An Iodine Survey of New Zealand Livestock. Part V—Sheep of the North Island.

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THIS survey was commenced in the South Island, where trouble with goitre is more common, the results being published by Mason (1933), Mason and Waters (1936), and Waters (1938). This paper, the last of the series, completes the survey of New Zealand supplementing the work of Sykes (1934) in the North Island.

The aim and method of the work has been explained in the papers mentioned and is summarised as follows:—Prompted by the occurrence of sporadic cases of goitre in farm animals, the survey of iodine available naturally to stock was based on the iodine content of thyroid glands of lambs. Samples, each of six glands, were taken at freezing works from drafts of lambs which could be traced back to single farms where the lambs were bred and fattened and where no iodized licks were used. Each sample was analysed separately, according to the method of von Fellenberg modified by Leitch and Henderson, and the iodine content expressed as a percentage of the dry weight of the glands. Field officers of the Department of Agriculture marked the position of the farms sampled on a large scale map.

As in Part IV of the series, the provinces have been divided into naturally bounded districts and further subdivided into farming areas. Districts such as Hastings, from which a large number of samples were received, were subdivided into small areas. Larger areas were chosen in districts represented by fewer samples, except where a marked difference in iodine level occurred or where the samples were too widely separated to be fairly designated as a farming area. For each farming area the averages of the percentages of iodine and the dry weights of the glands are given in the tables below. Results for each farm have been placed in iodine percentage groups broadly described as very low, low, fair, high and very high. More detailed figures are not justified, as considerable variation is found even in glands from one farm. For any area the distribution of samples between the iodine percentage groups gives a picture of the level of iodine as well as the degree of uniformity of the iodine supply in that area.

Each province has been presented separately and discussed briefly. Unfortunately, in many of the districts dairy farming is the principal industry and the majority of lambs were " bought in " for fattening. These districts are therefore represented by fewer glands than would be desired and the areas are not covered completely.

WELLINGTON.

TABLE I.

Farming Areas.	Classification of Samples.					Average for Area.	
	V. low up to .09	Low .10 to .19	Fair .20 to .29	High .30 to .39	V. high .40 and over	Iodine per cent dry wt.	Dry wt. per gland grams.
Manawatu-Wanganui							
Manawatu ..	4	11	—	—	—	.12	.93
Rangitikei ..	2	13		1		.14	.75
Wangaehu ..	3	3	1			.13	.81
Totals and mean	9	27	1	1		.13	.83
West Coast (excluding above)							
Wellington ..		2	1	2		.23	1.03
Otaki		4	2	1		.22	.61
Levin		1	5			.23	.67
Taihape	2	4	5	4		.23	.58
Kai-iwi		2	1			.22	.63
Waverley ..		4	11	3		.23	.49
Totals and mean	2	17	25	10		.22	.51
Wairarapa							
Pahiatua ..			7		1	.26	.59
Alfredton ..			2	1	1	.32	.45
Tinui			2		1	.32	.59
Masterton ..		4	2	3	1	.26	.61
Martinborough		1		1		.26	.42
Totals and mean		5	13	5	4	.27	.56

WEST COAST.

This district is mainly devoted to dairy farming and many of the sheep are bred on the hills and moved to the flats for fattening. The few glands collected show a marked difference in iodine content between samples from the Manawatu-Wanganui plain and those from the rest of the district. Of 38 samples from Manawatu, Rangitikei and Wangaehu, nine are very low and only two are above ·20 per cent. iodine. In the other areas the samples fall into the higher groups, although Taihape is an area with considerable variation in iodine supply and samples are found in each of the lower groups. The average for the whole district is rather low, mainly due to the figures obtained for the low iodine areas mentioned. The average for these areas, estimated separately, is 0·13 per cent., which is comparable with results from low areas in the South Island where goitre is known, with the difference that no enlarged glands have been reported in the Manawatu-Wanganui areas. It is notable that no glands from the district contained 0·40 per cent. iodine or more.

WAIRARAPA.

This district has already been surveyed by Sykes (1934). A few more samples were taken in the area and show it to be fairly high in iodine.

TARANAKI.

TABLE II.

Farming Areas.	Classification of Samples.					Average for Area.	
	V. low up to .09	Low .10 to .19	Fair .20 to .29	High .30 to .39	V. high .40 and over	Iodine per cent. dry wt.	Dry wt. per gland grams.
Patea			3	1		.27	.45
Hawera			3			.26	.45
Inglewood ..				4		.33	.58
Waitara		1	4	4	2	.31	.48
Totals and mean		1	10	9	2	.30	.49

This also is principally a dairying province and suitable samples were difficult to obtain. The samples shown above were small glands uniformly high in iodine. An attempt was made to supplement the samples by using glands taken from " bobby " calves, but the method of railing the calves made it impossible to trace them back to the farms with any degree of certainty. The average iodine content of the 30 samples of calf thyroids analysed was 0·37 per cent. on the dry weight. This bears out the conclusion that the province is well supplied with iodine.

