Controlled traffic farming

When a paddock is trafficked in the traditional manner by a variety of tractors, harvestors, implements and trucks with different wheel spacings, a considerable amount of soil compaction and inefficiency occurs.

Controlled traffic farming (CTF) is a system where all field traffic including the harvester is restricted to permanent wheel tracks referred to as traffic lanes or tramlines. The wheel tracks enable equipment with compatible wheel spacings to travel across a paddock using the same path for each operation. Global Positioning Systems (GPS) are often used to steer the machinery and keep it on the precise track.

CTF began in Queensland in the early 1990s. It has mostly been applied to broad acre cropping areas but is also being adopted in sugar cane and horticulture.

Advantages of CTF

When combined with zero tillage, the advantages of CTF include:

- less overall compaction (especially when paddocks are trafficked in a moist condition)
- more porous soils allow movement of water, air, plant roots and soil organisms, producing healthier plants and higher yields
- more efficient farming operations resulting in minimal overlap and longer runs and a reduction of fuel, seed, fertiliser and chemical usage by up to 25 per cent
- energy savings due to minimal overlap and tyres moving on ‘permanent’ compacted wheel tracks and tynes working in uncompacted soil
- less greenhouse gas emissions.

Contour banks and CTF layouts

Contour banks assist in the control of erosion on sloping land by intercepting runoff before it concentrates and diverting it to a grassed waterway. This becomes more important in seasons when there is minimal ground cover.

Most contour banks are not parallel, which leads to inefficiencies and compaction when working on the contour between contour banks. It is now a very common practice for farmers on land slopes below four per cent to work their paddocks by going over contour banks parallel to a fence line—a practice referred to as ‘tramlining’. It should be noted that many of these farmers are doing this for convenience; they may not have adopted a fully matched CTF system.

When working a paddock parallel to a fence line as shown in Figure 1, the direction of wheel tracks and planting rows in relation to the slope will vary considerably. In parts of the paddock, tracks will be virtually up and down slope, whilst in other areas they will be generally across the slope. This means that any runoff flowing along the rows and the tracks may concentrate and cause erosion in various parts of the paddock. If very wide contour bank spacings are used, the above problem will be accentuated. Drainage lines that have been eliminated by contour banks (‘contoured out drainage lines’) will have a particularly high risk of erosion.

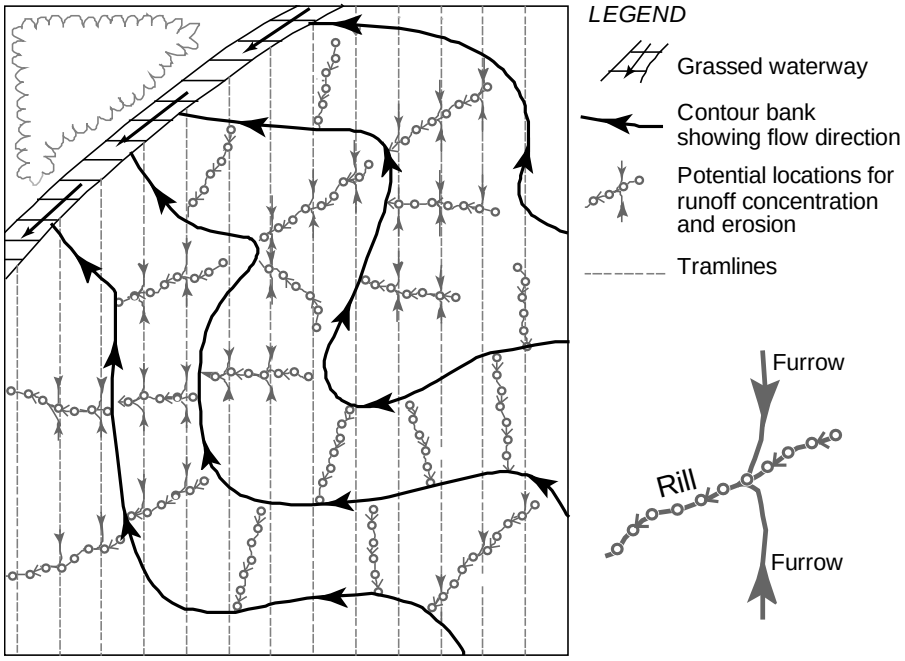

Figure 1 Tramlines parallel to a fence line create runoff concentrations and erosion.

CTF layouts on sloping land

The aim of CTF is to keep runoff in the same wheel track or crop row as it flows downhill to avoid the concentration of runoff which leads to erosion. Wheel tracks and crop rows will discharge their runoff evenly along the entire length of contour banks. With traditional contour cultivation, runoff is usually discharged into contour banks by rills. The resultant silt ‘slug’ can lead to waterlogging in the contour bank channel and bank failure may occur where banks are below specifications.

To avoid the situations that occur in Figure 1, a CTF layout needs to be designed with the following principles in mind:

- wheel tracks and crop rows should be as close as possible to 90 degrees to contour banks. Lower angles down to 45 degrees may be acceptable provided there is no significant rilling in the paddock
- herringbone layouts should be used on water spreading areas such as ridges (divergent drainage)
- additional waterways or drains may be required where runoff concentrates (convergent drainage).

Figure 2 provides an example of a CTF layout on a 2 per cent land slope. This paddock already had contour banks which directed all runoff to the waterway on the edge of the paddock. Two additional waterways have been added to accommodate convergent drainage.

The layout has two herringbone patterns and the layouts pivot on headlands on ridge lines and either side of waterways. Access tracks could be incorporated into the headlands as shown in Figure 3.

Runoff from wheel tracks and furrows must be able to flow into either a contour bank or a waterway. In some cases it may be necessary to construct spur banks between contour banks as shown in Figure 3.

