Colebatch Farm Walk - *soil, salinity & water management*

10.00am - 3.30pm

Including Lunch

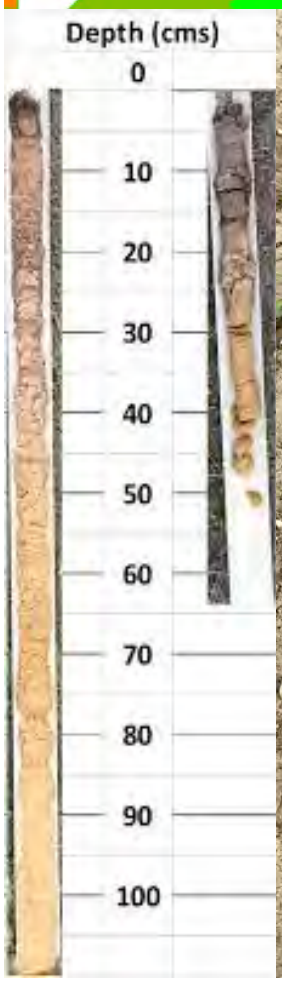
Tuesday 22nd September 2020

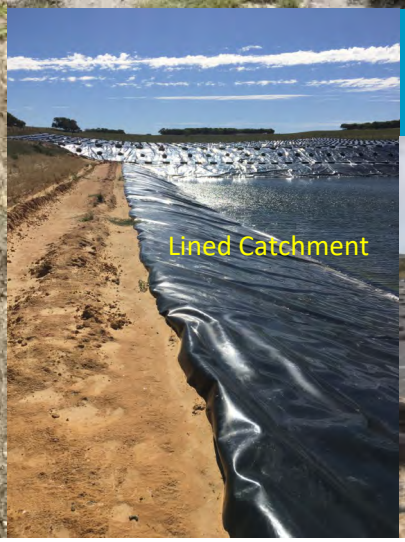
REGISTRATIONS & further info;
tstrugnell@coorong.sa.gov.au or
text on 0427 750 050
Register by Friday 18th of Sept

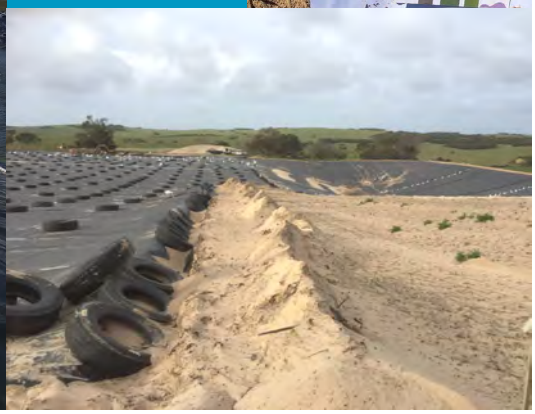
What you will see & hear?

Full program over the page

- Forage Brassica & Sorghum/Sudan Grass Cross
- Managing heavily clay spread ground
- Soil cores, pH & salinity testing across a range of sites to identify constraints
- Managing & reclaiming saline sites
- Visiting two Lined Catchment Construction sites







COORONG DISTRICT COUNCIL

Coorong Tatiara Local Action Plan

Government of South Australia
Limestone Coast Landscape Board

LANDSCAPE SOUTH AUSTRALIA LIMESTONE COAST

Government of South Australia
Primary Industries and Regions SA

Colebatch Farm Walk – ***soil constraints, salinity management, water harvesting*** **10.00am – 3.30pm including lunch**