AUCKLAND.

TABLE III.

Farming Areas.	Classification of Samples.					Average for Area.	
	V. low up to .09	Low .10 to .19	Fair .20 to .29	High .30 to .39	V. high .40 and over	Iodine per cent. dry wt.	Dry wt. per gland grams.
King Country-Waikato			1	1		.27	.48
Taumarunui ..		2	7	6	1	.29	.48
Te Kuiti ..					3	.43	.49
Otorohanga ..		1	2	6	5	.38	.54
Te Awamutu			2	1	3	.37	.47
Raglan			7	4		.23	.62
Hamilton ..	1	7	15	7	1	.27	.51
Morrinsville ..	1	2	1	1	1	.37	.47
Tauranga ..			2			.23	.64
Mercer		1	37	26	14	.29	.53
Totals and mean	2	13					
North Auckland			9	5	2	.32	.57
Dargaville ..		1	3	1	1	.26	.74
Whangarei ..		1	11	10	1	.29	.63
Kaikohe ..		1	8	10	2	.30	.71
Kaitaia		3	31	26	6	.30	.65
Totals and mean							
Gisborne		1	2	1		.24	.62
Hicks Bay ..			4	2	1	.30	.64
Tokomaru Bay		2	4	1	1	.28	.71
Tolaga Bay ..		1	1	1		.22	.70
Rakauroa ..		1		1		.25	.49
Pouawa ..		2	1			.20	.46
Te Karaka ..		2	5	2	2	.24	.49
Patutahi ..		9	17	8	4	.27	.61
Totals and mean							

King Country, Waikato and Tauranga.

The figures for this district are high with the exception of samples from Hamilton and Mercer, which are about average. There appears to be a small area near Taupiri where the iodine level is much lower. Recently some very enlarged glands were taken from sheep in this area which gave the following figures:—

Wet weight of gland.	Dry weight of gland.	Iodine percentage on dry weight.
179 grams	37 grams	0.0086
715 grams	131 grams	0.0052

Glands from sheep in the immediate vicinity of this farm were also shown to be low in iodine, but not so grossly enlarged.

The glands received from Otorohanga, Te Awamutu, Raglan and Tauranga were exceptionally high in iodine.

North Auckland.

The district is well supplied with iodine, the glands being uniformly high. Only 3 in 66 samples were below 0·20 per cent., while only six were above 0·40 per cent.

Gisborne.

A slightly lower average is found in this district, and proportionately more of the glands fall into the "low" classification. No glands are deficient, and the level of iodine in the district is satisfactory.

Hawkes Bay.

Table IV.

