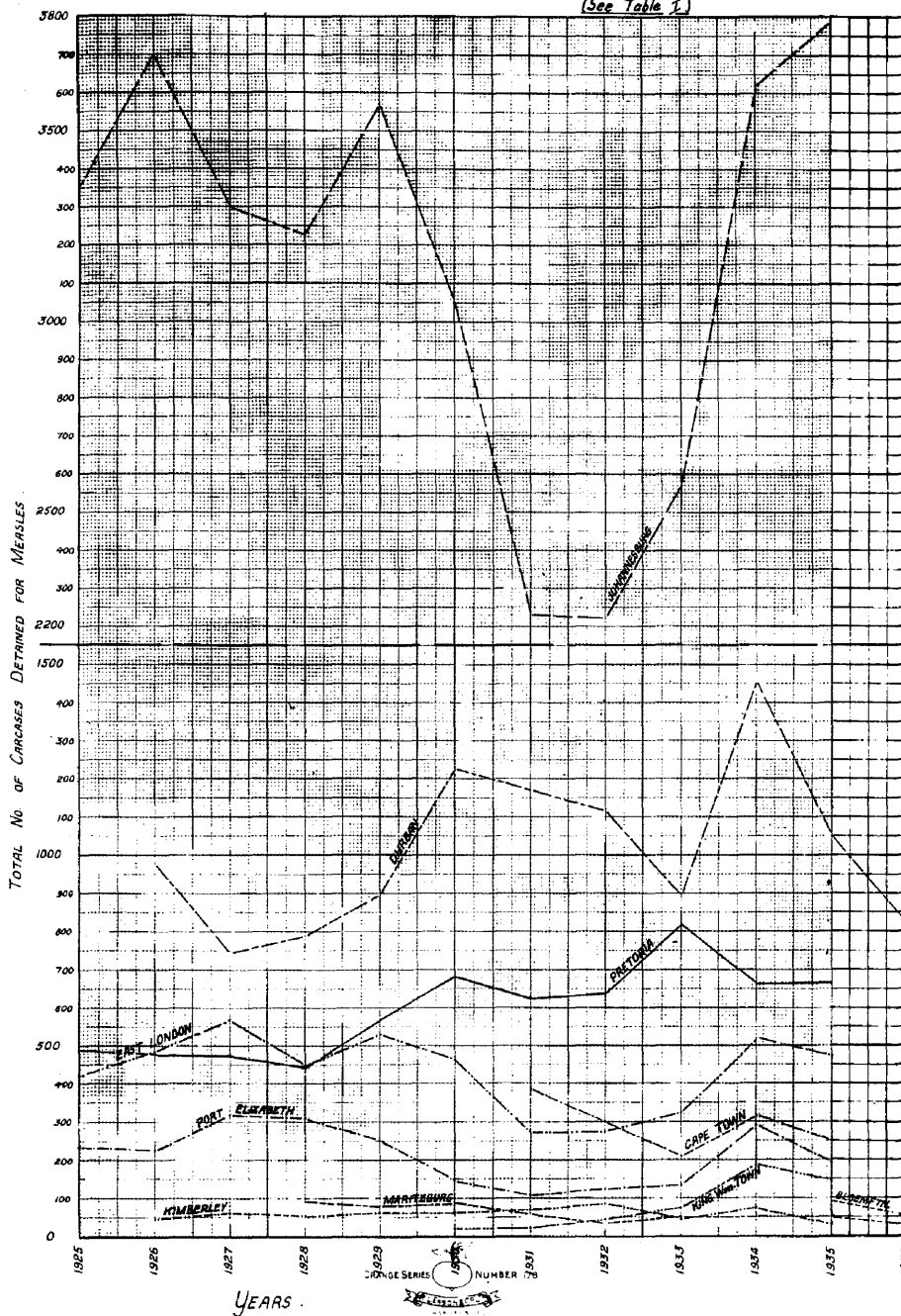


Chart 1. (Pigs).

Graphical Illustration showing the Total Number of Carcasses containing Measles at the nine Principal Abattoirs of the Union, plus Kingwilliamstown, adjoining Transkei.

Photograph of Graph in Dr. H.H. Curson's Note "Measles in Cattle and Pigs."



CHART 1 (CATTLE)  
Illustrating Total Number of Carcasses containing Measles. (See Table I.)

