

PASTURE SURVEY IN HAWKES BAY  
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In connection with the general Land Utilisation survey a pasture survey or stocktaking of our grasslands *is an* important aspect of the whole scheme.

In a general way New Zealand is looked upon as being a country capable of high production by virtue of the long grass-growing season and thus our pastures may rightly be considered to be the basis of; New Zealand's wealth.

From pastures over 80 per cent. of our total wealth is produced. This large percentage of our income which was in the vicinity of £40,000,000 for the 1936-1937 season was derived from the export of wool, lamb, mutton, butter, cheese, beef, casein, hides, tallow, grass and clover seed.

This great industry, that of grass-growing, then may justly be considered of vital importance to the Dominion. Most industries and businesses of New Zealand require an annual stock-taking just to indicate how much progress or improvement has been made since the previous stocktaking.

Live-stock returns, export figures, etc., show the general trend of progress so far as our primary production is concerned, but until recently a stocktaking of our pastures had never been undertaken.

The main objectives in the pasture survey are:

1. To ascertain where the natural or native pastures exist and to record what species of plants combine or associate to form such pastures.
2. To find out what improvements have been effected to date and where such improved pastures exist.
3. To determine as far as is humanly possible what the potentialities of our pasture lands are and how the high-producing pastures can be secured and maintained.

These three aspects of the survey are fundamental to the whole of New Zealand's future pastoral resources and pasture researches.

The mere presence of certain plants indicates just what others could be expected to grow and produce well under similar habitat conditions. Improvements in the pastures in a given district indicate furthermore what species could be profitably and satisfactorily introduced to still further increase production.

To obtain the maximum value from such an undertaking as this, then it is necessary to map in the finest detail as each species of plant when present in an association tells a definite story to the ecologist.

The main factors which govern what pastures shall grow in any one locality and of what species the pasture association shall be composed are:-

- (1) Soil fertility, soil type, texture, and moisture content.
- (2) Farm management and practice, type of stock carried, **and** top-dressing and management of **pastures**.
- (3) Climatic conditions, rainfall, **drought**, flooding, water and wind erosion.
- (4) **Altitude**, temperature, amount of sunshine.
- (5) Distance from coastline.
- (6) **Topography** of the area, whether flat, **ploughable** hills, or **steep unploughable hills**.
- (7) Distance from rail and market, road access to and through property.
- (8) Size of farm or station.
- (9) How country was originally cut up and **how** blocks have been **subsequently** subdivided.
- (10) Whether country was originally in bush, tussock, fern and scrub, or barren, such as the **sandhills** of the coastal regions.
- (11) Whether secondary growth, fern, manuka, etc., are likely to **compete with** pasture species.
- (12) What species of grasses were **own** and how these were introduced, **i.e.**, whether after bush burn or cultivation.
- (13) And last, but not of least significance, the **finance** available for improvements.

Not all of these **fac** tors can be altered by man, but of those which can be then man should make the most of each and every opportunity; but lack of knowledge is probably a limiting factor also.

The means whereby **e** onditions can be modified are frequently observed in the course of the pasture survey and so it is **not** merely the mapping of pastures which **has** to be undertaken, it is **necessary also** to record such other data as may be observed and which will be of value to farmers in the locality.

Fence line boundaries between good and bad **pastures**, for example, indicate that soil **type**, climate, etc., in such an instance play a less important part than does pasture establishment and management.

The differences in the composition of certain native pastures are rather remarkable and where such differences occur it has been interesting to note that the soil type itself has been probably the main influencing **fac** tor. Similarly temperature in certain regions governs the vegetative covering..

The soil type, in many respects, governs not only the native pasture but it **also** limits the extent of possible improvement. The extent to which pastures can be **modified, however**, are invariably disclosed by studying the existing vegetation. For example, it would be unreasonable to expect to see a dense **ryegrass-white** clover pasture on a shingly area which naturally grows sparse haresfoot trefoil and danthonia. Similarly one would not find **ratstail** and clustered clover on rich alluvial **flats**. Each species of pasture plant, and **certain** weeds also, indicates that a **specific** set of conditions exists.

Those plants which are considered to be of most importance in the pasture survey are:-

Ryegrass	Tussocks (Poa, Danthonia, Fescue)
Italian Ryegrass	Floa ting swee tgrass
Timothy	Poa qua ti ca
Prairie Grass	Marram and spinifex
Poa trivialis	Puccinellia and Polypogon
Meadow foxtail	N. Z. Rice grass
Crested dogtail	Whi te clover
Yorkshire fog	Strawberry clover
Poa pratensis	Suckling clover
Brown-top	Lotus major
Sweet Vernal	Lotus hispidus
Indian doob	English trefoil
Chewing 's fescue	Spotted and toothed burr clover
Eragrostis brownii	Haresfoot trefoil
Rat tail	Subterranean clover
Danthonia pilosa	Clustered clover
Danthonia semiannularis	Striated clover
Tall fescue	Red clover
Cocksfoot	<b>Alsike</b>
Paspalum	<b>Lucerne</b>

For some time the method of napping all the above species presented considerable difficulty, but a system of marking has now been evolved whereby all the above-named species can be marked in on the map and shown in their relative proportion and importance.

