METHODS OF PASTURE ESTABLISHMENT

By L. W. BLACKMORE, Instructor in Agriculture, Dept. of Agriculture, Timaru.

Remarks are confined in this paper mainly to the technical aspect of pasture establishment with special reference to recent developments.

Methods of establishing pastures or of introducing desirable species into pastures already existing may be grouped under three headings :—

1. **Surface introduction, without prior cultivation** where the seed and manure are either broadcast on the area or drilled directly into the existing sward.
2. **Some form of surface cultivation** followed either by broadcasting or drilling, and thirdly
3. **Sowing pastures on ploughed and worked land.**

I intend to concentrate on **sowing pastures on ploughed and worked land.**

COMPARISON OF DRILLING AND BROADCASTING

The two basic methods of sowing pasture on ploughable land are broadcasting through a topdresser or the grass-seed box of a grain drill and straight drilling.

The main requisites **for** good pasture establishment are:—

1. A quick, even strike and establishment.
2. A sufficiently even distribution of the seed to ensure good cover. Drilling favours the first and broadcasting the second.

The results from either method will depend above all on good consolidation and the available moisture supply, but drilling is less affected when conditions for any reason are below par. Why then should drilling give this advantage of greaten reliability of strike and quicker establishment? The functional differences between drilling and broadcasting are set out in the following :-

1. MECHANICAL ACTION OF ROLLER AND DRILL

During the final preparation of the seed-bed the more rubbly material tends to be raised to the surface by harrow action. Under dry surface conditions particularly this rubble is not completely broken down by the roller when the surface soil is forced down by the roller rings into the familiar corrugated pattern. With ordinary broadcasting the seed is then spread and covered with light harrows. In the covering process further dry surface soil from the tops of the corrugations is brushed into the grooves. Drill action on the other hand is quite different. The rubbly material on the surface is temporarily displaced by the coulters and the seed is laid in the moist layer, the rubbly and often dry material remaining on the surface where it belongs.

To get a proper appreciation of the differences between roller and drill action in preparing a place for the seed to lie, some mention should be made of the nature of the surface layer The dry surface layer or mulch so characteristic of soils in dry climates varies in depth depending on the particular conditions of climate, soil, and degree of consolidation. It acts as a buffer between the moist soil below and the constantly changing atmospheric conditions above. , This naked layer, unprotected as it is by foliage or roughage of any kind as is the rule with nature, is exposed to the full force of wind action, to rapid changes in temperature, and fluctuating moisture content. Because of its porosity,. too, it is subject to draught and excessive airiness, so that though it may be damp to look at, it is in reality in a physiologically dry state. On and near the surface also capillarity, consolidation, and tilth are poor.

When broadcast on a rolled surface, therefore, any seed near the surface, unless conditions are extremely favourable, often does not strike or establish. With drilling on the other hand all the seed is placed at a uniform depth below the danger line and is consequently assured of more favourable conditions for ‘both striking and establishing.

2. FERTILISER PLACEMENT

Though there is a partial placement of both seed and manure when broadcasting on a Cambridge-rolled surface, with drilling they are brought into intimate

contact under conditions of generally assured moisture supply. The placement of fertiliser is important in establishment for several important reasons. The higher concentration of phosphate has a greater effect on growth for the same per acre quantity used as in broadcasting. This results in more rapid establishment, while the pasture species are favoured in this respect more than the weeds. Under conditions sufficiently dry to limit root development and moisture movement in the soil, the proximity of fertiliser to the establishing plant is probably of greater importance still. Apart from these advantages, soil fixation is greatly reduced.

3. SURFACE IRREGULARITIES

Because the individual rings of a roller have no vertical play, this implement over its approximate 9ft. of width tends to act as a single unit. Under uneven surface conditions, therefore, the roller tends to bridge the low spots and ride heavily on the high spots. This particular aspect should not be over-stressed, but it must be considered in any critical comparison of methods. The coulters of a drill, on the other hand, have independent vertical action, and this is one of the reasons for the overall evenness of strike characteristic of this method of sowing.

4. PREVAILING WEATHER CONDITIONS AT TIME OF SOWING

Broadcasting as normally carried out either through the grass seed box of a drill or by a top-dresser is more subject to the influence of wind.' With drilling, on the other hand, wind has practically no effect on distribution, as neither the seed nor the manure comes into contact with the air. Drilling can therefore be carried out quite satisfactorily when the wind is too strong for satisfactory broadcasting.

The second requisite for good pasture establishment is a sufficiently even distribution of the seed to ensure good cover.