Tuesday 22nd September 2020

Stop	Item	Speaker	Organisation	Location	Time	Page n#
1	**MEETING POINT** Pintrellen – Lake Ellen Pastoral *Car pool to site* **Forage Brassica & Sorghum Sudan Grass Cross** -Site clay spread with 400 t/ha several years ago -In field pH and salinity testing -Snail control	Jonathan Pietzsch Felicity Turner	Lake Ellen Pastoral Independent Adviser	1574 Gum Well Road	**10.00am** – *10.40am*	**3 - 8**
2	**Partially reclaimed saline area** -Discussion of soil cores across the site -In field pH and salinity testing -Cultivation, establishment ryegrasses, subclover, & balansa clover	Jonathan Pietzsch Felicity Turner	Lake Ellen Pastoral Independent Adviser		**10.45am** – *11.25am*	**9 - 21**
2	Colebatch Downs **Historic reclaimed saline area** -Discussion of soil cores across the site -In field pH and salinity testing -Tall Wheat Grass, Puccinellia, & emerging clover	John Wren Felicity Turner	Parish Rural Pty Ltd Independent Adviser	2236 Woods Well Road	**11.35am** – *12.15pm*	**9 – 21** **22 - 24**
3	Moon Lake – Shearing Shed **LUNCH**			2386 Woods Well Road	**12.30pm** – *1.15pm*	
4	Woods Well Station **Construction of Lined Catchment**	Will Snook Andee Martin Mark Scobie	Woods Well Station Coorong Lined Catchment Project	Woods Well Road	**1.45pm** – *2.30pm*	**25 - 34**
5	Cornish Pastoral **Construction of Lined Catchment**	Rob Cornish Mark Scobie	Cornish Pastoral Coorong Lined Catchment Project	Woods Well Road	**2.40pm** – *3.30pm*	**25 - 34**
	FINISH					

Key Chemical Properties of soils - *Soil pH and carbonates*

From Understanding your Soils Manual – Brian Hughes PIRSA Rural Solutions

Soil pH

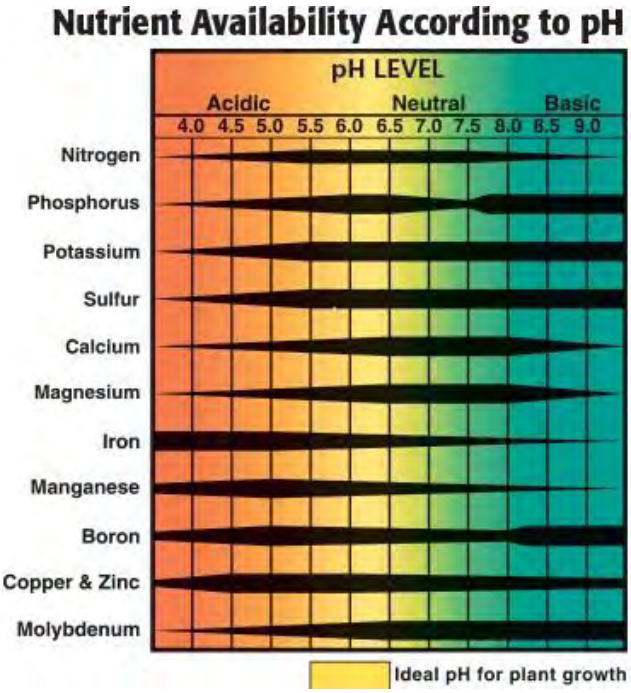
The pH of a soil indicates whether it is acid or alkaline which in turn provides an indication of nutrient availability. Soil pH can also affect the way in which agricultural fertilisers and herbicides react in the soil for example, sulfonylurea herbicides break down very slowly in alkaline soils compared to neutral or acidic soils. A field pH reading can provide an guide to a soil's acidity or alkalinity. Most agricultural plants prefer a pH of 6 – 8.5 (water).

Testing pH in the field

A field pH test kit gives a reasonably accurate (within 0.5 pH units) measurement to a laboratory pH($_{water}$) value but is likely to be between 0.5 and 1 unit higher than the laboratory pH($_{CaCl2}$) value. Kits are available in most hardware or garden stores, and will do up to 100 tests.

LEFT: Some commonly available pH field test kits

RIGHT: Nutrient availability according to pH



When using one of these kits, put some soil on the plastic card provided. Drop some indicator solution on the soil, mix it in then puff a little bit of the white powder onto it. The powder changes colour. Compare this colour to that on the pH card provided in the kit.