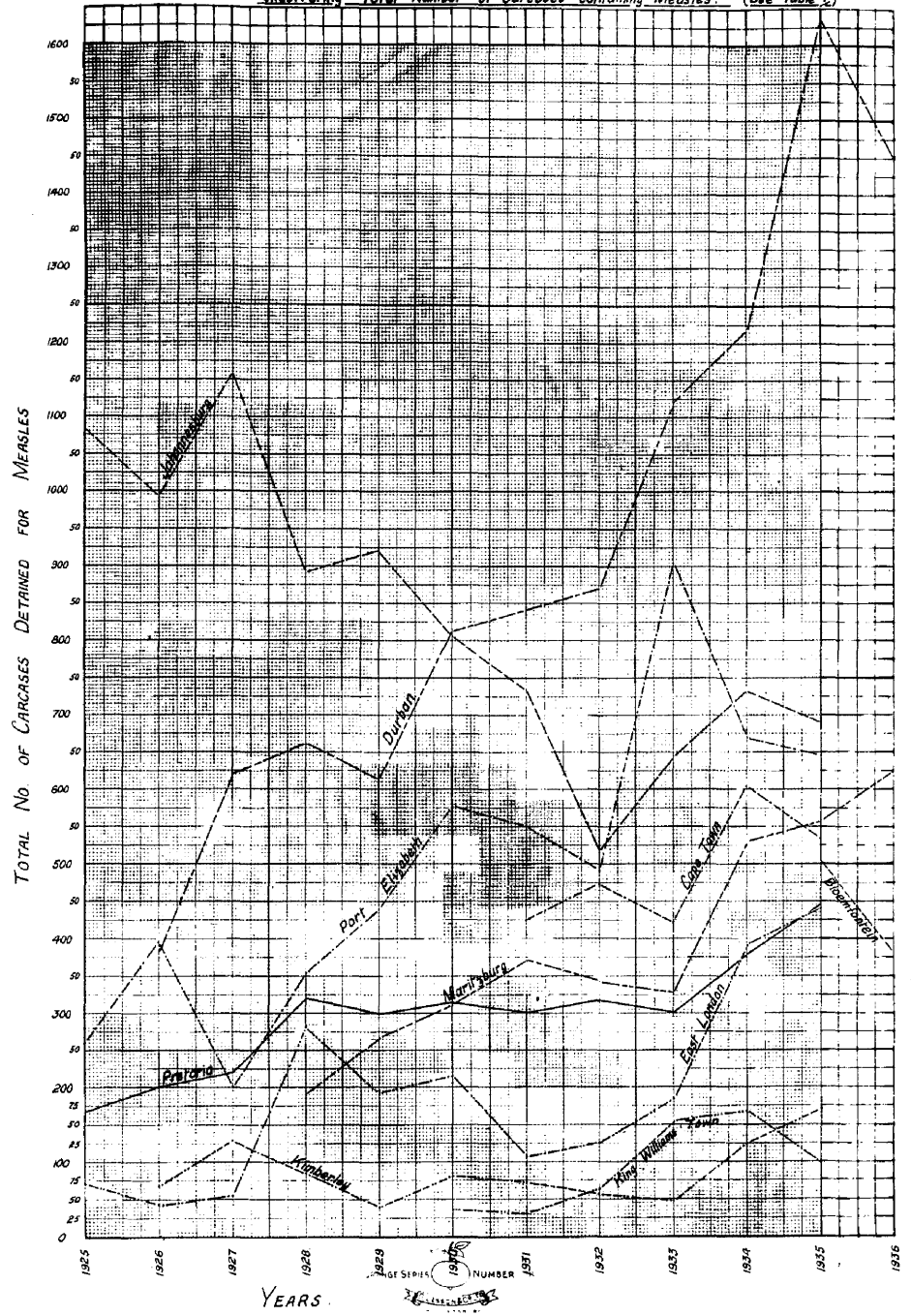


Chart 1. (Cattle).

Photograph of Graph in Dr. H.H. Curson's Note "Measles in Cattle and Pigs." 1936.

CHART II. (Pigs).  
Illustrating the Percentages the Figures of Chart I represent.  
(See Table II.)

