
FARMING IN THE BAY OF PLENTY

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We are confining our definition of the Bay of Plenty to the land covered by the Tauranga, Whakatane, and Opotiki Counties. It comprises a narrow coastal strip extending from Athenree, near Katikati in the north to Cape Runaway in the south-east, and is bounded inland by low ranges of hills rising up to 1,500 ft. The topography varies from easy rolling to hilly, with two large areas of swamp, one centred on Te Puke and the other, the Rangitaiki Plains, near Whakatane.

The climate is semi-tropical, with an annual rainfall ranging from 50 in. near the coast to up to 100 in. on the hilly inland country. Dry summers and autumns are not uncommon and severe winter frosts are known.

In the early days of European settlement much of the coastal land of the Bay of Plenty was covered by bracken fern and scrub, and the higher hills were still largely covered in forest. The swamps had a natural cover of flax, raupo, cabbage trees, rushes, and manuka.

The first land to be developed was the easier coastal country, when the natural cover was burnt and grass was sown. No artificial fertilisers were used and the low natural fertility of the soil resulted in rapid pasture deterioration and weeds, with only the lower-fertility demanding species such as browntop, danthonia, indian doobj, and ratstail surviving. When this stage was reached the ground was frequently ploughed, cropped with swedes or maize, and regrassed. In most of these early pastures there was very little white clover. Just before the First World War a few farmers began to use phosphatic fertilisers, mostly superphosphate, and the usage of this material increased rapidly in the 1920s. There was an immediate improvement in pasture quality, which was hastened by the introduction of certified' pasture seeds in the 1930s.

Bush sickness had always been a problem on soils formed from Kaharoa ash, and the introduction of cobalt to remedy this condition in the middle 1930s really marked the beginning of modern agriculture in the Bay. In 1.945 it was demonstrated that large areas of land needed potash, while since 1950 the increasing use of insecticides to control grass grub and army worm has resulted in still further pasture improvement.

Dairying is the dominant farm industry of the Bay of Plenty. Although centred on the flat or rolling coastal country, it is also the main source of farm income on many hill farms. Production varies considerably, ranging from 150 to over 350 lb of butterfat per acre. The average size of dairy farms is about 100 acres, milking from 60 to over 90 cows and carrying all replacements, although there are many units much smaller than this, particularly in the vicinity of the larger centres of population. On the Rangitaiki Plains, on the other hand, the acreages of dairy units are sometimes much larger.

Before 1940 sheep farming was of only minor importance in most of the Bay, largely owing to the widespread incidence of bush sickness. Today sheep farming is becoming increasingly important.

The general pattern is store sheep production on the higher, more broken, newer country, with fat lamb production on the coastal sheep farms. The dominant breed is the Romney, with an increasing interest being shown in Border Leicester-Romney cross.

There are many mixed farms in the area on which a small herd is milked and a small flock of breeding ewes, from 150 to 400, is carried. These units are usually on the hillier country where the farm is too small to be an economic sheep farm and too broken and hilly to be run wholly as a dairy unit.

There are about 1,000 acres of citrus and subtropical fruit orchards in the Bay of Plenty, particularly near Tauranga and Te Puke, and a number of holdings producing horticultural and market garden crops.

Although a description of the soils of the Bay of Plenty has been given in a previous paper, we believe that a knowledge of soil fertility requirements is necessary if one is to have a proper understanding of the farming problems of the area. All the soils of the Bay are naturally deficient in phosphates, and it is impossible to obtain satisfactory pasture production without the use of phosphatic fertilisers, of which the most efficient is superphosphate. After the land has been in occupation for a period, potash deficiencies start to show up, particularly on areas cut frequently for hay or on day paddocks on dairy farms. Practically no lime responses have been obtained in departmental trials, and no evidence exists to warrant the use of this material.

Widespread field trials have shown that there is likewise no experimental evidence to suggest that the use of magnesium as a pasture topdressing would be warranted. In our opinion hypomagnesaemia in dairy and run cows is associated with faulty winter stock management rather than with any mineral deficiency.

As far as minor elements are concerned, the position is not so simple. We have already mentioned that soils derived from Kaharoa ash are deficient in cobalt. The peaty loams are copper deficient, and evidence exists to suggest that copper deficiencies can be induced on soils derived from Kaharoa and Waihi ash as a result of heavy liming. Some farms on the coastal sands have also responded to dressings of copper. (N.B. Copper responses in the Bay are shown in improved stock health.)

Soils derived from Kaharoa and Tarawera ash are sulphur responsive, although there appears to be enough in normal superphosphate dressings to satisfy plant requirements. No responses have been obtained from the use of molybdenum on any soils in the Bay.

The only soils on which statistically significant liveweight increases in lambs have been obtained from the use of selenium are the coastal sands. Boron responses are obtained on hilly Kaharoa ash soils with brassica crops, but not on pastures.