Interpreting pH results

pH test results from a laboratory will usually come back with two results: pH in water (pH_{H20}) and a reading where a salt (calcium chloride) has been added to the soil solution (pH_{CaCl2}). Measurement of soil pH is highly dependent upon soil moisture content and the pH(water) value will fluctuate depending on seasonal conditions. The addition of Calcium chloride to the soil solution can help reduce the variation in measurement and as such is a more accurate indication of the "true" pH of the soil. **pH($_{CaCl2}$) values are usually 0.5 to 1.0 units lower than pH($_{water}$)**

The pH scale ranges from 1 to 14 and is a measure of hydrogen ions in the soil – the more hydrogen the greater the acidity. Low pH values have high levels of hydrogen ions and are considered acid. High pH values reflect low levels of hydrogen ions and are alkaline (Table 5).

High pH levels (greater than 8.3) indicate the presence of toxicities such as sodium bicarbonate. Sodium is often associated with boron, so clays with a very high pH can be high in lime, salinity and boron.

Grasses (http://pasturegenetics.com/seeds/gras
Sub Tropical Grasses (http://pasturegenetics.com/seeds/sub-tropical-grasses/)
Forage Cereals (http://pasturegenetics.com/seeds/fora cereals/)
Brassicas & Herbs (http://pasturegenetics.com/seeds/bras herbs/)
Vetch (http://pasturegenetics.com/seeds/vetc
DOWNLOAD PDF (/SEED/SUBZERO-HYBRID-FORAGE-BRASSICA/?PDF=21
options (http://pasturegenetics.com/seeds/sprir options/)
Cropping (http://pasturegenetics.com/seeds/crop
Turf (http://pasturegenetics.com/seeds/turf/

Subzero Hybrid Forage Brassica

Brassica napus

Subzero is a hybrid brassica which provides greater flexibility in sowing and a significantly greater forage yield per annum than other rapes. Subzero can be sown in spring or autumn with potential to carry through winter. Subzero has a very rapid regrowth potential under suitable conditions combined with its ability to carry through to winter, makes it the premier cultivar of its type. Subzero has excellent regrowth after frequent grazings, making it one of the most persistent forage brassica cultivars while retaining leaf and stem quality with active regrowth throughout cool seasons, including frost periods. Subzero sown in autum can be utilised throughout the year, due to its cold tolerance, high production and palatability can be kept fo winter grazing with more reliability than many other forage brassicas.

- Leafy rape type – Kale x Turnip
- Subzero has the ability to withstand 0°C frosts and retain green leaf
- Early maturing 8-9 weeks but can be left until 13 weeks before grazing
- Multiple grazing with high yields

Seed agronomy table

Lifespan	
Min Rainfall (mm)	500
Seeding Rate	kg/Ha
Dryland	3
High Rainfall / Irrigation	5

Blends using this Seed

Summer Feed Blend (http://pasturegenetics.com/blend/summer-feed-blend/)
Brassica Blend (http://pasturegenetics.com/blend/brassica-blend/)
Spring Graze Blend (http://pasturegenetics.com/blend/spring-graze-blend/)
Spring Finishing Blend (http://pasturegenetics.com/blend/spring-finishing-blend/)

Enterprises for this Seed

Sheep
Beef Cattle
Horse

Strengths

- Vigorous summer growing fodder crop with excellent feeding value; high leaf: stem.

Limitations

- Sensitive to several common insect pests.

Plant Description

Plant: Leafy, plant 0.6-1.2 m tall; deep tap root, no bulb. Some varieties regrow to allow 1-3 repeat grazings.
Leaves: Large, flat leaves, 30-50 cm long and 20-40 cm) wide; yellow, cross-shaped flowers with four petals and all produce sickle shaped pods containing tiny round seeds.
Seedhead: Yellow, cross-shaped flowers with four petals; produce sickle shaped pods.
Seeds: Pods contain tiny round seeds.

Pasture type and use

Sown in spring adjacent to a run-off pasture to provide summer grazing in ~3 months time. Often used to provide weed control and soil preparation prior to renovating with perennial pasture. Also useful as a break crop after cereal.