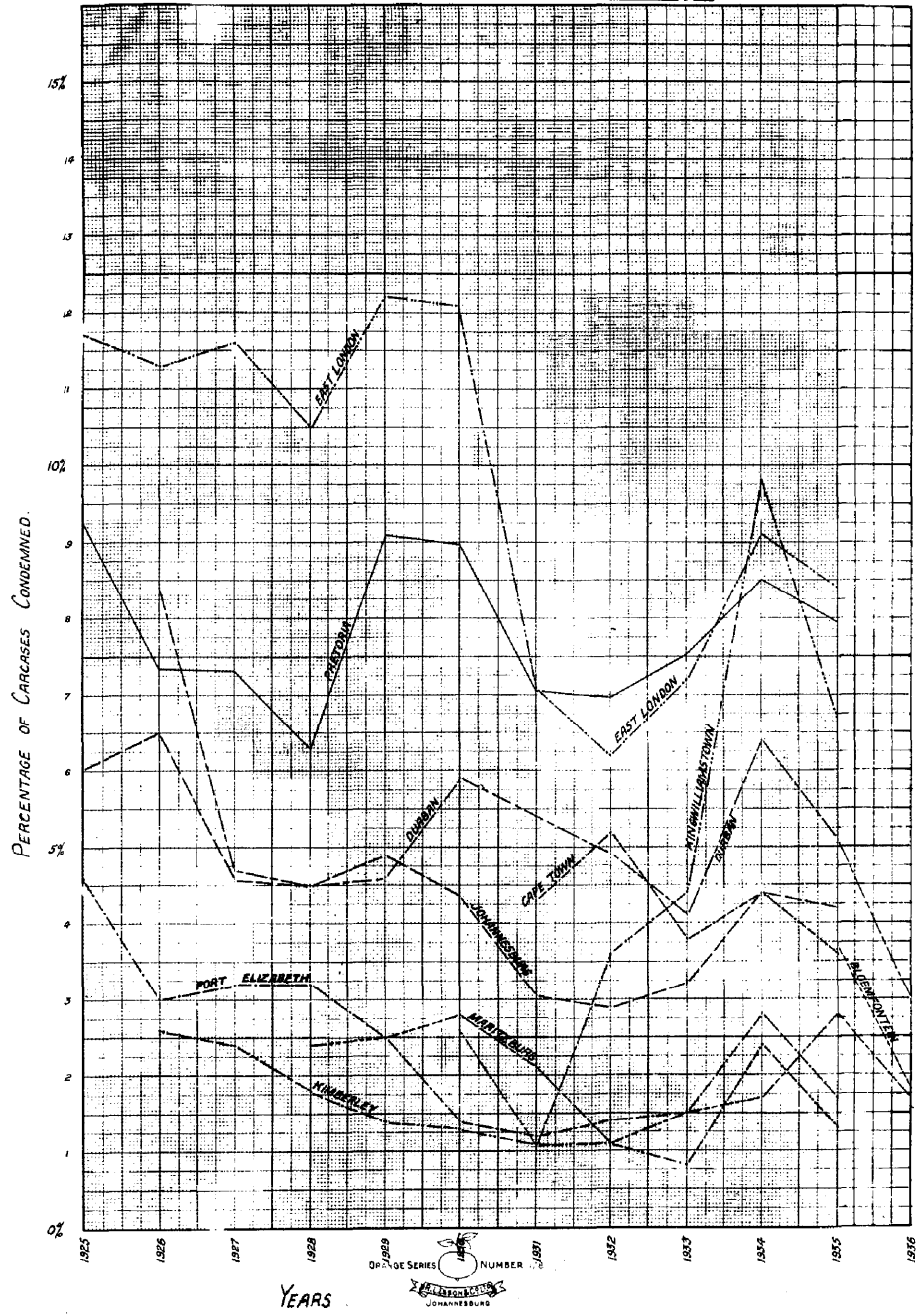


Chart 2. Pigs.

