

BANKS PENINSULA AND ITS PASTURES.

By R. McGillivray,
Yields Superintendent,
CHRISTCHURCH.

In dealing with the question of the pastures of Banks Peninsula it is necessary first of all to say something about the special features of the district and its past history, because the Peninsula as we know it is totally different from what it was at the time of European occupation, and vastly different from the Banks Peninsula of a still earlier period.

Professor Speight says that the story of Banks Peninsula as known to us is but a small part of its history and the period covered is a mere point of time as compared with the preceding ages in which the romantic cones were first slowly constructed by volcanic agencies and then destroyed by intense volcanic explosions.

The Peninsula in earlier times was a land of intense volcanic activity and its highest mountains are estimated to have been at least 7000 feet in height. It is considered that these high mountains eventually experienced a terrific catastrophe of a volcanic nature and were shattered, their places eventually being taken by what we know as the harbours of Akaroa and Lyttelton. At that time the Peninsula was no doubt a most uninviting locality with its lava flows and intense volcanic activity. It was from this volcanic material, however, that the future fertile soils of the Peninsula were largely formed, by the dissection of volcanic rock by water and atmospheric action, plus the wind-borne material swept off the plains by the fierce north-west winds, which raged over the treeless wastes during the period of the formation of the Plains.

The deposit of wind-borne soil (loess) is particularly noticeable on the western part of the Peninsula. There is little evidence of any great depth of deposit on the eastern part of the district, indicating that the north-west gales largely spent their force and deposited most of their load on the exposed western slopes. Where the deposit of wind-borne soil (loess) shows the greatest depth we find the tussock grassland, and it is probable that the northwest wind carried soil off the plains in such quantities as to prevent the growth of a forest covering. Early records give the original forest area of the Peninsula as **134,000** acres and the total area as 223,000 acres. The clearing of the bush commenced soon after the settlement and mixed pastures were sown including perennial ryegrass and white clover. The first record of cocksfoot being sown is in **1852**. This grass soon attained dominance and in most parts of the cleared land was soon in almost complete control and became the sheet-anchor of Peninsula farming. Even today its importance cannot be overestimated, although in isolated parts its prestige is not so great as formerly, and under severe sheep-grazing

Danthonia and other species have appeared in the pastures; in fact it would be a very bold investigator who would assert that Peninsula pastures have not deteriorated. The continuous hard grazing of wide stretches of country over a long period of years, without any return to the land in the way of topdressing materials, has weakened the sward and allowed the lower fertility demanding grasses such as Danthonia to find entrance in parts where cocksfoot once held full sway.

Banks Peninsula has for so many years been prominent in the public eye as a producer of Akaroa cocksfoot seed and Akaroa cheese that the position with regard to the district's sheep pastures and sheep population has been entirely overlooked.

The counties of Mt. Herbert, Wairewa, and Akaroa carry approximately 225,000 sheep and on Banks Peninsula the sheep carried per 1000 acres is the highest carrying capacity in the South Island. Mt. Herbert carries approximately 1300 sheep per 1000 acres, Wairewa 965, and Akaroa 987. The only other South Island County carrying over 900 sheep per 1000 acres is the Levels County in South Canterbury. Banks Peninsula also carries approximately 30,000 head of cattle, including over 9,000 dairy cows, so at a glance it can be seen that the district in spite of depletion is still holding its own fairly well. It should also be pointed out that the various types of stock mentioned are almost entirely grass fed, while in other counties supplementary crops figure largely in stock maintenance.

In any paper on Banks Peninsula pastures the question of fern control must be discussed, and in this connection it should be mentioned that certain parts of the Peninsula are natural fern lands, which have been continuously in fern for a very lengthy period of time. Fern has, however, invaded portions that certainly did not carry any at the time settlers commenced clearing the forest covering and occupied the land as grazing farms. Fern is undoubtedly one of the ~~retrograde~~ stages in the process of transition to forest, and it is a fact that when a forest is burnt out and left practically unstocked and untouched fern rapidly appears. It is thus possible to visualise the fern-clad country of Banks Peninsula prior to the development of the great forests which preceded the cocksfoot pastures of today. On some farms on the Peninsula fern is spreading, while on others the position has vastly improved. On other farms fern has been controlled, and, speaking generally, the fern position is better than it was 20 years ago. At the present time on parts of the Peninsula gorse is a far greater menace to the pastures than is fern. In some cases successful crushing of fern with stock has been undertaken. It may be stated that the fern is dormant in the district from about April until the early part of October when fronds commence to appear. The stocking, or crushing as it is termed, for fern suppression in the pastures should commence as soon as the fern begins to grow and before the fronds uncurl. Heavy stocking is necessary so that the growth will be eaten or broken down. Crushing is at times severe on stock, and they should not be left on too long, but success cannot be achieved unless the young fern growth is destroyed before it gets beyond the curl stage. When it receives a severe check in the spring it, is some time before it again shows up but a watch has to be kept and an attack made as soon as plants appear.