Where it grows

Rainfall: >600 mm or irrigation
Soils: Tolerates a broad pH range. Rape is more tolerant of low soil fertility than other Brassica fodder species. Ensure MO and B not deficient.
Temperature: Some varieties are well able to withstand heavy frost and retain leaf.

Establishment

Companion species: Herbs: plantain, chicory.
Legumes: White clover, red clover.
Sowing/planting rates as single species: 3-4 kg/Ha. Sow shallow (5-10 mm) in a finely worked firm, moist seedbed, cover with roller/mesh. Suitable for direct-drilling. * ensure seed is Goldstrike treated.
Sowing/planting rates in mixtures: 1-2 kg/Ha. * ensure seed is Goldstrike treated.

LEFT: Forage Brassica on Pintrellen September 2020

Sowing time: From August through spring.
Inoculation: Goldstrike treated.
The use of Goldstrike XLR8 seed treatment is recommended to reduce damage from insects at seedling stages.
Fertiliser: Sow with ~20 kg P/ha as triple super or MAP/DAP. Ensure molybdenum and boron adequate. Molybdenum coated seed is available.

Management

Maintenance fertiliser: Nitrogen (50 kg N/Ha) maybe applied at 4 weeks.
Grazing/cutting: Graze when mature at 10-13 weeks-depending on cultivar; repeat grazings after a month's recovery. Where yield is high it is usually strip-grazed by dairy cattle along a long front - to minimise tramplir losses. A back fence may maximise regrowth. Use a maximum 33% of rape in the diet of dairy cows - 100% OK for lambs. Beef cattle OK up to 70%. Crops thin after each grazing. Allow access to pasture/stubble, hay/silage for fibre.
Major pests: Red-legged earth mite, slugs, aphids, cabbage moth, cabbage white butterfly, diamond black moth, cutworms, lucerne flea, wingless grasshoppers and leafminers. Insecticide coated seed is available tc aid establishment.
Major diseases: Rarely a problem. Varieties tolerant of clubroot and dry rot are available. Fungicide treated seed is available to protect damping off of seedlings. Susceptible to some viruses
Herbicide susceptibility: Glyphosate.

Animal production

Feeding value: Excellent - low fibre is associated with a high rate of digestion which facilitates a high intake ME approx 12 MJ/kg DM.
Palatability: Readily acceptable
Production potential: Up to 10 t DM/Ha where moisture is available and soil fertility is good.
Livestock disorders/toxicity: Vaccinate and drench before grazing stock on Brassica. Monitor stock frequently. Scouring, nitrate poisoning (especially if molybdenum is deficient and/or if overcast conditions prevail), red water and photosensitisation/rape scald may occur if grazed while immature.

Upper Murray Seeds®
Sow much better

Hybrid sorghum x sudan

Grow'nGraze
FORAGE SORGHUM

HIGHLY PRODUCTIVE HYBRID FORAGE SORGHUM

PRODUCT INFORMATION

Grow'nGraze is a highly productive blend of hybrid forage sorghum which grows rapidly and recovers quickly following grazing or cutting.

Key Features
Under favourable conditions, Grow'nGraze has the potential to reach 1 metre in height, just 7 weeks after sowing.

Plant Characteristics
• Hybrid Sorghum X Sudan

Grazing Management
Grow'nGraze will produce maximum feed quality and quantity with intensive strip feeding or rotational grazing. The most rapid recovery after grazing generally occurs if the crop is not grazed below a height of 15cm.

Feed Quality
• Digestibility 56-61%
• Protein 12-18%
• Ideal grazing height 1 metre

Seed Options
• Bare or treated seed is available

Seed Size
30,000-35,000 seeds/kg

Sowing Rates
• Marginal dryland 3-5kg/ha
• Favourable dryland 5-10kg/ha
• Irrigation or high rainfall 15kg/ha

Safer Sorghum Grazing
The young plants and leaves of sorghum/sudan grass contain prussic acid which decreases as plants mature. When plants reach 0.8-1m in height, the prussic acid content in reasonable growing conditions should not be dangerous.