The basic pasture type of the majority of the coastal country of the Bay of Plenty is the paspalum, ryegrass, white clover sward, and this is considered by many to be the ideal pasture for the area. It has a long seasonal production spread, and pastures of this type have produced up to 400 lb of butterfat per acre. The paspalum does a twofold task. For a start, it provides a wealth of feed at a time of the year when the strains of ryegrass that are at present available are producing very little. Again, by providing a ground cover during a dry summer and autumn it helps the ryegrasses to survive the droughty conditions. This point was emphasised in a paper presented by H. G. Titterton to the Hamilton Conference in 1957. Paspalum also has its limitations. When grown under conditions of low fertility or bad management it becomes sod-bound. Such a sward is low producing in all except the summer and autumn, with no winter and spring production.

Further inland, paspalum is to some extent replaced by cocksfoot, a grass which the writers consider to be of great importance in this area, where it will produce feed right throughout the year. It is considered that cocksfoot should be an ingredient of all general purpose grass seed mixtures on the ash country.

One is often asked why there is so little timothy in the Bay of Plenty. Although it will grow well in this region, particularly on the coast and on the swamps, it is slow to establish and contributes very little to the total feed supply on most farms. Prairie grass is coming increasingly into prominence, particularly on the higher fertility paddocks on dairy farms, and the use of this grass is

warranted under these conditions. Much of this grass has come in as a volunteer. Crested dogstail is common in many pastures particularly on the hills, and throws much useful feed on the lower-fertility hill country. The only permanent clover of any importance is white clover; cowgrass is an important pioneer on newly developed ash country. Lotus *uliginosus* remains an important ingredient of a pasture mixture on high rainfall-low fertility soils.

There are a number of weed grasses in the Bay which cannot be ignored. Kikuyu grass is not of any major economic importance, but a rather similar type of plant *P. distichum* has increased to an alarming extent on much of the swamp country, and is also encroaching on to the higher land and is causing much concern, particularly as there appears to be no efficient economic means of chemical control. Other grasses such as sweet vernal, goosegrass, *Poa trivialis*, and Indian doobj are normally suppressed by efficient farm management. Barley grass is present throughout the district and is on the increase. Yorkshire fog produces a considerable amount of feed during the winter on both swamp and hill country. We believe that more work is needed to investigate the value of fog as a pasture species, particularly from the point of view of stock health.

The key to successful pasture establishment on volcanic ash country is to prepare a well-consolidated seed bed. Because of this, there is a tendency to sow on the ash after a burn, even though the land may be crawler tractor country. Easy country with a rough surface is frequently surface sown, and, after a few years, cultivated, cropped, and regrassed to permit of future harvesting. Swamp country development is being dealt with in another paper.

The normal sowing time is the autumn, usually after autumn rains have fallen. Seeding rates vary from 20 to 40 lb of seed per acre. It has been demonstrated that excellent pastures can be obtained by sowing from 20 to 25 lb of seed per acre and increasing the initial fertiliser application from the standard rate of 3 cwt of superphosphate per acre to 6 or 7 cwt. In other words, the most efficient land development being done in the area embodies the use of light seed mixtures and heavily initial fertiliser application. DDT superphosphate is being used to an ever-increasing extent for grass grub control.

It is common to find new pastures becoming strongly clover dominant in the second year after establishment. We believe the following factors to be largely responsible:

- (a) Damage by insect pests, particularly grass grub.
- (b) Poor initial clover establishment, which may be caused by too lenient grazing during the first few months of the life of the new pasture, insufficient topdressing, etc.
- (c) The use of an unbalanced seed mixture, with far too heavy a seeding of ryegrass, which can not only suppress the clover seedlings but also the slower-establishing cocksfoot plants.

Stocking rates vary considerably over the area. In the two years 1958-1960 there were exceptionally good growing conditions, and a number of farmers overstocked their properties, sometimes to an alarming extent. Last summer was dry and was followed by a hard winter, and many of them paid the penalty for injudicious stocking.

Before contemplating any increase in stock numbers on any farm in the Bay of Plenty, it must be realised that summer and autumn dry spells are fairly common, and feed reserves must be sufficient to carry stock through these periods, as well as allowing for normal winter feeding.

There are also farms which are understocked, but these are by no means as common as they were a few years ago.