CHART II (CATTLE).  
 Illustrating the Percentages the Figures of Chart 1 represent.  
 (See Table II)

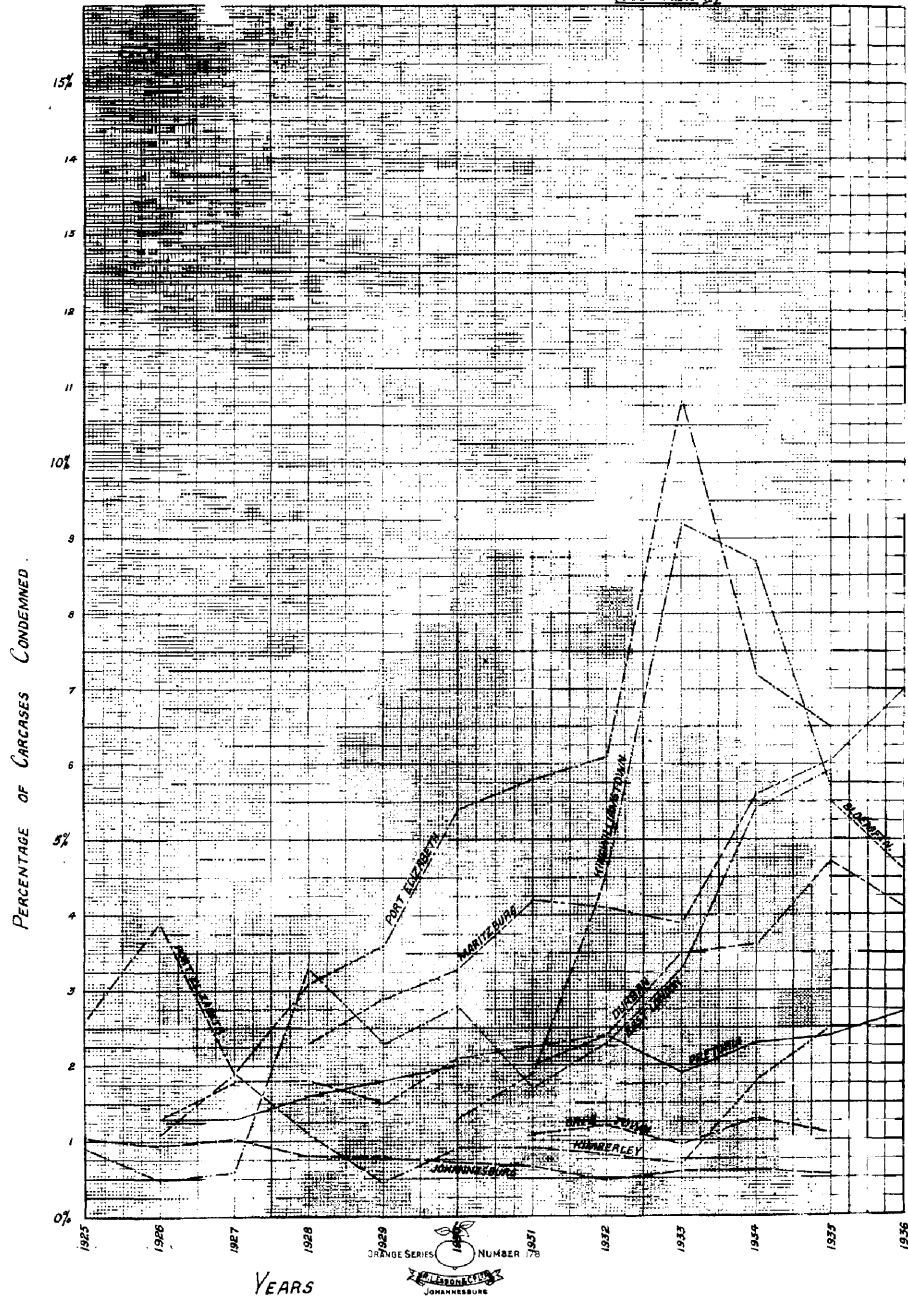


Chart 2. Cattle.

Summary:- Reference to the accompanying "Incidence Maps" will clearly show the areas in which the largest percentages of infection are found. These are marked in black, in respect of Pig Measles. The largest Union centres, e.g. Johannesburg, Cape Town, Durban, Pretoria, Bloemfontein, Port Elizabeth, East London, Pietermaritzburg, Kimberley and all the Witwatersrand towns obtain their slaughter stock from various parts of the Union, so that it is difficult to fathom the incidence of infection and its origin. A more correct reflection is probably shown by the recordings of the smaller abattoirs, where much of the stock slaughtered is reared locally.