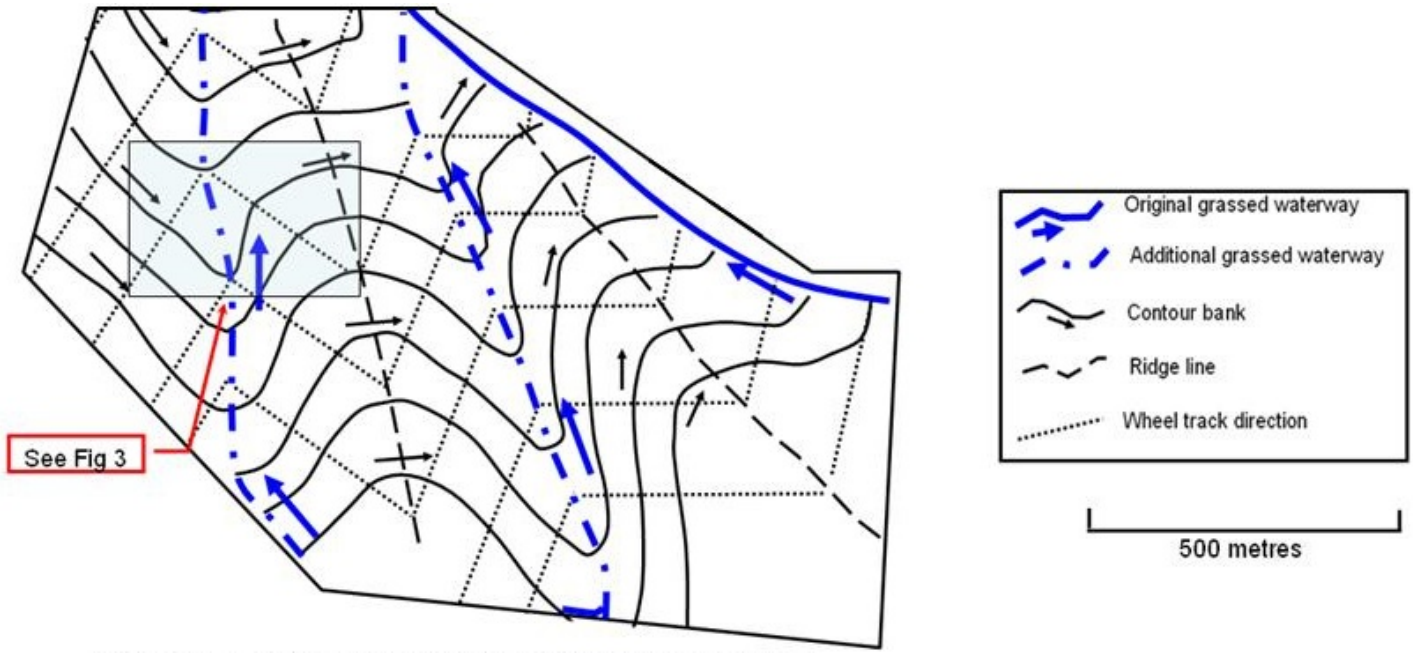

Figure 2. A CTF layout with two herringbone patterns

These banks direct runoff into waterways through gaps in the waterway bank. Runoff directed to the waterway would cause erosion if it was not allowed to enter the waterway via the spur bank.

As machinery traversing contour banks can reduce their capacity, it is important to monitor them regularly and to carry out maintenance when required.

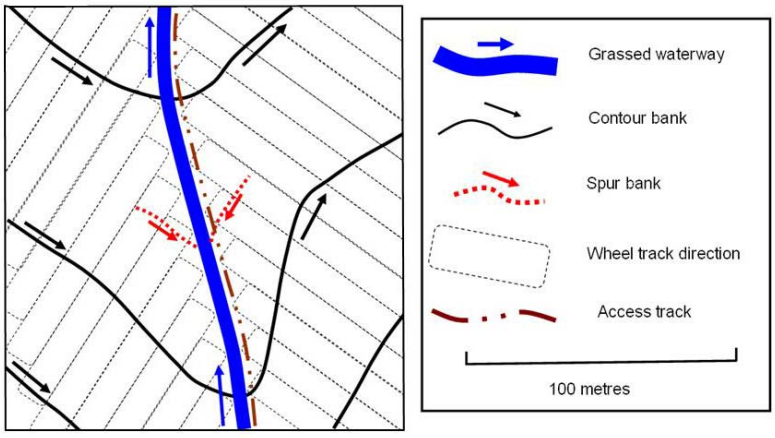

Figure 3. A contour bank layout showing two spur banks to allow runoff from downslope wheel tracks and furrows to enter the waterway.

CTF layouts on floodplains

Strip cropping (Figure 4) is used on parts of the Darling Downs floodplain subject to erosive flooding. Since strip cropping is carried out in parallel strips it is compatible with CTF.

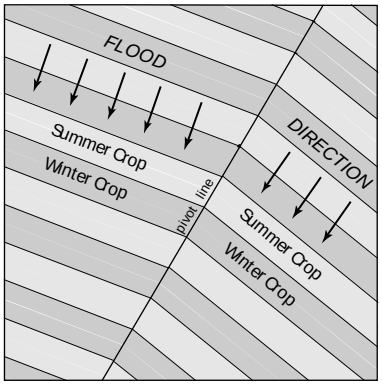

Figure 4. Strip cropping layouts are CTF compatible

Further information

This and other science notes are available from the Queensland Government website www.qld.gov.au – search 'science notes'. For further information about this science notes series phone **13 QGOV** (13 74 68) – ask for science notes – Land series L146.

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