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The soil our basic asset

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THE SOIL ... OUR BASIC ASSET



CONTOUR FURROWS INCREASE PASTURE GROWTH

By J. E. WATSON, B.Sc., Adviser, Soil Conservation Service

GOOD pastures on steep slopes will give profitable returns from grazing, and will also reduce erosion risks. Water needed for pasture growth on such slopes must not be allowed to run off and erode lower slopes. The use of contour furrows is a readily applied erosion control measure which can be very effective in increasing the amount of water held and absorbed on steep slopes.

On many farms there is some sloping land, which, because of its steepness, or through being broken into small areas by rock outcrops, is suitable only for pasture. The farmer will wish to get profitable grazing returns from such land, and profitable grazing requires maximum pasture growth. Pasture growth depends on the species of pasture sown, on fertilizer applications and on grazing management, but will be **particularly** limited by the amount of moisture available.

Rain which falls on steep slopes is likely to run off and cause erosion

damage, and the best way to prevent such run-off is to have a dense pasture cover. Such a cover will protect the surface soil from the pounding action of the raindrops, and will also provide resistance to the movement of water over the surface. When rain falls, the pasture will hold the water while it is being absorbed into the soil.

The southern portion of our State has a long dry summer, and it is difficult, even with careful grazing, to maintain sufficient pasture cover all the time. Consequently, summer rainstorms or the opening winter rains may fall on



A general view of a contour furrowed area of pasture land. The spacing of furrows is sometimes arranged to coincide with one or two drill widths of the implement used for pasture renovation. In practice, it is unusual that the same width is always maintained between any pair of furrows. Each furrow has to be dead level (i.e., on a contour), and while the vertical interval (or difference in level) between any pair of contours is always the same, the horizontal distance between them varies with the slope of the land.

ground which is nearly bare of vegetative cover. To prevent run-off it will be necessary to provide extra protection. On steep pasture slopes this protection can be given by contour furrows.

CONTOUR FURROWS DESCRIBED

Deep furrows are ploughed along contour lines spaced at intervals of 12 to 30 feet apart. The furrows, being level, will hold water, each furrow acting as a small reservoir, so that water running down the slope will be intercepted and held in the furrow until it soaks in. This extra water absorbed can result in considerable improvement in the pasture growth, especially early in the season when good growth for early feed is important.

Contour furrows are very valuable on sloping areas which have a bare or nearly bare hard surface which normally absorbs very little water. Most of the rain falling on these areas will run off and possibly cause a serious erosion problem on lower slopes. In some cases, spectacular results have been obtained simply by putting in contour furrows on such an area, as the increased water absorbed and thus made available for plants has resulted in a rapid improvement in the natural grass cover. However, better and quicker results can be obtained by seeding the area with suitable pasture plants, preferably with a cover-crop of oats or cereal rye. To ensure a good pasture cover, the area should not be grazed in the first year, and only a light seeding rate for the

This is the eighth article of a series which commenced in the January-February, 1952, issue of the journal—a series which outlines the principles of soil conservation and their main applications in Western Australia. It is hoped that the articles will help to impress upon farmers the need to conserve the soil and prevent erosion, and will point the way to the practical application of suitable soil conservation techniques.

The Soil Conservation Service exists to co-operate with farmers to this end. If you would like an officer of the Service to visit your

property to discuss your soil conservation problems, write without delay to the Commissioner of Soil Conservation, Department of Agriculture, Perth.

There are very many small eroded areas which farmers can reclaim, or protect from further damage, with their present equipment.

Soil Conservation Schools lasting one day will be conducted for groups of farmers to show how they can do this work themselves. A district organisation can arrange this for a group as small as six or up to sixty or seventy.

cover crop should be used to avoid too much competition with the pastures.

CONTOUR FURROWS ARE EASILY CONSTRUCTED

There are many implements suitable for giving the desired furrow—with good capacity below ground level. Some of these implements are likely to be available on farms.

Single-furrow road ploughs have been used extensively, but have the disadvantage of requiring an operator for the plough.

Two-furrow mouldboard and disc ploughs with automatic lift operation are very satisfactory for making contour furrows. The plough is readily lifted out of the ground. This is a time-saving advantage when starting and finishing furrows and for leaving gaps for furrow blocks or for vehicle access.

Tractor-attached disc or mouldboard ploughs (single or two-furrow) with hydraulic control are possibly the best equipment for contour furrow construction on steep slopes. They can be controlled with great accuracy, and also enable the furrows to be put in on very steep slopes where the pull of a wheeled implement when turning would make the work too dangerous.

The standard six or seven-foot grader ditcher has been used much for contour furrowing in this State. This machine is reversible and has not the disadvantage of "empty" trips necessary with most ploughs. However, an operator for the ditcher is required and usually it will make good furrows only on moderate slopes.

LAYING OUT OF CONTOUR FURROWS

Surveying of Contours.