Heavy infection in pigs is reflected in such centres as Ficksburg, Clocolan, Senekal, Wepener and Bethlehem, which are situated close to the Basutoland border, and in the Transvaal a very interesting "black zone" may be traced from the North-West Cape (Mafeking and Vryburg), through Lichtenburg, Potchefstroom, Rustenburg, Pretoria, Witbank to Middelburg. It is correct to state that a large percentage of pigs slaughtered in this "Black Zone" originates from native areas. The Vryburg and Mafeking Districts have numerous Native Reserves; Lichtenburg District has a large Reserve near Delarey, many native-owned or leased farms, and the district <sup>also</sup> joins the vast Moiloa Native Reserve of Marico; Potchefstroom has numerous native farms; Rustenburg District, likewise, has many Native Reserves; Pretoria and Witbank Districts have many native areas, and Sekoekoeniland forms a considerable portion of Middelburg District. It is with regret that no figures are available for the Transkeian Territories, but relatively high percentages were obtained from Kingwilliamstown, close by.

The incidence of C.bovis is highest in Natal, the extreme

Eastern Transvaal and also in the Eastern Cape, namely at the abattoirs at Kingwilliamstown, East London, Port Elizabeth and Fort Beaufort, and it can safely be presumed that a large percentage of the bovines slaughtered at those abattoirs are of native origin.

The following tables show a summary of the average percentages, <sup>reverse</sup> in order of frequency, of the incidence of C. cellulosa and C. bovis at South African abattoirs. The averages given are over periods ranging between 1 and 10 years.

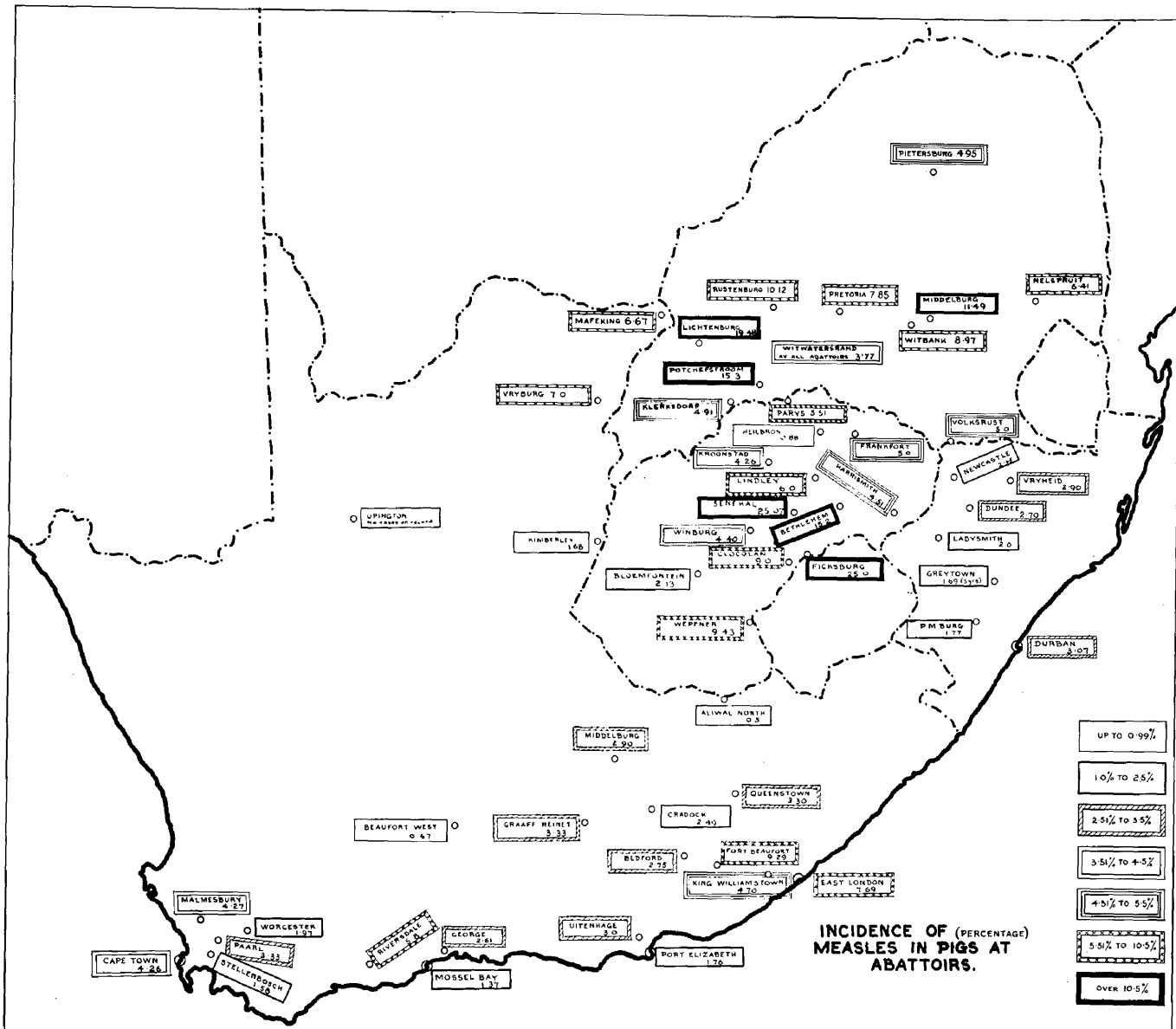
Average Percentages of C. cellulosa at Union abattoirs.