Such plants as kgropyron, Erodium patotara, Manuka, ferns, Tahinau, raupo, Phormium, etc., which are of importance as indicator plants, can also be marked in on the map.

By mapping in this manner it is possible to show the presence of species instead of merely mapping communities or associations and so the maps will be complete records of the vegetation on any one area at the time of inspection.

Seasonal changes in the pasture, the presence or absence of annual species, requires care and skill on the part of the field officer to ensure accurate mapping.

The species and strains of grasses and clovers to be used in future pasture establishment and the management required to maintain these pastures will be learned it is hoped from this pasture survey.

The breeding of grasses and clovers can be better undertaken when the ecologist and plant-breeder are familiar with the requirements of the various parts of the Dominion.

The pasture survey of Hawke's Bay, so far as the work has progressed to date, has been very instructive and enlightening, I am fairly convinced that quite extensive areas should have been left in native bush and scrub or in native grass, rather than to have been grassed in the obviously incorrect manner which was so common years ago. It is distressing to see some of the poor pastures, poorer even than the native ones and yet pastures which cost the farmer much good money and hard work.

Because parts of the country were considered to be second-class, then inferior seed and seed of wrong species was used. The pastures deteriorated, less stock were carried, and so the country slowly reverted to weeds or scrub and fern.

High quality seed of the correct species and **strains**, had such been sown, would have prevented the deterioration of vast areas of our pasture lands.

The restoration to higher production of deteriorated **pastures** will be an expensive matter, but it is hoped that as a result of this pasture survey, the task of pasture improvement **will** be somewhat eased as further knowledge is gained about our pasture plants, their requirements and management.

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DISCUSSION ON THREE PRECEDING PAPERS.

MR. F. B. CALLAGHAN. (Wellington):

It is possible that through the order in which the three papers have been read the Conference may not have fully appreciated the part that each was intended to play in the studies of land utilization in Hawkes Bay.

Some two years ago a group of Hawkes Bay citizens, interested in the development of their province, were seeking information as to how its interest could best be promoted. They were probably in hopes that there were latent resources of petroleum or minerals upon which new industries could be established. Unfortunately, however, there appears to be no reason for building upon hopes in this direction. The real wealth of the Province lies in its oil, crop and stock resources. Consequently, the papers which have just been read indicate, though very inadequately because of the shortness of time available, what has been attempted to reveal what these natural resources are.

Mr. Pohlen's paper has shown something of the methods of soil survey and its objectives. Already the soils of a great portion of Hawkes Bay have been demarcated and classified in accordance with the latest genetic system which regards soils as being in a state of evolution. This information forms a base upon which to build sound practices which will lead to its better utilization.

Mr. Madden has outlined the method in which the pastures growing on these different soil types are being investigated. An examination of his maps reveals certain areas where an enterprise has produced something better than the general average. It is quite possible that these restricted areas indicate the potentialities of a much wider area. It is for Mr. Elliott, whose paper dealt with the farm management survey, to seize upon these indications and assess how far they can be extended and built into farm management and practice so that an improved land utilization may result.

Mr. Elliott's paper also gives indication of the general type of farm management which characterises certain areas of the district at present, and these will be subjected to critical examination so that with knowledge available of soil characteristics of the present and potential pasture possibilities and of farm processes possible in Hawkes Bay, it should be possible to develop its natural resources along rational lines, and if this results in better pastures, increased numbers of sheep, cattle and crops, then the increased returns therefrom will exert a beneficial effect through every phase of the industrial structure of the province.

I am anxious, by reference to the component parts of the land utilisation survey which have been dealt with in the three papers today, to draw attention to the way in which the three surveys fit into a scheme destined to provide for the rational and sound development of the Hawkes Bay Province.

MR. FLAY, (Lincoln) :

Onepoint- that appears to have been overlooked in this survey is the conservation of hay feed etc. to help further to

increase. production in' a 'time of shortage.

Let us see what the effect is going to be when this survey is completed. How are we going to bring to fruition all the potentialities that are lying waiting to be developed?

I am associated with a property in Canterbury of 800 acres which in 1930 carried 800 ewes, with an average of  $6\frac{1}{4}$  lbs., of wool, and a lambing percentage of 67%. Today the place is carrying 1600 sheep, of which 1300 are ewes, some cattle, and the wool clip is  $9\frac{1}{2}$  lbs., and the lambing 80%.

In 1930 the property had a productive capital value of about £5000. Today its value is \$7000. In 1930 the value of the live stock was £1000 - today it is in the neighbourhood of £2500, so that this particular man has increased his capital by some £3000. But what has happened in the meantime? Kc has increased his assets: what about his overdraft?

