No-till and pastures

Farmers are very familiar these days with no-till planting technology for grain crops. No-till, or zero-till planting technology allows for better management of fallow systems through stubble retention and not exposing soil surfaces to the elements. No-till planters for pastures however, are not as widely known or used as they could be. They are new, relative to no-till planters for cropping systems, and are essentially an adaptation of the cropping technology to planting pasture seed. No-till pasture planting has the same benefits as with crops, as pastures can be planted into crop stubble, or even planted into a sprayed out weedy fallow.

Modern subtropical perennial pasture species, such as Bambatsi Panic, Green Panics, Rhodes grass, Consol Love grass and various winter-active sub clovers, form an important part of the various livestock industries of the Northern Tablelands and slopes. These grasses are robust, very deep rooted and aid in the development of deep moisture storage and nutrient access by improving soil structure in well managed grazing systems. The improved pasture grasses however, are difficult to establish using conventional planting techniques.

Most of the improved subtropical pasture grasses have particularly small seeds and must be sown within a millimetre or two of the soil surface. Traditional “plough and plant” approaches to pastures leave a soil structure unsuitable for the establishment of modern subtropical improved pasture species. Traditional planting technology also tends to sow pasture seeds too deeply to survive. A ploughed fallow will dry out rapidly in the critical top few millimetres and will have poor surface structure. Young seedlings are initially too weak to establish in such an environment.

Case Study: ‘Pineleigh’, Delungra

John Gunther has been farming in the district since 1986 when he began operating two properties, one near Glen Innes and his Delungra property, ‘Pineleigh’. John’s main operation has been sheep and cattle with some cropping. When John first purchased ‘Pineleigh’ it had a long history of heavy cropping and grazing. It had very poor fencing and water infrastructure. Contour bank systems had failed and surface water was not getting to dams on the farm. There was sheet erosion and serious compaction problems across the property.
‘Pineleigh’ is located in the upper reaches of the Myall Creek sub-catchment of the Gwydir River. This part of the catchment is characterised by broad plateaus consisting predominantly of undulating basalt hills and has a long history of cultivation. As a consequence, soils often have poor surface structure and sheet erosion is particularly common. John started thinking about changing his farming practices about 5 years ago to address these issues.

**Soils and soil types at ‘Pineleigh’**

John says that all of his soils are “black basalt” or “red basalt” soils that should be more productive than they currently are.

Soil landscape maps, which include ‘Pineleigh’, show that most of the soils in the flatter lands are dominated by Black Vertosols (Black Earths) and have a very high land capability and production capacity. ‘Pineleigh’ also has small areas of sandier materials on conglomerates which are rapidly responsive to rain, yet have poor long term moisture storage, as well as some steeper lands which are rocky and difficult to manage for pasture production.

Management of this range of soil environments presents a challenge, particularly for planting and maintaining pastures, as each area has its own set of challenges.

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**Table: Soil landscapes, landscape processes and descriptions and resulting soil types.**


<table>
<thead>
<tr>
<th>Soil Landscape Name</th>
<th>Dominant Processes</th>
<th>Dominant Soils</th>
<th>Qualities and Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bannockburn Plain</td>
<td>Erosional, gently undulating long tertiary basalt flow benches. Slopes 0 to 4%</td>
<td>Dominated (&gt;80%) by deep self-mulching Black Vertosols (Black Earths). Minor Grey Vertosols, Ferrosols</td>
<td>Localised high run-on, widespread productive arable land, localised rock outcrop, localised shallow soils, widespread sheet erosion, rural land capability III.</td>
</tr>
<tr>
<td>Blackfellows Waterhole</td>
<td>Erosional, undulating to rolling low hills and rises on Conglomerate. Slopes 5 to 15%</td>
<td>Mostly shallow soils such as Lithosols (Rudosols) and Earthy Sands (Tenosols)</td>
<td>Widespread poor moisture available, localised rock outcrop, widespread shallow soils, localised steep slopes, rural land capability VI.</td>
</tr>
<tr>
<td>Carters Mountain</td>
<td>Colluvial. Steep to precipitous upper slopes and scarps of basalt. Slopes 20 to 135%</td>
<td>Very shallow Lithosolic Clastic Rudosols (Lithosols) with minor Haplic Brown Dermosols (Prairie Soils).</td>
<td>Localised gully erosion, localised mass movement, localised productive arable land, widespread rock outcrop, localised shallow soils, localised sheet erosion, widespread steep slopes, rural land capability VI.</td>
</tr>
</tbody>
</table>

Note that rural land capability runs from I (best) to VII (poorest land for production and erosion control).
John’s plan for better soil management

The long history of cultivation and poorly managed grazing on ‘Pineleigh’ has resulted in low groundcover, a predominance of unpalatable pasture species and weeds. Soils were often structurally degraded and “just are not storing water the way they should be”. John wants to reduce cropping as much as possible for cost reduction and moisture conservation reasons, getting rainwater to penetrate deeper into the soils, so that pastures produce longer. John hopes that this will increase the drought resilience of ‘Pineleigh’.