In speaking of fern control it should be pointed out that the fern rhizomes are often of great size and extent and are heavily stored with plant food reserves. All these food reserves are manufactured by the fronds and thus in any attempt to control fern in the pastures the destruction of the fronds must be aimed at so as to prevent the manufacture and storing of food, and a continuation of this destruction will eventually lead to the death of the fern plants and a re-establishment of favourable pasture conditions.

There are many grasses to be found on the Peninsula, including perennial ryegrass, (*Lolium perenne*), tall oat grass (*Avena elatior*), tall fescue (*Festuca elatior*), *Poa pratensis*, *Danthonia* (sp.) *Poa annua*, Timothy (*Phleum pratense*) Crested dogtail (*Cynosurus cristatus*) Sweet vernal (*Anthoxanthum odoratum*), Doggrass (*Holcus lanatus*) Brown top (*Agrostis* sp.) and others, but of all known grasses cocksfoot occupies the key position and stands alone in point of importance on Banks Peninsula. The dominance of cocksfoot conflicts to some extent with many of our views in connection with a mixed sward, but we must not lose sight of the past production of the Peninsula, and in any consideration of pasture covering the topography of the country must receive consideration. On all the steep country on the Peninsula cocksfoot stands supreme and I do not see any chance of its being replaced by any other useful grass. During dry summer and autumn periods dairy production would practically cease if it were not for the cocksfoot pastures which provide more pasturage at such times than any other grass that could be grown.

What might be called the proper management of the cocksfoot pastures on the Peninsula is a matter that presents difficulties, but after all proper management is governed by district conditions, and a type of management that is correct in one district may not apply in any way to the cocksfoot pastures of a district like Banks Peninsula. The present pasture control methods on the Peninsula have been condemned, but after careful investigation of the whole position I am of opinion that these methods will not change to any great extent even under a system of universal topdressing of pastures.

On Banks Peninsula we have fairly large areas from which cocksfoot seed is taken. These can be looked upon as special pastures and the management consists of light grazing with cattle or sometimes with sheep during the winter season only. The remainder of the year these pastures are considered seed areas, and experience has shown that no grazing should take place except during the winter season, and even then in any grazing there should be acres to the cow rather than cows to the acre, and some farmers follow the practice of stocking their seed areas with young stock only. There must not be anything in the nature of heavy stocking on such areas, or the seed production will fail, as one cannot combine heavy grazing of the cocksfoot areas and seed production.

On other large areas not used for seed production the country is steep, and controlled grazing is out of the question. Another point is that reliable and experienced farmers have found that their dairy stock grazed on the rough cocksfoot fields during the winter have come into

-4-

the spring in better condition and better fitted for the, milking season than in cases where attempts have been made to hand-feed them through the winter. Some good hay should be provided, however, for the early spring period, and when this is done the Peninsula management of pastures insofar as control is concerned is, in my opinion, sound, when full consideration is given to the type of country under review.

Mr. Bruce Levy has pointed out that the suppression of the natural growth form mitigates against the optimum development of cocksfoot and for this reason the normal commercial type of cocksfoot never shows to the best advantage in what is considered a well-grazed, well-utilised sward as it does where rank growth predominates. Rough growth provides the essential shade for the crown and protects from the sun and wind the basal portions of the shoot, from which new roots arise. In short pastures and particularly under close and continuous grazing the new root system does not develop to anything like the same extent as it does where the growth is rank. The Banks Peninsula farmers have found this to be correct and hence the comparative roughness of their cocksfoot pastures.