These commonly recommended precautions for forage sorghums should be followed:

1. Delay grazing or feeding until plants are 0.8m tall either from the first growth following mowing or close grazing.
2. If crop development is stunted by drought or other conditions it should be allowed to recover before grazing or feeding.
3. Wait a full week after a killing frost to feed or graze the dry crop.
4. Provide sulphur blocks to stock.

v5 03/2019

AUSTRALIAN GROWN

PRODUCT INFORMATION

Upper Murray Seeds®
Sow much better

Guide to Production Potential

Good dryland or part irrigation	3-4 grazings per season	14 t/ha DM
Hay/Silage	3-4 cuts at 1.5m	14 t/ha DM

Measuring salinity

Salinity is the accumulation of salt in soil and water. High salt levels can adversely affect plant growth, soil structure, water quality and infrastructure.

High salt levels occur naturally in many parts of the Australian landscape but in many cases have been exacerbated where human activities accelerate the mobilisation and accumulation of salt.

Methods for measuring salinity

It is important to identify saline areas so they can be appropriately managed. There are a range of methods for measuring salinity. Two common ways are by using an electrical conductivity (EC) meter or by measuring how much salt is in a solution of soil or water.

An EC meter measures how much electricity moves through a solution—the saltier the solution, the more electricity moves through it and the higher the conductivity reading. EC can be easily measured in the field or in a laboratory. A wide range of EC meters are available, ranging in price and size.

Electrical conductivity can be expressed in different units—for soil, EC is measured in dS/m (deci-Siemens/metre), while water is measured in µS/cm (micro-Siemens/centimetre). It is important to always calibrate the EC meter before use.

Another way to detect salinity is by measuring how much salt is in a solution—this measurement is called total dissolved solids (TDS) or total dissolved ions (TDI). It is measured in units of mg/l (milligrams/litre) or ppm (parts per million). Higher readings mean more salt is present in the solution.

Measuring salinity in water

Salinity in surface water and groundwater can be easily measured in the field by collecting a water sample, inserting an EC probe into the sample and reading the value shown on the meter.

Alternatively, a water sample can be collected and forwarded to a laboratory for testing of salinity and chemical composition. The container should be entirely filled with the water sample to exclude air. Samples for laboratory analysis should be forwarded as quickly as possible. Delays and high temperatures will change the composition of salts in the sample, affecting the results. Typical salinity values for water are given in Table 3.

Measuring salinity in soil

EC is usually measured in the field using a 1:5 soil:water suspension (EC1:5), or in a laboratory using a soil saturation extract EC (ECse) or a 1:5 solution.

To measure EC1:5 in the field, put approximately 10 millilitres of distilled water, rainwater or tank water into a jar, container or tube. Add small soil particles until the contents of the container increase by 5 millilitres to bring the volume to 15 millilitres. Add additional water to bring the total volume to 30 millilitres. Shake intermittently for five minutes and allow it to settle for five minutes. Dip an EC probe into the solution and take a reading. Remember to wash the EC probe after using it.

The interpretation of EC values to determine soil salinity levels depends on the texture of the soil. Salts are readily dissolved out of sandy soils whereas salts are more tightly held by clay soils. This means that the same amount of salt will have a greater impact on sandy soils then it will on clay soils. As a guide, sandy or loamy

soils are moderately saline if EC1:5 is above 0.3 deci- Siemens/metre, and clay soils are moderately saline if EC1:5 is above 0.6 deci- Siemens/metre.

As the EC1:5 is measured on a diluted sample, a more realistic measurement of the actual salt levels that a plant will encounter can be measured on a saturated extract (ECse). This can be done by some laboratories. As a guide, soils are generally considered saline if their ECse is greater than 2– 4 deci- Siemens/metre.