Ultimately, his aim is to keep most of the property under improved pastures, whilst continuing with a smaller area of predominantly fodder cropping, in rotation with improved pastures when re-establishment of pasture or weed management is required.

John has been addressing the issues on his farm through the following practices:

• developing more controlled grazing techniques;
• dividing the property into smaller, more manageable paddock sizes;
• allowing longer rest and recovery periods for pastures;
• better planning and location of watering points; and
• reducing or rotating cropping land through pasture rest phases using a no-till pasture planter.

Farm Planning Assistance

John participated in a farm planning course and with financial assistance purchased a versatile no-till planter which can be used for both crops and pastures. John already has about half of his older cropping area in improved pastures, though his plan has been hampered by dry weather. Despite this, the areas that were put into pastures early in his project are now under high grass cover.

Species include Rhodes grass and Premier Digit. John has been using Burgundy Bean as a legume, but aims to include a greater variety of winter active legumes into the mix. He has recently sown some Bambatsi Panic and Rhodes grass into one of the rockier hillcrest paddocks on ‘Pineleigh’ but success has been limited due to the dry weather. Interestingly, there are still sturdy pasture plants which have managed to germinate in these extreme conditions.

How much did it cost?

Each hectare of pasture he plants costs John about $170. This includes soil preparation, cost of seeds, fertiliser and running the no-till planter. Financial assistance helped John with 40% of the purchase price of the no-till planter enabling him to address the pasture planting issue about 3 to 4 years ahead of his original schedule.

Ongoing costs include fertiliser, attention to soil nutrition and soil health and maintenance of new infrastructure such as fences and stock watering systems.

Impacts on the greater catchment

Improved groundcover on ‘Pineleigh’ through establishment of improved pastures, reduction of cropping areas, the change from cultivation to no-till planting and better grazing management, are all practices that improve or maintain soil health. Also, run-off from ‘Pineleigh’ will be greatly reduced and less flashy, washing less sediment into Myall Creek and the Gwydir River when heavy rain occurs.

Improved groundcover and greater root depth from the species selection means that soil structure will rebuild over time. Soil moisture will be able to penetrate the soil and be stored rather than run off. This greater use of the soil profile also means that soil nutrients can cycle more easily and produce more vigorous, healthy pastures. John says, “healthy soils and healthy plants are more resilient to climatic extremes and produce better livestock as well”.

John’s no-till planter.
Photo: SoilFutures Consulting Pty Ltd, 2010.
Reflections

John has learned a few valuable lessons along the way. He says that if he was to go back and buy the planter again he would get a disc planter rather than one with tines owing to their versatility on rocky ground. He finds that the tines he uses tend to get stuck in rocky areas and fling rocks without ensuring good seed to soil contact. When the time comes, he will change his tines for discs and this should improve the planter to soil contact and precision of sowing.

John has also found, particularly in his redder soils (the Ferrosols), that using no-till sometimes doesn't work on its own and that he has to break the surface up a little bit to get establishment. This is possibly because the mulch load or groundcover levels were lower and these soils tend to be hard-setting or surface crusting, which does not give good seed to soil contact with the one pass that the planter is designed for. This should improve over time as groundcover and biological activity of soils improves. John also smiles and says, “you can’t grow anything at all without rain”.

Final comments

John is very keen about better management of pastures and is always looking to improve what he does through keeping up to date with knowledge on pastures by observing their performance on his own property, attending field days and reading.

John says that his erosion control through repair of contour banks, fixing gully heads (the most vulnerable point of a gully) and waterways, paddock subdivision, more sustainable grazing management, and good pasture establishment technique with his new planter, helps him make the most of his soil and moisture resources.

As with many farmers, John wants to leave his property in a better and more productive condition than when he purchased ‘Pineleigh’. He hopes that the changes he has initiated and ongoing better management will ensure that this is the case.