In 1930 he had no surplus, and had to draw on capital from another account, which increased at one stage to £1500. Today he is still £1000 overdrawn, and interest has to be paid on this money, so you can see we are up against one difficulty which involves the borrowing of money to enable this man to carry on and have faith that in the years to come that money will be returned to him several hundredfold. Another two years will do it at present prices. He should have a capital of £3/4000 by that time.

But it will have taken him about two years from the starting point to what seems now to be the finishing point, to get into a good state of finance.

So far no mention has been made in regard to the size of a farm in relation to its productive value and budget showing us the final nett result,

MR. R. P. CONNELL. (Palmerston North):

I should like to mention that a good deal of chemical study of the soils of Hawkes Bay is being made in connection with this survey, and the work is being done and this almost wholly by the Cawthron Institute, Mr. Rigg at one stage, proposed to be at this Conference to discuss that, but he was prevented from coming. I do not know the details of these chemical studies - they have not yet reached a stage when a comprehensive statement can be made, but they promise to be a most valuable supplement to the other work that is going on,

SUBTERRANEAN CLOVER. Mr. Elliott makes an unconditional recommendation that Subterranean Clover should be used for extensive areas in Hawkes Bay. I bring this up because under Hawkes Bay conditions we could without hesitation recommend Subterranean, and it might be inferred that the same would apply to other areas in the South Island, and I wish to point out that there are essential differences in regard to Subterranean in Hawkes Bay compared with the same seed in Canterbury and North Otago. By June we have in Hawkes Bay 6" to 8" of high nutrition leafage produced from seed sown in February to March. If that result could be depended on in the South Island, one would have no hesitation in recommending the use of Sub. Clover. That growth cannot be depended on, however. This year the autumn in Hawkes Bay was abnormal. The rainfall from March till June was similar to that of Canterbury in a normal year - and whereas over a series of years we have had 6" to 8" plentiful growth of Sub. Clover, this year with typical Canterbury conditions we have had very little autumn growth,

With regard to finance, I quite agree in the main with Mr. Flay's contention that financial circumstances **very** often hamper the practical application of our knowledge. But while I agree generally in that respect, I think he over-stresses the importance of the matter,

In cases where the farmer produces the feed, or shows that he is going to produce the feed, he does not very often have difficulty in getting financial assistance from the Banks or lending firms. If his general standing in the community is **even** average, and if he has the feed, he **will** get the finance for live-stock pretty regularly,, so far as I *can* make out.

MR. MARSHALL. (Timaru):

I was interested to hear Mr. **Connell's** remarks about Canterbury conditions being in Hawkes Bay this year. I am much in favour of Montgomery Red Clover on a **lot** of our country **in places** of Subterranean.

A friend bought 1000 lb. of Subterranean Clover this year. He sowed it in 3 and 4 acre blocks, along with Montgomery Red. I inspected one of the areas sown in the summer and one sown in March, and neither was satisfactory. The Subterranean had been checked by frost and was developing leaf curl, etc., while the Montgomery Red was a beautiful dark green, with a good healthy growth.

MR. J. W. CALDER. (Lincoln):

The experience with Subterranean Clover as given us in Hawkes Bay **is** one that we expected under Canterbury **conditions**. As you, **know**, the success of Subterranean **largely** depends on its **autumn** sowing and an early **autumn** rainfall. During the last two or three seasons the Canterbury Subterranean has had the advantage of a fairly good **autumn** rainfall and has done very well. How it would do in a **season** of normal rainfall we are unable to say,

**This** year the Subterranean established fairly early, and with the application of Super has done very well. I think we can be fairly confident that it will play a useful part in the light grasslands in Canterbury, Montgomery Red is going to be a competitor, We need a clover for that light land, and if Montgomery Red or Subterranean will do it, the **Canterbury** farmer will go for whichever is the more satisfactory.

DR. ALLAN. (Wellington):

There was for many years in New Zealand a Voice crying in the Wilderness, urging that there should be a soil survey, and although that Voice in the Wilderness did not fall entirely on deaf ears, nothing seemed to come to it.

The great progress that has been made this year towards this soil survey, combined with the analytical survey of Hawkes Bay **would** have given much pleasure in **my friend**, Mr. Leonard Wilde, of Feilding.

THE CHAIRMAN.

We all know that the farmer spends money, or borrows money, for the express purpose of improving his position; In the past in New Zealand an immense amount of money belonging to the individual,

an immense amount of money belonging to the lender, and an Immense amount of money lent by the State, has been lost in farming endeavours, and one feels that work of the description that has been outlined in N. Z. should, when it is properly put in hand, enable money to be wisely expended for capital purposes, and for increased maintenance etc .

There is one point I am not quite sure about - **and** that is, whether these generalised soil surveys and pasture surveys and farm studies will fill the bill, When all is said and done, it is the individual farm unit which has to be considered in regard to the improvements or developments that may take place,

I think one can summarise the real objective of soil survey, pasture survey, and land utilization survey, by saying that the final objective of them is to enable money to be provided, either by the individual himself, or borrowed by the individual, or be lent to the individual, with complete confidence that it **will** not be lost.

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