A liwal North	0.5	Winburg	4 .4	
Beaufort West	0.67	Johannesburg	4.42	
Heilbron	0.88	Harrismith	4.51	
Germiston	1.04	King Wm.Town	4.70	
Mossel Bay	1.37	Klerksdorp	4.91	
S tellenbosch	1.58	Pietersburg	4.95	
Kimberley	1.68	Volkswrust	5.0	
Greytown	1.69	Nigel	5.02	
P'Maritzburg	1.77	Frankfort	5.03	
Port Elizabeth	1.77	Durban	5.16	XX
Worcester	1.97	Parys	5.51	
Ladysmith	2.0	Riversdale	5.8	
Bloemfontein	2.13	Lindley	6.0	
Newcastle	2.45	Krugersdorp	6.10	
C radock	2.49	Nelspruit	6.41	
George	2.61	Mafeking	6.67	
Dundee	2.70	Vryburg	7.0	
Bedford	2.75	East London	7.67	
Middelburg (C.)	2.9	Pretoria	7.85	
Vryheid	2.9	Witbank	8.97	
S wellendam	3.0	Clocolan	9.0	
Uitenhage	3.0	Fort Beaufort	9.29	
Queenstown	3.3	Wepener	9.43	
Paarl	3.33	Rustenburg	10.12	
Graaff-Reinet	3.33	Middelburg(Tvl)	11.49	
S prings	3.91	Bethlehem	15.2	
Randfontein	3.96	Potchefstroom	15.3	
Cape Town	4.26	Lichtenburg	19.48	
K roonstad	4.262	Ficksburg	25.0	
B rakpan	4.27	S enekal	25.07	
Malmesbury	4.27			