Salinity tolerance ratings for soils are usually based on ECse values, rather than EC1:5. To convert EC1:5 to ECse, identify the texture of the soil, and use the guide in Table 1

Table. 1. Conversion of EC1:5 to ECse for a range of soil textures

Soil type	Multiply EC1:5 by
Sand	23
Sandy loam	14
Loam	10
Clay loam	9
Light clay	7.5
Heavy clay	6

For example, sand with an EC1:5 of 0.3 dS/m is equivalent to an ECse of 6.9 dS/m, while a heavy clay with an EC1:5 of 0.3 dS/m is equivalent to an ECse of 1.8 dS/m. Soil salinity classes are shown in Table 2.

Table 2. Approximate soil salinity classes

Salinity rating	EC_{se} (dS/m)	
Slightly saline	1.5—2	Salinity effects usually minimal
Moderately saline	2—6	Yield of salt sensitive plants restricted
Highly saline	6—15	Only salt tolerant plants yield satisfactorily
Extremely saline	>15	Few salt tolerant plants yield satisfactorily

Salinity tolerance of crops

As a general guide, salt tolerant crops include barley, canola, cotton, beetroot, soybean, wheat, olives and sorghum. Moderately salt tolerant crops include lucerne, tomato, cabbage, potato and carrots. Low salt tolerant crops include maize, sugar cane, celery, lettuce and pumpkin.

Table 3. Guide to typical salinity limits for waters. It is important to also check other water quality parameters (e.g. chemical composition, sodium adsorption ration, metals etc) before use.

		Electrical conductivity (EC)		TDS
		(µS/cm)	(dS/m)	(mg/l or ppm)
Distilled water		1	0.001	0.67
Rainfall		30	0. 03	20
Sewage effluent		840	0.84	565
Freshwater		0-1500	0-1.5	0-1000
Great Artesian Basin Water		700-1000	0.7-1.0	470-670
Brackish water		1500-15000	1.5-15	1000-10050
Upper limit recommended for drinking		1600	1.6	1070
Tolerances of livestock to salinity in drinking water (at these values, animals may have an initial reluctance to drink, but stock should adapt without loss of production)	Beef cattle	5970-7460	5.9-7.5	4000-5000
	Dairy cattle	3730-5970	3.7-5.9	2500-4000
	Sheep	7460-14925	7.5-14.9	5000-10000
	Horses	5970-8955	5.9-8.9	4000-6000
	Pigs	5970-8955	5.9-8.9	4000-6000
	Poultry	2985-4475	2.9-4.4	2000-3000
General limits for irrigation	Salt sensitive crops	650	0.65	435
	Moderately salt sensitive crops	1300	1.3	870
	Salt tolerant crops	5200	5.2	3485
	Generally too saline for crops	8100	8.1	5430
Salt water swimming pool		5970-8955	5.9-8.9	4000-6000
Seawater		55000	55	36850
Dead sea		110000	110	73700

Note: To convert from µS/cm to dS/m, divide by 1000. To approximately convert from µS/cm to mg/l, multiply by 0.67.

References

- ANZECC (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality. ANZECC and ARMCANZ.
- Charman PEV and Murphy BW (2007). Soils: Their Properties and Management, 3rd Edition. Oxford University Press, South Melbourne.
- Foth HD (1990). Fundamentals of Soil Science, 8th Edition. John Wiley & Sons, New York, USA.
- Price G (ed) (2006). Australian Soil Fertility Manual, 3rd Edition. CSIRO Publishing and Fertilizer Industry Federation of Australia, Collingwood.
- Salcon (1997). Salinity Management Handbook. Department of Natural Resources, Indooroopilly.

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 L137.

For further information about salinity visit < http://www.qld.gov.au/environment/land/soil/salinity/> or email soils@qld.gov.au.