White clover is recognised as an important legume, and must receive mention in any paper dealing with Peninsula pastures, as the white clover of these old pastures seems to be of the true wild type. It exists at times under anything but ideal conditions for clover growth, being an aggressive type with an extremely strong development of stolons wherever the top growth is not too dense. The percentage in most pastures of even this strong growing clover is, however, low, as the strong growth of cocksfoot inhibits its development. It is impossible to state definitely that actual white clover strain differences exist on the Peninsula but it is probable that such is the case as in places in the district there are to be seen plants of remarkable vigour while in other parts the type is rather small both in growth and in leaf. There appear to be distinct signs of persistence, and where any liming or phosphating is done white clover shows up most aggressively. On the Peninsula white clover appears to be a shy producer of flowers and its leafyness seems to mark it as of the better type and a most useful plant in a cocksfoot sward where the growth is not too rank.

on the lower slopes and in the valleys of the Peninsula there is a place for good mixed pastures to be established on land well cultivated and adequately limed and fertilised, but these areas must be considered as quite apart and quite different from the steep hill country. The area available for these suggested mixed pastures is only a mere fraction of the total area of the Peninsula, therefore the hill country cocksfoot areas will be seen to be of greatest importance. In any sowing of pastures only seeds of known strain should be used, as persistence and high production are vitally important in a grassland district such as the Peninsula.

-5-

The continuous grazing of wide stretches of the Banks Peninsula country over a very long period of time has resulted in impoverishment. The soils of the Peninsula must originally have been in a remarkable state of high fertility to have stood the slow but steady drain of plant food that has been taking place over the years since European occupation began. When I mention impoverishment I do not wish anyone to think that the Peninsula soils and pastures are at their last gasp and that production from the pastures is going to fail. Nothing of the kind is anticipated, and the wide realisation that now exists regarding the necessity for manurial treatment assures the dawn of a new era which will usher in almost universal topdressing of Peninsula pastures and make this favoured district and its self-reliant inhabitants more prosperous than they have ever been before.

It has to be recognised that the topdressing of Peninsula pastures offers considerable difficulty in most parts owing to the hilly nature of the country and also because of the apparent necessity for considerable applications of lime in addition to phosphate dressings. Farmers have asked me to devise a method for rapid application of fertilisers on country such as the Peninsula, and in a trial recently carried out with the Walker horse topdresser results were satisfactory, but in my opinion the aeroplane will eventually have to be brought into use if all parts of the Peninsula pastures are to be economically and rapidly dressed with suitable topdressing mixtures.

The Fields Division of the Department of Agriculture has been carrying out investigations in connection with the topdressing of Peninsula pastures since 1927. In practically all experiments the necessity for applications of lime stands out prominently by reason of the fact that phosphates applied in the absence of lime have frequently given most unsatisfactory results, and even a fertiliser such as basic slag has given better results on limed than on unlimed land. Superphosphate applied as a pasture topdressing on unlimed land has often proved most disappointing but where lime is present superphosphate can be depended upon to give excellent results and to produce a more grassy pasture than will basic slag dressings, where the pasturage frequently shows an excess of clover growth.

The experiments on Banks Peninsula have been carefully observed at practically all seasons of the year, and the effect of topdressing on the pastures noted. Basic slag applications produced a very pleasing-looking sward, being dark green in colour and apparently very palatable, but at times consisting of an excess of clovers. Superphosphate produced practically as good a sward as did Basic slag on limed land but not of the same intensity of colour but there appeared to be a slightly better growth of grass with less clover, and on the whole a well-balanced feed was produced.

The improvement of Peninsula pastures by means of topdressing can strongly be recommended. The use of superphosphate or basic slag in conjunction with lime has been proved to give good results and in places the use of basic slag alone has given satisfaction; in fact, where liming is out of the question the claims of basic slag, or reverted super, cannot be overlooked.

Dressings should be made in the autumn rather than in the spring, as autumn applications in a climate such as that of the Peninsula will assist winter and early spring growth and lead to pasture production at the time when feed is most required,

In conclusion I may state that the foundation of prosperity on Banks Peninsula is intimately associated with the introduction of cocksfoot in 1852, and with the establishment of the Cheese Industry. So far as can be ascertained, the first cocksfoot seed was saved in December 1854, being cut with the hook and tied in sheaves and stacked. By the year 1865 large orders for seed were coming forward, and by 1868 the present method of harvesting, whereby the crop is cut and left on the stubble to dry prior to conveyance to the threshing floor, was well established. As the bush disappeared before the exigencies of settlement the fat cattle and dairying industry came prominently into the picture, to be followed later by sheep-farming and the raising of fat lambs. Throughout these varied activities, however, it is cocksfoot pastures pre-eminently which must receive full credit for the success of primary production on Banks Peninsula.