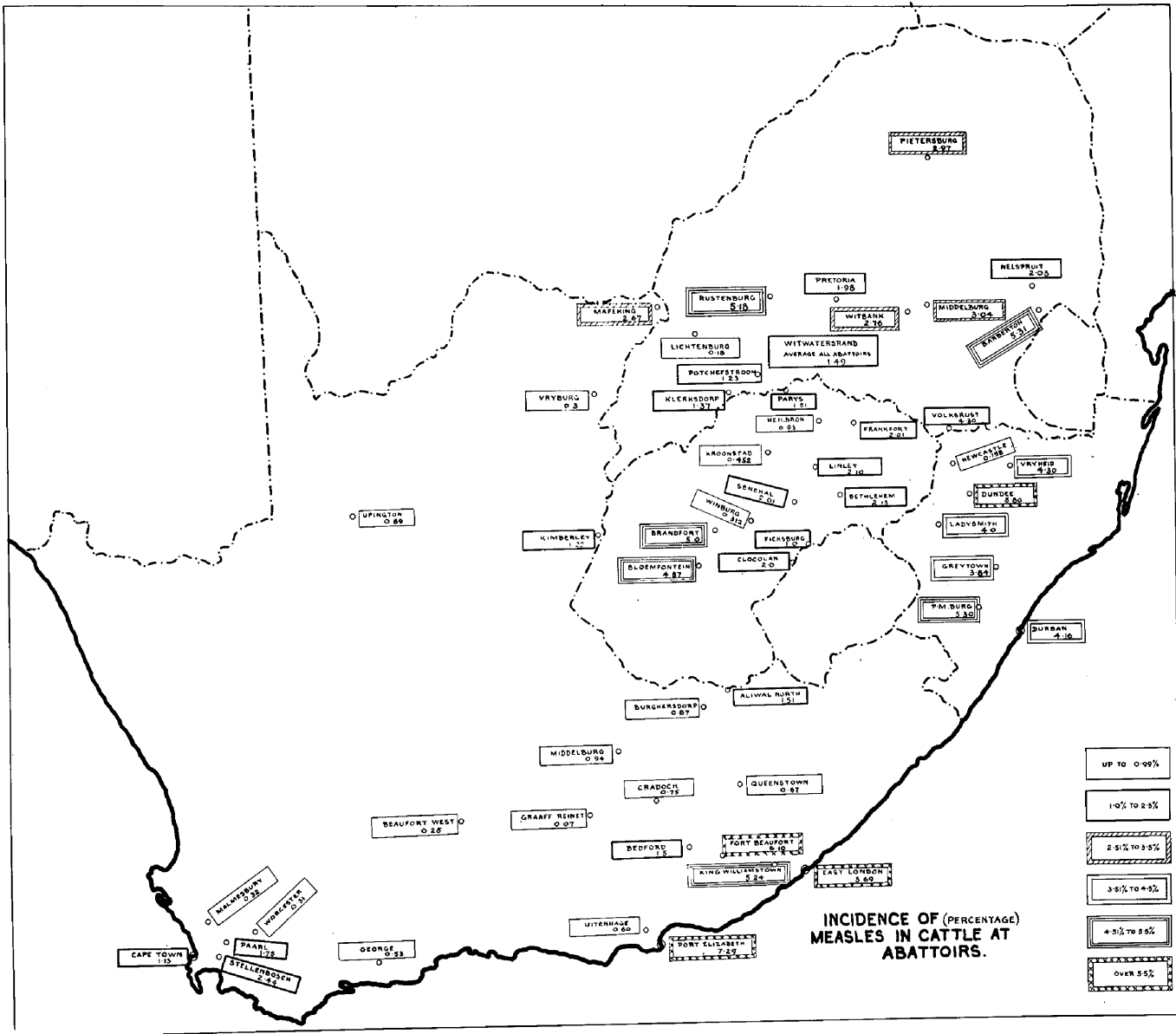
Average Percentages of C.bovis at Union abattoirs.

Heilbron	0.08	Pretoria	1.98
Newcastle	0.158	Clocolan	2.0
Lichtenburg	0.18	Senekal	2.01
Beaufort West	0.25	Lindley	2.10
Vryburg	0.3	Nelspruit	2.03
Worcester	0.31	Frankfort	2.03
Malmesbury	0.32	Bethlehem	2.13
Kroonstad	0.45	Randfontein	2.30
George	0.53	Stellenbosch	2.44
Uitenhage	0.6	Mafeking	2.67
Queenstown	0.67	Durban	2.68 XX
Brakpan	0.71	Witbank	2.75
Johannesburg	0.75	Nigel	2.80
Cradock	0.75	Pietersburg	2.97
Burghersdorp	0.87	Riversdale	3.0
Upington	0.89	Middelburg (Tvl)	3.04
Middelburg (C)	0.89	Breytown	3.84
Ficksburg	1.09	Ladysmith	4.0
Volksrust	1.06	Swellendam	4.0
Cape Town	1.12	Vryheid	4.3
Springs	1.20	Bloemfontein	4.87
Kimberley	1.22	Brandfort	5.0
Boksburg	1.22	Rustenburg	5.18
Potchefstroom	1.23	Kingwilliamstn.	5.2
Klerksdorp	1.37	P' Maritzburg	5.3
Krugersdorp	1.46	Barberton	5.31
Germiston	1.48	East London	5.69
Aliwal North	1.5	Dundee	5.8
Bedford	1.5	Fort Beaufort	6.1
Parys	1.51	Port Elizabeth	7.29
Paarl	1.75		

XX Durban. The percentages given for Durban, of C.cellulosae and C.bovis in the accompanying maps, viz. 3.07 and 4.16, respectively, were for the 12 months ended June 1936. At the time the maps were compiled, I did not have all the data for Durban. The percentages shown in the tables, viz. 5.16 in pigs and 2.68 in bovines, are the average percentages for 10 years ended 1936.



Map. No. 1.



Map. No. 2.