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THE IMPORTANCE OF CULTIVATION IN PASTURE ESTABLISHMENT.

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INTRODUCTION.

There is nothing new in what I am going to say every real farmer and gardener realises the importance of a good seed bed at sowing time and understands the principles and practice involved in its preparation. But at the present time (and I speak only of the Auckland Province) there are many farmers inexperienced in cultivation work, who are turning thsir attention to re-sowing their grasslands with improved strains of grasses and clovers.: men whose active experience in farming has only embraced the management of established grass and the care of livestock.

If we look at farming as it really is, if we examine the pastures that have been sown down during recent years, evidence is soon forthcoming that a great deal of the land sown in grass is not cultivated as well as it ought to be, and many farmers are no&securing the full advantage of the improved strains of grasses and clovers they are now using in their grass mixtures.

Reliable strains of grasses and clovers, fertilisers and lime can be bought ready for use - they are now standardised. Cultivation can't be bought - it has to be done by the farmer: it is-not capable of standardisation. It depends on the skill of the operator, his tools (horses and implements) and time. Experience leads me to believe that the most pressing need in grassland improvement at the present time is for research work in cultivation and crop rotations to form the basis for advice to farmers in preparing land for grass.

SEED BED FOR GRASS.

A good seed bed for grass should be clean, sweet, moist, fine and firm at the time of sowing, for these conditions favour rapid and complete establishment of grass and clover plants. Possibly freedom from weeds and aeration are not as important as for annual crops.. Grasses and clovers can eventually suppress most undesirable plants, but weed competition at the time of actual establishment is often a disadvantage: aeration in relation to grass and clover establishment is possibly not as important as with annual crops, for both grasses and clovers seem to be more adapted to a settled condition of the soil than cereals or fodder crops. But of grasses and clovers it is essential that -the seed bed be moist, fine and firm, and the seed sown whilst the land is warm.

Moisture and warmth go 'together. The autumn is normally the best time for pasture establishment, and this necessitates tnat seed bed preparation should be, accomplished so that the land is moist at the time when the grasses and clovers ought to be sown. With late preparation a dry bed usually results,, and sowing has often to be delayed until the late autumn, when really heavy rains have sufficiently moistened the land to render it fit for sowing: whereas. with a moist bed light rain will 'bring up the grass and then the reserves of moisture in the soil will be sufficient to carry on the plants.

Fineness is importan-t and should go deeper than surface pulverisation: it is the under part of the seed bed that should be fine. A fine surface with clods underneath is unfavourable to growth. The clods bridge

open spaces and thus prevent the rise of moisture from below, When the clods crumble down as they ultimately do, the seed bed lacks the firmness requisite for good grovvth.

Firmness is essential for the full germination of grasses and clovers: clovers particularly require a really firm seed bed. Natural settlement before sowing is undoubtedly preferable to artificial consclidation. With the former the soil firms from below up, with the latter the soil is made firmer at the top than below.

The importance of moisture, firmness and fineness in the seed bed for grass is nowhere more strikingly seen than in the cultivation of poor land, and I now propose to describe the tillage operations in the cultivation of gumland, pumice land and pest land for grass.

THE CULTIVATION OF GUMLAND.

The gumland soils occur in patches right. through North Auckland: the soil is a grey silt or aclay, on undulating treeless downs rising occasionally into low hills. The surface covering consists of manuka, bracken fern and danthonia, and where the drainage is poor, of swamp vegetation, rushes and umbrella fern, The surface soil, being deficient in hums, is very sticky in the winter and bakes very hard during the dry summer weather. Cultivation is accordingly difficult and costly, as the land can only be ploughed and satisfactorily worked down in the late autumn and early winter and again in the late spring and early *summer.* In addition to the low natural fertility of the soil the grassing *of* the gumland areas has been rendered still more difficult by the operations of gumdiggers. The ground was roughly dug up wherever gum was suspected to exist and a thin layer Of top soil, generally only a couple of inohes thick, was buried a foot or more'down, and deep holes were dug and left unfilled. But what led to the worst destruction of the soil was the continual burning off of the covering scrub. The gumdigger did *not* cut down and clear away the vegetation on the surface of the ground he wished to clear: he resorted to the simple method of "putting a match to it". Fires started to clear a few yards often swept thousands of acres. This repeated burning off caused every vestige of dark surface soil to disappear and left a. bare clay soil on extensive areas of gumland. Unpromising it certainly Looks in its unimproved state, but experience has shown that with drainage, careful cultivation, the use of perennial strains of grass and clover, and the application of adequate quantities, of phosphates and often of lime, these unpromising soil.3 can be satisfactorily grassed. Cultivation is very important: without a moist and firm seed bed and early sowing white clover won't establish and without white clover ryegrass won't grow. In preparation for grass the best practice is to clear and burn the surface covering, fill holes and drain wet places, plough in the autumn with a short breasted plough, leave fallow over the winter, harrow, re-plough in the spring and keep the surface harrowed *over* the *summer* and sow grass in February or early March. The two ploughings give an excellent seed bed - the bottom is firm and moist - firm with natural consolidation, and this firm and moist bed allows of early sowing and a good grass and clover *cover* is. secured before the winter, and the first grazing can be done before the land is really wet.

