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Farm planning - 5. - Soil erosion control

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In the previous four articles on the subject of farm planning there has not been very much discussion of soil erosion control. Earlier articles have put forward the fundamental ideas that fences should follow natural boundaries and be related to topography. This method of fencing helps in the prevention of erosion because attention is paid to over-stocking, gateway erosion, cultivation, tracks and firebreaks. As well as the prevention of erosion the cure of erosion should also be considered.

There are several methods of controlling erosion and their use depends on the type or degree of erosion.

The growing of pastures is the simplest method of erosion control. Pastures reduce runoff by increasing the absorption of water. The plant material also reduces the speed of runoff and so lengthens the time water takes to reach water channels. This causes a reduced volume of flow and erosion control is made easier. Pastures can be improved only under conditions where grazing can be controlled, and grazing control is much easier in planned layouts which take into account water supplies and the different soil types.

Contour working and contour banks are the principal contour practices. Contour working is simplest; it involves working between guide lines which are level across the slope and nearly parallel. In unplanned fence layouts, awkward sections do occur, but in a redesigned fence layout the same areas can usually be contour worked quite easily. Contour working is often thought to be difficult by farmers with no experience of the method (see Fig. 1.)

The methods of subdivision mentioned in the last article on farm planning are based on fencing at right angles to the contour, along ridges and on the contour. This method of fencing automatically fits in well with contour working. Fencing along natural boundaries keeps fences out of the way of cultivation. While this may not constructively help to work on the

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**Fig. 1.—This contour working requires no contour banks. If fences are well placed there is no inconvenience in working on the contour. Rain which has just fallen is soaking into the soil right where it falls. Water cannot concentrate in amounts large enough to cause erosion or bogginess.**

**FARM PLANNING**

5.—Soil Erosion Control

By B. a'B. MARSH, B.Sc. (Agric.), Adviser, Soil Conservation Service
Soil erosion control by contour banks was made very difficult by the fences which have been marked in this photograph. These fences have no logical reason for their position and there are ample alternatives which would improve the layout.

Contour banks are used on land which has eroded, or is very likely to erode with normal farming. Their use is based on the principle that gullies cannot be safely filled or cultivated across unless water is diverted to a safe waterway. They enable cultivation on the contour right across a slope where normal cultivation can cause, or has caused erosion. Contour banks are ridges of soil about 18 in. high and extend with a slight fall right across erodible land. A bank may extend, say, from a rocky ridge on one side, to a grass covered waterway on the other side.

Access into each land can be most safely made around the high end and not around the waterway end of the bank. If fences cross a system of banks, access becomes a difficult problem (see Fig. 2), and for this reason, fences should not cross areas definitely in need of contour banks.

Fencing on natural boundaries, such as rocky ridges helps by keeping fences in areas where banks cannot be built. Fences on natural boundaries such as creeks and hollows, usually result in waterways being on the boundary of natural paddocks, so that these waterways are common to two paddocks. Banks can be discharged at these waterways and do not have to be taken through fences.

If large areas requiring contour banks have to be subdivided across the slope, it is most convenient to place the subdividing fence halfway between two banks and in straight stretches of about 5 or 10 chains, approximately following the contour (see Fig. 3.)

Waterways to guide excess water from the property should be grass-covered. Waterways are considered as natural boundaries when planning and if fences follow such waterways there will not be any reason to cultivate across them.
Fig. 3.—This contour fence is on a contour bank. There are minor disadvantages associated with erection and maintenance of the fence and the bank. Subdivision across the slope is probably best carried out with the fence half way between two widely spaced banks and built in straight sections of 5 or 10 chains so that it can be approximately parallel to the banks.

Fig. 4.—Though this trouble was caused by sheep travelling to badly-distributed watering points, removal and re-siting of fences is necessary to allow filling, protection and stabilisation.
If waterways are gullied, their eventual filling and healing should be kept in mind. A new fence plan could result in a gullied watercourse being no longer inconvenient and it might seem unnecessary to heal such a gully. However, in the future such waterways may be required to receive discharge from contour bank systems which are not obviously wanted at the moment. This situation could arise in the future if cultivation is carried out more intensively that at present.