Methods of pasture management in the Bay of Plenty are very similar to those adopted in other parts of the Auckland Province, except that a modification of autumn pasture management has been introduced on some dairy farms to capitalise on the autumn growth of paspalum. The method is briefly as follows. About the middle of March from a quarter to a third of the farm is closed and the herd is rotated around the balance of the property, which is gradually closed for autumn-saved pasture after the first week in April. Early in May we then have from two-thirds to three-quarters of the farm closed for autumn-saved pasture and the herd is then grazed on the area closed in March. They finish the milking season on this grass, possibly supplemented with silage. They are also wintered on this area. Those paddocks that were closed in early April may now have quite a growth on them, and the dry cows are given a break of grass daily, plus hay and silage. Thus, in a season of poor late autumn and early winter growth, the bulk of the farm is closed for autumn-saved pasture, while if growth conditions are good, the herd gets a daily ration of grass as well as normal winter supplements. This method of wintering has given good results on those farms where it has been tried and produces more grass for the milkers in the spring. Cows calve down in better condition. There is less acidosis and grass staggers, and often less bloat. Some milk fever may occur under this type of management, but cases are usually simple and readily respond to treatment.

There are several pasture problems in the Bay of Plenty. Most of these, such as bloat, insect pests, and metabolic diseases, are about as bad as they are, say, in the Waikato. One problem that appears peculiar to the Bay is the inducement of a copper deficiency, or, more precisely, a molybdenum excess, due to heavy liming. Copper deficiency has been found on a number of farms on the ash country. In all cases investigated these farms have a past history of liming or basic slag usage.

A great deal of pasture improvement has been carried out over the past few years. Sod seeding has given variable results. When farmers do the job properly, and rectify whatever factors have been responsible for the deterioration of the original pasture, good results are obtained. It has been found to be difficult to get good results from undersowing **sodbound paspalum**. A number of farmers have adopted a policy of ploughing, cropping (usually with swedes, **chou moellier**, or soft turnips), and regrassing in an endeavour to improve their pastures. The two factors that have done most to improve pastures in the area over the past decade would probably be grass grub control and an extraordinary increase in the use of potash.

So much for the past and the present. Now, what of the future? There is still land yet to be developed and grassed down in the Bay of Plenty, limited only by economic factors and considerations of soil conservation. At present there is a total of 491,000 acres of grassland, and it is estimated that by the year 1980 there will be 620,000 acres. Most of this increase, if not all, will be in the Whakatane and Tauranga Counties, while in Opotiki our best hope is that the present area of sown grass will remain the same. The greater proportion of this land still to be developed will probably be devoted to sheep farming. With the possibility that an export meat works will be established in the Bay of Plenty within the next 20 years, there will probably be a considerable increase in the amount of cattle fattening and fat lamb production.

Since the war there has been a strong tendency to decrease the size of holdings, particularly in the Tauranga County, with a number of properties going out of farming for housing subdivision and others being diverted to fruit and horticultural production. Just how far this will go cannot be determined at this juncture, as it largely depends on the comparative economics of grassland farming and horticulture.

As far as dairy farms are concerned, increase in **stock numbers** will probably be on existing farms as a result of improved techniques. In fact there is a distinct possibility that some dairying land will change over to fat lamb production.

The major change in pastures will be a lessening of the amount of paspalum with increasing fertility and an increase in the use of prairie grass, cocksfoot, and probably Italian and long-rotation ryegrass. We believe that there will be an increased production from pastures as a result of increasing fertility, improved subdivision, and pasture utilisation.

There will probably be somewhat of an increase in the diversification of farming, with increased vegetable and fruit production, mostly in the Tauranga County, with the promise of tobacco growing along the coast. Complementary to agricultural production is the probable extension of farm forestry projects, with farmers being encouraged to plant trees on their marginal and sub-marginal land for pulp, wood, and timber.

There are few areas in New Zealand that have expanded since the war to the same extent as has the Bay of Plenty. The future of the area is assured because of its potential to produce such a wide variety of agricultural, horticultural, and forestry products.

DISCUSSION

Q. (J. Graham) : Would Mr A110 be prepared to elaborate on his statement concerning grass staggers in the Bay of Plenty and poor winter feeding.

A. Stock go into the winter in good condition, during winter they are done fairly hard on a falling plane of nutrition and then after calving, they are put on to fresh short pasture. Complications then occur.

Q (J. Holden): Would Mr A110 suggest a grass-seed mixture for a fat lamb farm between Te Puke and the hills?

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A. Perennial ryegrass	_____	10-12
Short rotation ryegrass	_____	5-6
Cocksfoot	_____	3-4
White clover	_____	2
Cowgrass	_____	3

Q (D. Sinclair): Mr A110 commented that he only obtained a selenium response on coastal sand, but made no mention of any responses on the Rotomahana mud country.

A. I am dealing with the Bay of Plenty region only and not the Rotorua County which is outside my district.

Q. (Morton) : Is lime considered to be at a sufficient level on the Papamoa swamp country?

A There was no lime response on the many trials laid down on Papamoa swamp country.

Q. (J. Lockhart): Could Mr A110 indicate how definite he is about molybdenum poisoning through liming.

A. A number of cases were investigated where ill-thrift in cattle and sheep have given a response to copper. Past history indicated a heavy lime usage., A number of trials were put down on farms on yellow-brown loam soils where heavy lime applications had been used in the past. It is too soon yet to comment on these.