How easy it is to write "The two ploughings give an excellent seed bed?" If pens were ploughs and fields were paper, how easy it would be to grass these intractable clays. The land is best twice ploughed. Think of the work for that first ploughing on badly dug-over gumland clays - where the surface consists. of great

spits of clay left jumbled together by the gumdigger, shallow and deep holes filled with water and a profuse growth of rushes. First comes the clearing and burning: then the spade work to drain, to level mounds and fill holes so that a reasonable surface is prepared for the horses and plough to work on. Then the first ploughing, with the horses, slipping and stumbling *over* clods and through holes, dragging the plough where it would not seem possible for a plough to go. At the first turn over the land looks anything but promising. Rough the ploughing certainly is, with yellow and white furrow slices., devoid of any dark humus, turned always to the weather. But the roughness is an advantage: the ameliorating effects of the air and rain are offered full play: the clods soften as the air and water reach all parts. Time plays its part. The work cannot be hastened: it must be left to the weather. In the spring the land is harrowed and the clods break down. The second ploughing is easier than the first. The plough is the best implement for preparing a seed bed. This second ploughing provides that necessary pulverisation for the bottom of the seed bed and leaves the land in that moist and firm condition underneath which is so necessary for grass and clover establishment,

THE CULTIVATION OF PUMICE LAND.

Pumice land is light and sandy and the very opposite of the gumland clays,. Yet like the clays it is of low natural fertility, and its cultivation, although much easier than the cultivation of the clays., must be properly performed to get a good establishment of grass and clover. Time must be availed of to consolidate the clays whilst the roller must be used to firm the pumice soils.

Open plains of pumice land occur in the Central Plateaux of the North Island: the porous sandy soil gives rise to semi-arid conditions, and the surface, covering consists of tangled scrub and tussock.

In grassing this country the surface covering is first cut and burnt, the land ploughed with a Lea-mouldboard plough 5 in. deep (the better the ploughing the easier the subsequent seed bed preparation) then left fallow for a few months to allow of weathering and aeration, and for the furrow slices, to close together. The land is then rolled on the furrow with a Cambridge roller: double disced: chain-harrowed to level the surface: rolled before and after seed sowing.

Rolling on the furrow with the Cambridge roller is important: this rolling consolidates the bottom of the seed bed, and brings the soil moved by the plough again in close contact with the unmoved subsoil, making a continuous firm layer of soil through which moisture may move from the deeper layers to the surface.

If pumice land is not consolidated white clover won't establish., and without white clover ryegrass won't grow. This is clearly seen on steep hillsides where the roller cannot be used.

THE CULTIVATION OF PEAT LAND.

Peat land varies considerably in texture and moisture holding capacity: some areas have silt with the peat and are reasonably easy to grass: other peat land is composed almost entirely of vegetable matter, contains a waterproofing material, and only becomes wet after months of wet weather. Peat lands are primarily grassed by surface sowing Yorkshire Fog and Lotus Major, two plants that do well on the land immediately after draining.

Take now a poor peat swamp of poor quality that has been drained and is now covered in the original fog and lotus pasture which is to be ploughed and sown in better grass. With loose, poor dry peat work it how you will with ordinary tillage implements and you can't get it sufficiently moist and fine for early autumn sawing. Sow early, the establishment is poor and the thinly set grass and clover plants are'crowded out with weeds; wait till the land is sufficiently moist and it is too late to sow. Yet with early sowing the strike and establishment may be quite fair near gateways where very heavy consolidation has taken place.

LESSONS FROM THE CULTIVATION OF POOR LAND.