In the next decade or two, the population of Western Australia and the world will be such that increased production will be essential. Increased production will almost certainly bring about intensified cultivation and this will require increased use of contour banks and their use in turn requires stable waterways. Though this situation may not arise for some time, it can take a long time to stabilise the drainage system on a farm, and it would also take a long time to re-fence to allow easy stabilisation of the drainage system (see Fig. 4). The sooner a start is made the sooner the farm can be made ready for any advances in agriculture.

To sum up, erosion control is necessary to maintain productivity now and to cope with increasing production in the future. Fence planning can not only help to prevent erosion from occurring but it can help in the cure of existing erosion.

6.—Replan Your Fences

In this Journal, previous articles on farm planning for soil conservation have discussed the necessity for planning from the point of view of topography, farm management, subdivision and erosion control. Most men on the land would agree, after reading these articles, that not only would a different fence layout be advantageous, but that in order to adopt it and all it involves, the farmer must work to a plan.

A large number of men in agreement with the basic ideas would have to shelve any thought of major planning on their properties because their fences are too good to consider their replacement in the next ten or fifteen years. Other farmers, however, who have fences in need of replacement must do something in the near
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The successful applicants then continue with Sub-Leaving, or higher studies, in 1959.

Before the course can be commenced students must have attained:

(a) Sub-Leaving Standard in English, Maths, A, Chemistry and Physics (including Magnetism and Electricity).

(b) Junior Standard Bookkeeping.

Should places still exist for 1960 commencement after the preliminary selection early in 1959, they are filled in order of application during 1959, by qualified applicants.

Some places still exist for 1959 commencement and are now being filled by qualified applicants, i.e., those who have or are now taking the correct course at Sub-Leaving or higher standard.

Duration of Course.—Two years.

Fees.—Approximately £130 per annum covering full residential charges.

Scholarships.—Department of Agriculture (3), the "Countryman," and J. J. Poynton Memorial (2).

Boarding Allowance.—Most Muresk students are eligible for the Education Department Boarding Allowance (£50 per annum).

Full details of the College are obtainable from the Principal, Muresk Agricultural College, Muresk, W.A., or the Department of Agriculture, Perth.
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future even if finances are difficult and these are the men who can derive most benefit from using some of the ideas put to them in these articles.

Another section of the farming community includes those with new properties now being developed. Basically the same ideas apply but they are more difficult to put into practice, because the owner knows practically nothing about the water supply position and also because there are no accurate maps of the property on which the natural features can be mapped accurately and above all, quickly.

There are many farmers now wanting soil conservation farm plans and there are certain to be more in the future. It is unlikely that the Soil Conservation Service will be able to draw up farm plans for all who ask and it is hoped this article will enable many to draw up satisfactory plans for themselves.

The following procedure for compiling a plan applies to farms with many fences in need of replacement; with gently undulating to steep land; or with widely differing land use types such as sandy country likely to blow, salt land, sloping country likely to wash, and other heavy land. The procedure is applicable to country which is used for grazing stock plus cultivation for cereals. It applies to practically every farm in the sheep and cereal areas.

PROCEDURE

A map is necessary and this should have marked on it with reasonable accuracy, all the existing fences.

A special trip must be made around the farm so that all relevant details can be marked onto the map. The mapped fences can be used for reference points to help map accurately the following:—water supplies, rocky ridges, permanent clumps or strips of trees, shade belts, etc., all salt or seepage areas, wind blown areas and erodible sandplain of 30 acres or more. All-weather tracks should also be marked if much difficulty is experienced on the farm in this respect. If all-weather tracks can be established fairly easily by grading and forming or by a small amount of gravel carting, tracks should not be marked in at this stage. Particular attention should be paid to the drainage pattern even up to the high country. All drainage lines should be mapped even if they only drain 50 acres at the head. Eroded or grassed depressions which can run small quantities of water in normal rains should be included.