Contour furrows are always laid out as near to level as possible, and Soil Conservation Service workers use a surveyor's Dumpy Level for this work. However, there are several types of home-made levelling devices which are sufficiently accurate for contour furrow surveys. The hose level as described in the September-October 1952 issue of this Journal (Leaflet No. 2014) is recommended as being very satisfactory for this work.

Where the land is fairly uniform in slope, the layout work may be reduced by surveying only every second or third furrow line. The tractor driver should be able to judge one or two lines between each pair of surveyed lines. If sufficient care is taken these lines should not vary much from the contour.

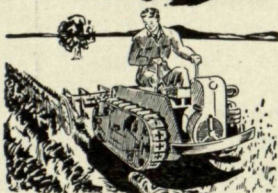
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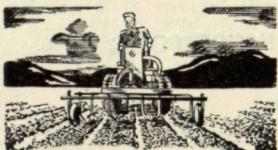
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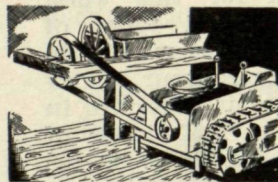
PLOUGHING, with single, two, or three furrow plough. Turns sharply, minimising headlands.



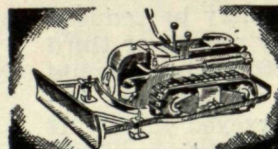
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Spacing.

The ideal spacing is such that each furrow will have sufficient capacity to intercept and hold the run-off water from the strip of land between it and the next furrow above, during the heaviest rain to be expected. It follows that if the furrows cannot be put in right to the top of the slope, a large capacity absorption bank will be required above the top furrow.

It is usual to make a furrow as large as possible, because the size of the furrow will determine its capacity to hold the run-off. The amount of run-off will depend on many factors, including the width of the strip above, the steepness of the slope, the grass cover and the soil type and physical condition of the surface soil.

In bare clay soils or powdery soils which normally absorb water very slowly, the furrows will need to be large and close together. In absorbent sandy soils with good grass cover the furrows can be more widely spaced.

In this State the spacing used is usually between 12 and 30 feet, depending on the above factors. Often the spacing will be partly determined by the size of machines likely to be used

for pasture renovation e.g. approximately one, two or three combine widths.

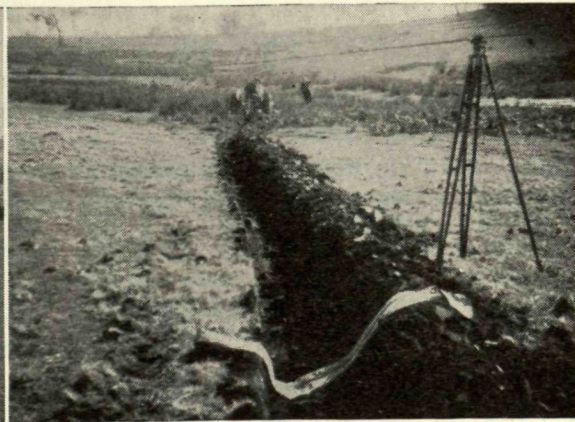
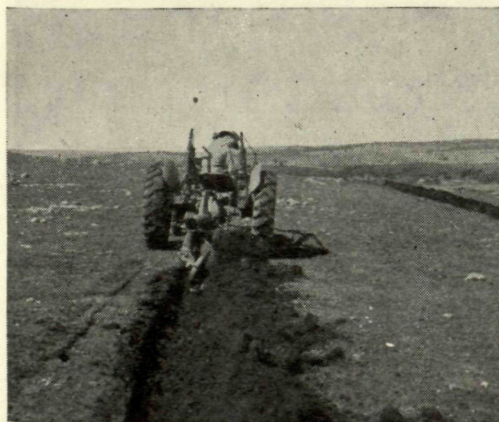
CONTOUR FURROWS IN THE EROSION CONTROL PROGRAMME

Contour furrows are often the first mechanical measures which need to be applied on many farms. They are applied to the steeper slopes which are usually the highest—and the erosion control measures should always be started at the top of the slope. Early treatment of a small problem area at the top of a slope will often prevent gullying of lower slopes. An expensive job of reclamation can thus be avoided.

Many farms already have implements which are suitable for the construction of contour furrows, and a limited amount of instruction on methods of layout and design will enable most farmers to make a start with contour furrowing.

By making a start with contour furrowing the farmer learns the principles of contour treatments before he attempts a more involved contour bank layout.

Any contour furrowing work completed becomes effective immediately. The degree of effectiveness will depend

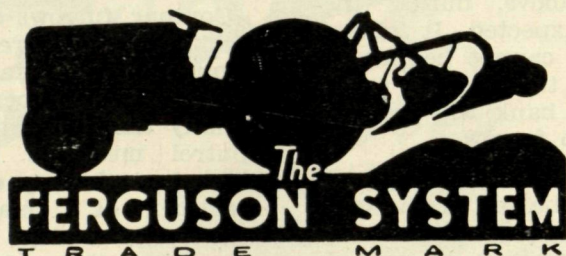


Left: Furrow made with tractor attached single furrow disc plough.

