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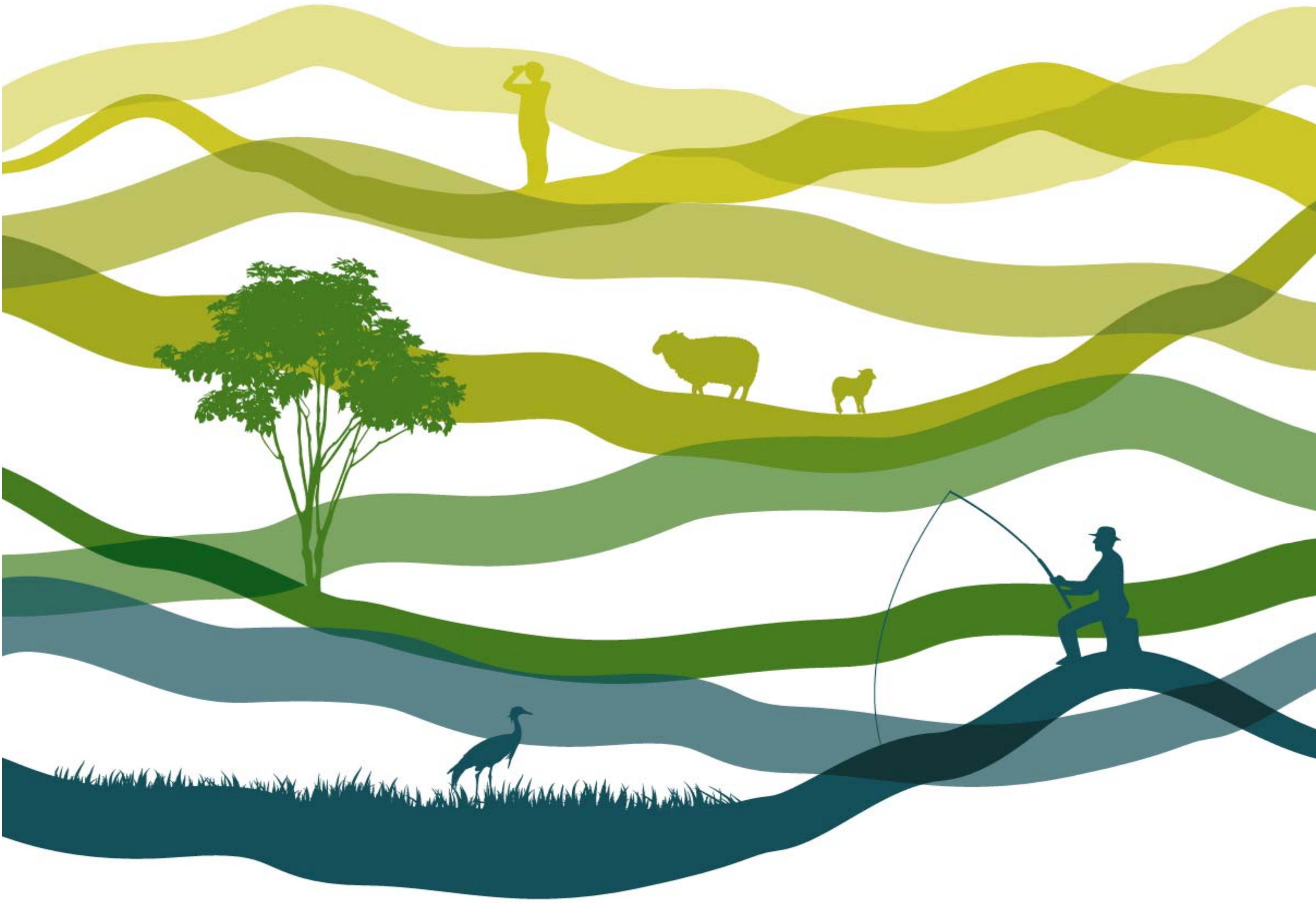
BESTWOOL BESTLAMB

GOULBURN BROKEN CATCHMENT MANAGEMENT AUTHORITY



Project Summary – Subsoil Manuring Demonstration Trial

This project is jointly funded through the Goulburn Broken CMA and Australian Government.

Healthy, resilient and increasingly productive landscapes supporting vibrant communities.