A good primary establishment is all-important in grassing land of low fertility. If the land will hold moisture and the establishment is good the pastures can be made by building up the fertility with topdressing. (I speak only of high rainfall districts). Ryegrass is easier to establish than white clover, but without white Clover ryegrass won't grow, topdress. how you will. Unless a good white clover establishment is secured there is the almost certainty of losing the whole cost of cultivation, seed and fertiliser.

Is the position very different on land of better fertility? How often do we see in newly-sown pastures the improvement in establishment that occurs from accidental dauses - the better establishment near gateways and on headlands, in the wheel marks of tractors or lorries, in the footprints of horses, in the beneficial effect of a fallow where part of a field has been ploughed and fallowed longer than another part.

After establishment, stock and topdressing make a pasture: with good and early establishment stocking can be earlier and heavier, and it is no exaggeration to say that a pasture is made or marred in the first six months; I firmly believe that many pastures that are now being sown on dairy farms will turn out to be only 100 to 12% lb. butterfat per acre pastures, whereas with butter cultivation and better management they would be. capable of producing 175 to 200 lbs. of butterfat per acre

PASTURE ESTABLISHMENT ON DAIRY FARMS.

Let us now turn and see'how grass is often put in on dairy farms. A farmer has been cutting his topdressing a bit short during recent years and finds he is not now getting the grass -production that will provide sufficient summer graeing and give a surplus large enough for hay and ensilage to keep his stock going during periods of low grass production. After being caught short one winter he decides to *break* up a field of his poorest grassland for a crop of swedes for next winter, and, as he has heard a lot about certified ryegrass, he expects to get a really good pasture when he sows it down later to grass - one that will give a full return for the fertiliser he applies in topdressing. He ploughs his land early for swedes, for he knows he has to let the turf rot and the land consolidate if he is to get a crop. Now after the swedes usually one 'of two things is done - he either takes a green crop or a, soft turnip crop for summer feeding an3 sows grass. almost immediately after ploughing the land following the summer crop, or he leaves the land after the swedes untouched until February or early March, and then ploughs, works down and sows the grass all within a week or two. With light land the seed bed is often too loose, for he does not roll on the furrow, because the usual roller requires five horses for rolling on the furrow and he has only three. With heavy land the seed bed is usually cloddy and loose below because the seed bed has been hastily prepared. With both types of

land the seed bed is usually dry and sowing is delayed until some really heavy rains have fallen.

Now if matters are to be improved certain questions deserve consideration. sre we in the high rainfall districts to rely wholly on grass for feeding cows? If so (and it is certainly the cheapest and easiest way) the grass is our crop and all care should be taken in the cultivation for that crop. When it comes to renewing grass my experience is that the best establishment is secured by ploughing old grassland, summer fallowing and sowing to grass again early in the autumn.

If annual forage *crops* are to be grown as an essential feature of dairy cow feeding are they to be rotated with temporary or long rotation grass? What rotation will give the best results for grass. sowing? (Regular annual forage crops on dairy farms mean extra labour and equipment. The slogan of "Better Feeding of Dairy Cows" was not taken up as long as better feeding meant annual forage crops but was quickly incorporated into farm practice when it meant the saving of grass ensilage),

To come back to cultivation: the implements and horses necessary ior thorough cultivation of land for grass. on dairy farms and the methods of cultivation. A dairy farmer has. usually only two or three light draught horses and the iinplements used must be adapted to the horse power. For light land a roller is essential; the land must be rolled in the furrow: the dairy farmer requires a Cambridge roller 3'6" to 4' wide so that he can roll in the furrow with two horses. On heavy land pulverisation and consolidation should be brought about with the plough; the work that is done on large arable farms. with heavy grubbers and Cambridge rollers should be performed with two ploughings, for there is no better pulv'erising implement than the plough. at present farmers use the discs to give a superficial pulverisation, whereas two ploughings give a complete pulverisation and a good bottom to the seed bed.

SUMMARY.

The seed 'bed for grass should be firm, moist, fine and warm at the time of sowing. These conditions are particularly well emphasised in grassing poor land, on which if the seed bed is not exactly correct the grass may fail completely. Accidental happenings, such as the better strikes secured in tractor or lorry wheel marks, indicate that the seed bed for grass, even on good land, is often *not* as well prepared as it might be. Cultivatio operations - their method and time - are intimately connected with farm management. On dairy farms the def *in-*, ition of the procedure to get land ready for grass depends on whether farms are to be purely grass farms or whether, grass is to be supplemented by annual crops. The actual cultivation of land for grass should be thoroughly performed with implements suited to the horse power availabl-

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