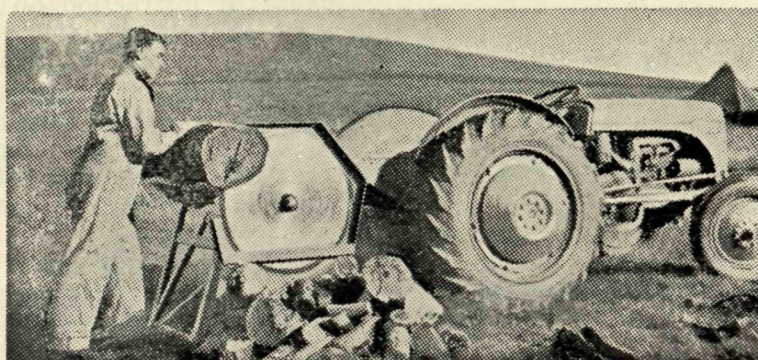
Right: Furrow made with tractor attached single furrow mouldboard plough.

It is usual to make the furrows as large as possible. It is only wise to consider the below ground capacity of a furrow. The small bank on the downhill side of the furrow is not likely to be effective for holding water for any great length. Even if fairly continuous the bank will soon be broken down in places by stock tracks.

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on the efficiency of the job, but there is little danger of causing further erosion damage as there is with poorly designed or inadequate contour bank systems.

POINTS TO REMEMBER

Don't Furrow Rilled Areas.

Contour pasture furrows should not be used on an area which is badly dissected with rills and gullies. The furrows would almost certainly have a succession of low spots and they would only serve to lead water into the gullies. To reclaim such an area the use of contour banks will be necessary.

Where there are a few small gullies in a pasture furrowed area, the furrows



Water still lying in a large capacity contour furrow three days after rain.

This furrow is in the powdery soil often associated with mallet timber. This soil usually absorbs water very slowly, and large furrows close together are necessary to hold the water until it can be absorbed or evaporated. This is the bottom furrow, but further down the slope a contour bank can be seen. This bank diverts all run-off from the problem area and prevents it from flowing down and causing damage to more productive lower slopes.

should not be made continuous across a gully. If constructed across a gully, the furrow should be blocked up well back from either side of it to prevent any water running from the furrow into the gully.

Block Furrows Frequently.

Even if there are no gullies in the area pasture furrowed, blocks should be made at intervals along the furrows. This will prevent water being led to a low spot in the furrow and should always be done to those furrows put in by judgment between two surveyed lines. It is most important with clean furrows as made with a disc plough or a grader ditcher. The desired effect is obtained most simply by lifting the plough or ditcher out of the ground for two or three feet about every two chains along the furrow.

Furrows need not be continuous—they can be broken at an obstacle (e.g. tree or rock outcrop) and started again the other side. If necessary a short furrow can be put in above or below the obstacle to cover the gap in the main furrow.

The ends of each furrow should be turned uphill for a few feet to prevent water running out of it. Careful maintenance of the furrows will be necessary especially after the first few rains. They should be inspected after any heavy rain and blocks put in where any weak places have become evident.

TRY SOME CONTOUR FURROWS ON YOUR FARM

If you have some sloping land which sheds water easily, try contour furrowing a small area at the top of the slope. This will soon give you an indication of the effectiveness of the furrows in controlling run-off and assisting pasture establishment.

Benefit to established pastures may be more difficult to measure on a small area treated with contour furrows. It will probably show up best with pastures making quicker growth after the opening winter rains, and staying green longer at the end of the season.

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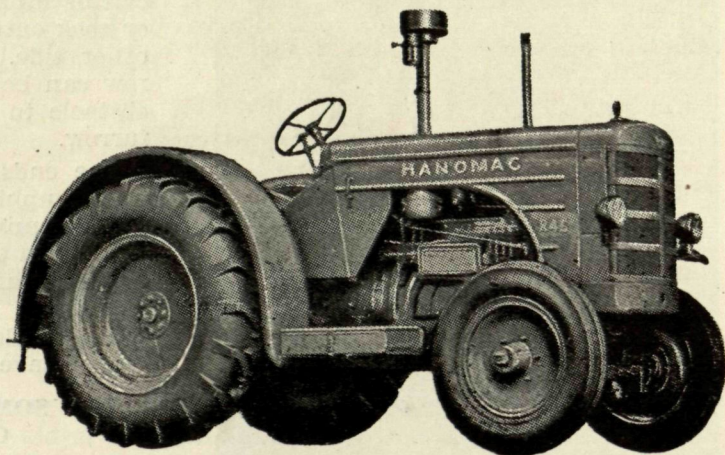
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