Though the advantages of drilling are widely recognised, 7in. row drilling has very definite disadvantages. Though fertiliser placement and the greater concentration of plants gives a temporary advantage of more feed in the initial stages, the excessive competition within the row must subsequently have a

depressing effect on production, and the disproportionate inter-row space provides a harbour for weeds. These are the reasons broadcasting is preferred, wherever practicable. As cover is not so important, however, for temporary pastures the advantages of drilling are usually exploited when sowing Italian ryegrass and often short-rotation ryegrass. Good cover has many advantages, some of which are not well known. Because of better distribution, plants have a greater chance to develop; their root systems can explore the soil more efficiently for both moisture and plant food while their leaves have less competition among themselves for light. By acting as a protective mantel the top soil is kept moist and alive. This is specially important for shallow soils; and also because the top inch of soil is the most fertile where topdressing is practised. Under good cover rain and even light showers are retained more readily while losses from capillarity and evaporation are reduced to a minimum. In contrast to this the inter-row spaces between 7in. drills tend to dry out badly and become progressively poorer for the more desirable species to establish in. Especially is this so on light soils. Through the trampling of stock, rain, and the baking action of the sun and wind, the surface layer between the rows tends to lose its structure and to form a hard skin which will not absorb water readily,

Apart from the advantages already mentioned, good cover creates more favourable conditions for growth by reducing extremes of soil temperature not only between day and night, but also between seasons. So does it ensure a better utilisation of applied fertilisers for the reason that, just as we get a placement effect from fertiliser in 7in. rows, so we tend to get the opposite effect when fertilisers are broadcast on to placed rows.

COMPROMISE PRACTICES

In attempts to exploit the advantages of both drilling and broadcasting a number of compromises and modifications of the two practices have been tried with a certain amount of success in some cases, such as cross drilling, double drilling (one drill hitched behind another and offset 3½ins. to give double-rowing effect) and drilling part of the seed and broadcasting the remainder. Though these practices have had some merit, they all have definite disadvantages.

RECENT DEVELOPMENTS

In attempts to improve on current practices the problem has been approached from two different angles. Some have set out to perfect the roller-broadcast technique of sowing; others have concentrated on the drill. The roller enthusiasts, realising that the placement of both seed and manure together at a uniform depth was a desirable feature of drilling to incorporate, have achieved this by attaching seed and manure boxes to the roller, both the seed and the manure being directed via tubes or corrugations into the bottom of the roller grooves. The drilling enthusiasts, on the other hand, because the overall distribution of the seed by broadcasting was superior to 7in. drilling, have improved the underground spread of seed through the coulters. In other words the roller enthusiasts have attempted to make a drill out of the roller and the drill enthusiasts an underground broadcaster out of the drill.

The types of attachments that have been designed for improving drill coulter distribution may be divided into two main classes:—

1. **The broadcast coulter or coulter attachment** in which the objective is a complete or nearly complete underground spread of seed. The maximum spread of seed so far obtained has been 6in. per coulter. As each coulter is 7in. apart, this means that approximately 6/7 of a complete underground spread can be achieved. In practice a 6in. or even 5in. spread is usually sufficient to give a fairly good cover once the pasture has established.
2. **3½in. coulter attachments.** There have been two approaches here. First there is the subsidiary coulter attachment offset by 3½ins. and attached to the standard coulters, thus giving double the normal complement of coulters; and secondly, the divided or split type of coulter in which the number of coulters remains the same, but each has a specially designed attachment to replace the standard coulter points.'

Ofthe two developments 3½in. drilling has so far found most favour. With sub-surface broadcasting the attachments have tended to be rather more cumbersome, while good distribution of the seed and

manure has been more difficult to achieve. Although distribution in the form of 3½in. rows is not ideal, the rows are sufficiently close for practically complete cover to develop at an early stage in establishment. It also has the advantage of good fertiliser placement. In other words 3½in. drilling retains the essential advantages of 7in. drilling, while in seed distribution it is a compromise between 7in. drilling and ordinary broadcasting.

In the roller technique of sowing I consider that the placement of both the seed and manure at an even depth and in contact is a definite advantage. It is the nearest approach to drilling as we know it, and in fact the name roller drill is given to this type of machine by those responsible for its design. I also believe that the type of roller drill fitted with extra heavy rings that leaves true V-shaped drills would be superior to the Cambridge roller under our drier conditions. I consider, however, that drilling by the improved methods has the advantages of first, superior mechanical action and secondly, vertical flexibility, both of which have already been discussed in detail.

The ultimate worth of any of the newer developments cannot be assessed on performance alone. Overall costs of these improvements to the farmer, their ease of fitting, and their adaptability in arable farming districts for the sowing of crops other than pasture are of no less importance.

DISCUSSION

Q. What is the place of the disc coulter for pasture sowing?

A. It is satisfactory in principle but the disadvantages are that it is manufactured without a manure box and that it is of no value on stony ground.

Q. Have you had any difficulty in regulating the depth of sowing of white clover?

A. No, provided the ground was properly consolidated.

Mr P. D. Sears stated that the roller drill was developed for use on pumice country where a drill could not be used because of stumps and stones.

Q. Do these attachments fit ordinary drills?

A. Yes. There are various methods of attaching. The latest attachment can be fitted by merely removing the coulter points.

Q. Do you find covering difficult when using the wide coulter?

A. There is some difficulty on light land. It is advisable to follow drilling with a long tined medium harrow which will let the stones through. It is also advisable to use a snig chain before rolling. On good land the use of grass seed harrows and a snig chain provides satisfactory covering.

Mr C. S. Marshall stated that he had used the wide coulter, but had abandoned it. On stony land, distribution was not good. On good land a wave of soil that was hard to split was formed. The wide coulter was however, good for broadcasting on a rolled surface.