Project:	Subsoil manuring demonstration trial
	Summary prepared February 2015
Location	Katunga, Victoria
Organisation	SoilCare and Soil Health Bestwool Bestlamb group
Contact	Greg Bekker 03 5761 1631 greg.bekker@ecodev.vic.gov.au
Fund source	GB CMA SoilCare Small Project Grants 2013-14
Year of demo	2012-2015
Objectives	• To increase crop yield in first year by 50% and fodder (mainly Lucerne) yield in subsequent years by 50%. • To improve soil water, nutrient and carbon cycling. • To improve soil carbon and thereby soil water holding capacity, CEC (cation exchange capacity), biological activity. • To reduce the amount of irrigation water used. • To remediate the hard pan often found in irrigation paddocks at about 20-30cm, and prevent, or at least prolong, it coming back.
Basis of trial	Plot research of subsoil manuring on a Sodosol has shown an average increase in crop production of 50% with lasting effects. This trial tests the efficacy of the practice at farm-scale. We expect it to enhance ecosystem functions vital for farm resilience to climate change by improving soil water, nutrient and carbon cycling. Generally, subsoil manuring uses a machine to rip a band of manure to about 40cm deep in hostile soil. This project took advantage of laser grading work on the property. In laser grading the topsoil is removed, the site leveled with a fall gradient and the topsoil replaced. This trial took the opportunity to spread chook manure at 20t/ha on the site before the topsoil was replaced. The farmer attended a field day looking at subsoil manuring at a sister-project site (see Costerfield Subsoil Manuring Demonstration Summary). The results of the trial work presented highlighted the potential of subsoil application of organic matter in improving subsoil physical properties, that is, the porosity that allows for air and water movement, and therefore carbon, nutrient and water cycling at depth. Improving soil properties at depth should improve rooting depth and penetration, allowing roots more access to water, as well as nutrients. The farmer hoped that better access to water would reduce the volume of irrigation water required for perennial pastures into the future. He also wondered if increasing organic matter and root activity at depth could prevent the re-establishment of the clay hard pan (compacted layer) typical of irrigation bays.
Treatments	The demonstration includes one replicate of two treatments: 1. Control 2. 20t/ha chicken manure - spread at approximate depth of 20-30cm. Manure was incorporated to a further depth of about 45cm through ripping. The topsoil was then replaced. Manure spread 10 October 2013 on full irrigation bay.
Measurements	Soil chemical test Soil bulk density Dry matter production kg/ha Grain yield Watering quantity, duration and frequency recorded for treatment 1 and 2.
Results	Data collected to date includes soil chemical properties, sowing and germination results, pasture cuts to determine potential yield and feed tests to determine feed value. Irrigation dates and volumes have been recorded along with soil moisture measurements. Final yield (in tonnes of hay) was recorded in both treatment plots.

The data collected provided an interesting story and learnings. The under-sowing of Lucerne in a cover crop of barley worked well in the control bay but not in the sub- soiled chicken manure bay. Sowing and germination rates were similar between the bays, but once established, the barley crop soon showed signs of increased growth and tillering in the sub-soiled chicken manure bay which is no real surprise given the high nitrogen content (4.17%) of the chicken manure. Originally, the barley growth was seen as a good outcome, with the expected increase in yield looking promising. Pasture cuts showed a 20-30% increase over the control bay.
The paddock was not grazed because harvest options for off farm sale were being discussed. The barley went through to milky doe stage, when it was to be harvested as silage and sold to a nearby dairy farmer.
Feed tests undertaken 19 September 2014 showed some interesting results. The barley protein levels were 10.6% in the control bay and 22.3% in the sub-soiled manure bay. The metabolisable energy (ME; calculated) was 10.1 MJ/kg dry matter in the control and 10.9 MJ/kg dry matter in the manured bay.
The bays ended up being made into hay; 193 5x4 round bales were made across 8 bays (the same as the control bay), giving an average of 24.1 bales per bay. The control bay yielded 24 bales and the subsoil manured bay 25 bales. At 350kg per round bale no real yield difference was recorded in the end.
The big difference now is the number of established Lucerne plants in the control bay compared to the manured bay, with the control having many more established Lucerne plants. It is thought that the initial growth of the barley in the manured bay significantly reduced the establishment of Lucerne plants.
Monitoring is continuing.

Subsoil manured bay *Control bay*

Subsoil manured bay *Control bay*