While travelling around the farm, try to imagine that you are a newcomer seeing the erosion gullies and eroded tracks, firebreaks and farmyards for the first time. Find out how to cure all this erosion. Single gullies can be filled safely only if short spreader banks are built. Gully
systems need contour banks to divert water to safe waterways. Eroded farmyards can be stabilised by a circuit of formed roads. Isolated shallow washes caused by heavy rain on cultivated paddocks and shallow washouts along corner headlands can probably be cured simply by working on the contour. Most uneroded sloping land should be worked on the contour without contour banks.

The map will now show all the features and fences which make cultivation difficult. Transfer, by tracing or carbon paper, all the mapped details except those fences needing renewal within 15 years. This second map will appear to be less cluttered now that the fences have gone and the clear areas between lines are called natural paddocks.

At this stage, the other articles in this series should be studied so that a clear idea of the principles will be fresh in mind.

A general look at the map will show many natural paddocks, some small, some in need of subdivision and others ideal in size: these should be left as clear as possible of fences. Concentrate on one corner of the property and try to determine an ideal paddock layout keeping in mind the size of paddock you require, and all the other factors, but mainly water supplies. If a section seems too difficult, leave it for a while and concentrate on another section. Don't be put off by crooked fences as these will be less trouble in the long run than fences cutting across clear or open country. If an area has no definite problems and no obvious best subdivision, leave the fences where they are. Refer frequently to the other Farm Planning articles particularly Number 4 on Subdivision.

After an hour of fairly heavy concentration a pattern will emerge and finishing off will be much easier as with a jig-saw puzzle.

Where it is impossible to arrange for existing water supplies to water all paddocks reasonably cheaply and easily, think seriously about the possibility of sinking an earth tank near the most needy paddock regardless of catchment, and then use contour banks or a roaded catchment to fill it.

When the paddock layout is nearly complete, the whole plan should be studied to make sure that there is easy access into all paddocks and that movement of sheep will not be prevented anywhere by a particular paddock being in crop. Plan eventually to have graded roads on the main access routes to all paddocks. Such roads will increase efficiency, assist erosion prevention and will also serve as firebreaks.

The completed plan, which should be copied onto durable paper and kept safely,
might be so different from the original and made up of so many crooked fences, that it might run the risk of being discarded right away. The improved water supply plan, however, might look promising enough to make it worth a try. If misgivings are set aside and the plan used as a working plan, the advantages will make themselves felt as time passes.

NEW LAND

The procedure just outlined obviously requires detailed knowledge of the property; new land needs a different approach.

An approximate plan can be made to include the main waterways or creeks in the property, any extensive rocky ridges and also boundaries of light and heavy land and perhaps areas likely to go salty. To go into more detail will take too much time. This plan of the main features will show several, probably large, areas which are clear on the map and bounded by these natural features. Clearing should be carried out within these large natural blocks and they should be fenced close to the natural features marked. As these natural blocks are developed, the farmer can become familiar with the property and by the time it is cleared and under pasture the more detailed planning can be commenced. It is very unlikely that the original fences will be unsatisfactory as they will be usefully placed.

SUMMARY OF SERIES

The six articles on farm planning which have appeared since the January-February (1958) issue of the Journal of Agriculture of Western Australia have dealt with; 1. The need for Planning; 2. Grazing and Fences; 3. Natural Cultivation Boundaries; 4. Subdivision; 5. Soil Erosion Control and this 6th article on the method of planning.

Farm planning is a broad field and takes in stock planning, crop planning, pasture planning, machinery planning, economics and in fact every one of the many fields in which every farmer must be an expert. This series might appear to deal with nothing more than fence planning, but this is only because many different aspects of soil conservation and erosion control are affected in so many ways by the arrangement and relative permanence of fences. Management methods, for instance, can be altered from time to time to fit in with soil conservation requirements but fences cannot easily be changed from time to time and much thought must go into their planning.
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