

The survey of the pastures of Hawke's Bay has produced much valuable information as to the relation between pasture type and soil, climate, top-dressing, and other factors. A novel technique of mapping the different pasture associations in detail was developed, and is illustrated by a map accompanying this report. It is apparent that there is considerable scope for the profitable improvement of Hawke's Bay pastures.

The farm management survey in Hawke's Bay carried out by officers seconded from the Department of Agriculture, although incomplete, has produced some important facts relative to the possibilities of expansion of fat stock production and carrying capacity.

In North Auckland some 2,000 square miles have been mapped and may be classified as follows:—

	Square Miles.	Per Cent.
Group 1 : Flat to rolling land suited to permanent farming (dairying, fat-lamb raising, &c.)	650	33
Group 2 : Rolling to steep land suited to sheep and cattle grazing	550	28
Group 3 : Land covered with problem soils	150	7½
Group 4 : Land too steep for permanent farming	400	20
Group 5 : Land with soils unsuited to permanent farming	250	12

2,000 square miles.

The economic utilization of some of the soils of North Auckland presents difficult problems. In some cases the difficulty lies in the physical and chemical status of the soil itself, and this applies particularly to the mature soils; in others the steepness of the country and the liability to erosion resulting from the removal of the original forest cover are complicating factors. Interesting and valuable results have emerged, indicating the incipient stages leading to erosion, particularly to what is known as sheet erosion.

The soil survey maps have in some areas been made use of for assistance in land-valuation.

Reconnaissance soil surveys have also been carried out in Banks Peninsula and at Blenheim, while special soil surveys in relation to the conditions requisite for the development of tung and citrus growing have been carried out. Similar surveys in relation to the growing of tobacco and flax are contemplated.

FRUIT RESEARCH.

A comprehensive programme of fruit research has been carried out during the year by the various participating bodies under the general direction of the Fruit Research Committee.

The Plant Research Bureau and the Cawthron Institute have co-operated in an attack on the problem of mouldy core of apples in the Auckland District. A field survey of affected orchards has been made with a view to determining the incidence of the disease and the factors associated with it. The survey has indicated that the trouble occurs in all varieties possessing an open calycine sinus and is not restricted to any particular soil type or system of tree management, does not respond to spray or fertilizer treatments, and has not indicated a clue by which the disease may be remedied.

Experiments on the control of internal cork of apples by spraying or top-dressing with borax have fully confirmed the excellent results obtained last season. So far borax treatment has not been successful in the control of bitter-pit or tree-pit, indicating that these diseases are not of the same nature as internal cork.

Botanical investigations included the continuation of trials of East Malling and Northern Spy stocks. There is evidence that there are among the East Malling stocks under test at least two types which will, over a wide range of soils, produce trees of far greater vigour than those on Northern Spy stock.

At the Dominion Laboratory the study of the chemical characteristics of New Zealand grapefruit with a view to devising a satisfactory test for maturity has been continued. The effects of temperature, humidity, and ethylene concentrations on the curing of lemons are being studied under carefully controlled conditions in order to provide a scientific basis for recommendations in regard to commercial practice. For the purpose of investigating the possibilities of gas storage for fruit for the local market, a small cool store was installed adjacent to the Dominion Laboratory, and experiments on the keeping-qualities of apples in varying concentrations of carbon dioxide and oxygen were instituted.

Dunnage investigations were continued in a series of trial shipments to Great Britain, where the fruit was examined by officers of the Low Temperature Research Station. Local investigations were undertaken in connection with the influence of manurial treatments on the keeping-quality of fruit and the use of different types of wraps.

MINERAL CONTENT OF PASTURES.

The success which has attended the use of cobalt salts in the treatment of stock ailment at Glenhope, Nelson, Morton Mains, Southland, and certain areas in the North Island has been followed up during the past season by detailed studies of soils, pastures, and animal organs, with a view to determining whether the ailments were caused by an actual deficiency of cobalt in the food of animals.

An extensive survey of the cobalt content of the main soil types of New Zealand made by officers stationed at the Cawthron Institute showed a fairly good correlation between low soil cobalt and incidence of stock ailment. Certain anomalous results, however, indicated that attention must be given to methods for estimating the availability of cobalt from the soil and pasture under different seasonal conditions.

Analyses of animal organs from affected areas showed that the cobalt content of organs, particularly the liver, from sick animals was much lower than that of healthy sheep or sheep which had been drenched with cobalt chloride. The results indicated that the cobalt content of the liver was likely to be a useful index to the occurrence of ailment. Analyses of pasture samples also supported the theory of cobalt deficiency as a direct cause of stock ailment in the districts investigated.