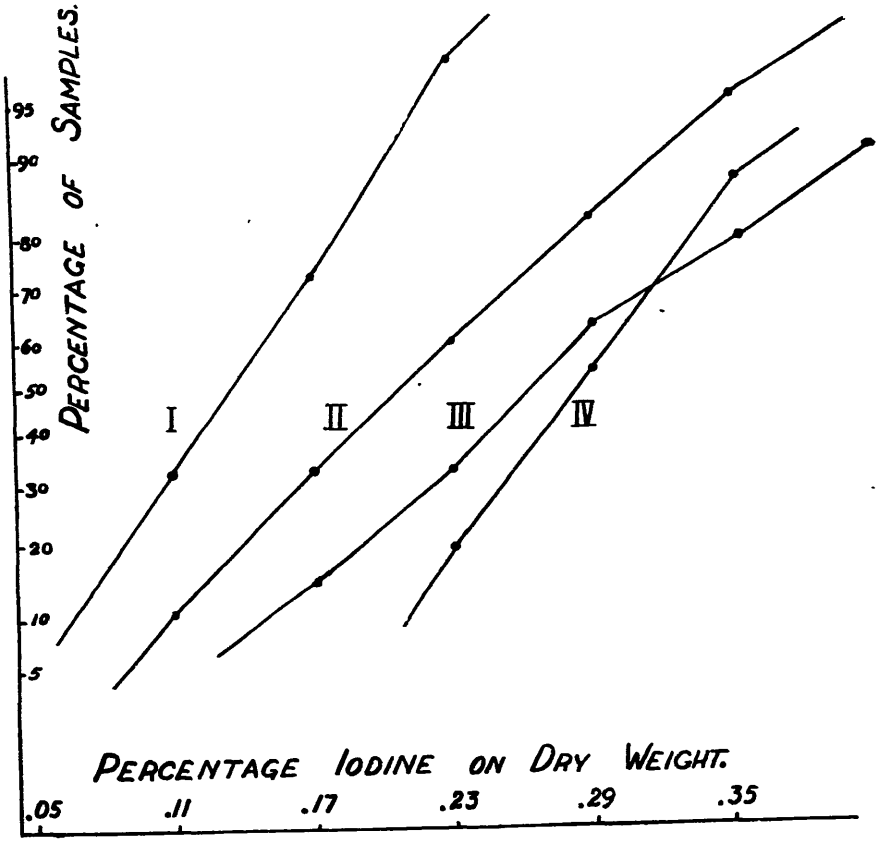
Farming Areas.	Classification of Samples.					Average for Area.	
	V. low up to .09	Low .10 to .19	Fair .20 to .29	High .30 to .39	V. high .40 and over	Iodine per cent. dry wt.	Dry wt. per gland grams.
Waikaremoana ..		1		2		.27	.71
Wairoa		4	5			.21	.67
Eskdale		4	3	3	1	.26	.65
Sherendon ..	1	6	5	1		.19	.72
Maraekakaho ..		6	8	1	2	.24	.74
Hastings	1	3	2			.16	.61
Waimarama ..	1	3	3	3		.22	.61
Opapa		2	4	1		.24	.82
Waipawa ..	3	11	5	2	1	.19	.68
Porangahau ..		2	3	2		.25	.62
Waipukurau ..	2	11	7	1		.17	.72
Ongaonga	2	7	4	3		.20	.82
Takapau	1	10	5	6	1	.24	.63
Totals and mean	11	70	54	25	5	.21	.70

As this province is largely devoted to sheep farming, a large number of samples was available and the farming areas were covered fairly completely. The level of iodine is lower than in Auckland and Taranaki, and resembles Wellington fairly closely. There is a high proportion of deficient glands in the areas Sherendon, Hastings, Waipawa, and Waipukurau, but the data on hand did not show any correlation between iodine level and geological formation.

GRAPHICAL PRESENTATION OF RESULTS.

For comparison with South Island results accumulative distribution diagram has been prepared. This is a modification of the ogive in which the scale is so adapted that normal distribution results in a straight line.

Each point shown represents the percentage of samples falling on or below that level of iodine. The more upright the curve the closer the limits of variation.



The four curves shown have been selected as representing the districts surveyed with sufficient accuracy.

Curve I. Manawatu-Wanganui Area.

The curve is straight, showing an even distribution, and steep, showing the narrow range of the iodine content of the samples. About one-fifth of the glands are below 0·10 per cent. and only one-tenth above 0·19 per cent. iodine, and the median corresponds with 0·13

per cent. iodine. The area is lower in iodine than other districts in the North Island and similar to Westland and Southland, which gave a very similar curve.

Curve II.

This curve is given by samples from the West Coast of Wellington Province other than the areas dealt with in Curve I, and may be taken to represent Hawke's Bay samples. Here a wider variation in iodine level is apparent from the flat curve. One-twentieth of the glands are below 0·10 per cent., one-tenth are above 0·33 per cent., and the median at 0 21 per cent. iodine. The curve is similar to that for Canterbury.

Curve III. Wairarapa Samples.

Very similar curves are given by Waikato and Gisborne samples. This shows a similar wide variation in supply, but a higher level of iodine in these areas than in the areas represented by Curve II. The number of glands below 0·10 per cent. is negligible, while one-tenth contain above 0·41 per cent. and the median is about 0·27 per cent. iodine. Nelson, Marlborough, Banks Peninsula, and Otago give similar curves.

Curve IV. North Auckland Samples.

Taranaki samples gave an almost identical curve. The curve shown is fairly upright, showing the uniform conditions which exist in these districts. No samples are below 0·20 per cent., yet nine-tenths are below 0·37 per cent. iodine. These areas, while not giving any glands with very high iodine content, have on the whole a better and more uniform supply than other areas in New Zealand.

Summary.

The iodine content of 464 samples of lamb thyroids shows the North Island to be generally well supplied with iodine.

The Manawatu-Wanganui plain is the only area low in iodine and may be placed in the same class as Westland and Southland. No enlarged glands, however, have been received from the area.

The West Coast of Wellington Province, excluding the area just mentioned, and Hawke's Bay are fair in available iodine and resemble the Canterbury Plains.

The Wairarapa, Waikato and Gisborne areas are well supplied with iodine and are comparable with Nelson, Marlborough and Otago.

Taranaki and North Auckland are uniformly high in iodine.

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