Saltland Pasture Redemption

Tips and Tools for Identifying and Dealing with Saline Soils

REPORT PREPARED BY FELICITY TURNER FOR THE COORONG TATIARA LAP

Key Outcomes

- **Maintain groundcover at all costs; reduces evaporation, capillary rise of salt, and provides opportunities for micro-climates and plant colonisation.**

- **Know your soil salinity levels and choose an appropriate salt tolerant mix of species for remediation (some crops and pastures handle waterlogging, some don't).**

- **Seeding after a rainfall event that flushes the salt through the soil profile is important when remediating salinity affected sites.**

- **Diversity in the mix of pasture species being sown is important as it provides an opportunity for multiple species to find their fit on sites that can be highly variable in their levels of soil salinity and waterlogging.**

- **Neptune Messina was found to be a suitable species in the local environment (as part of a salt land pasture mix), providing the soil salinity threshold didn't exceed recommended levels (30 dS/m ECe).**

- **Prevention of dryland salinity is better (and often easier) than remediation.**

Background

The Coomandook Saltland Pasture Redemption Project was initiated by the Coomandook Ag Bureau in 2015 to investigate the application of new developments in the productive use of saline land across Coomandook / Cooke Plains area. The initial focus of the project was to assess the suitability of the salt tolerant pasture legume Messina as a potential species to remediate saline scalds and reduce the level of wind erosion and recharge to groundwater in these areas. The 'Saltland Pasture Redemption Project' broadened the scope to look at a range of species, methods and timing of establishment, the

PROJECT DETAILS

Project ID: 4-9GS7FPL

Funding Body

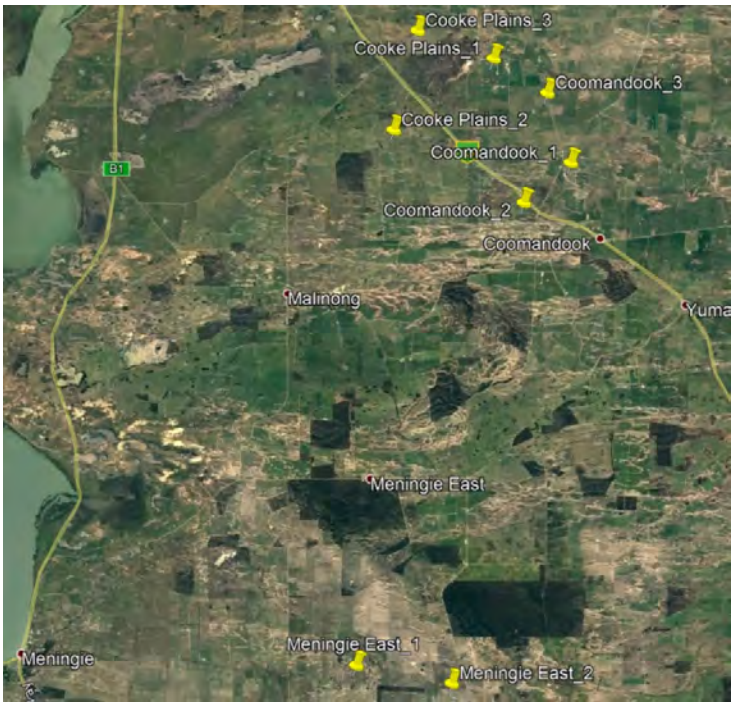
This project is supported by the National Landcare Program – Smart Farms Program, an Australian Government Initiative

Project Duration

2018-2020

Site Locations

Coomandook, Cooke Plains and Meningie East, South Australia (Various site locations)



use of groundcover and mechanical intervention methods to try and assist in the remediation of saline soils across the Coorong Tatiara Local Action Plan project area.

Sites were established in key areas where dryland salinity was occurring and have been monitored as either short term strategic sites, or longer-term demonstration sites. The location of these is shown in Figure 1.

Figure 1. Location of saltland redemption sites (2016-2020)

The local landscape

Parts of the Coorong Tatiara Local Action Plan project area have a high potential for dryland salinity formation due to being low lying in nature, and its proximity to the regional unconfined groundwater system drainage point into the River Murray Lower Lakes and Coorong. This is shown in the Digital Elevation Model (DEM) in Figure 2 where the red and orange areas are those that are less than 11.6m above sea level. Monitoring of piezometers within this localised area have found that groundwater levels respond strongly to changing rainfall patterns.

More information can be found in the 'Coorong Dryland Salinity Review: Improving Salinity Understanding – June 2019' which can be accessed here http://www.coorong.sa.gov.au/salinityreview

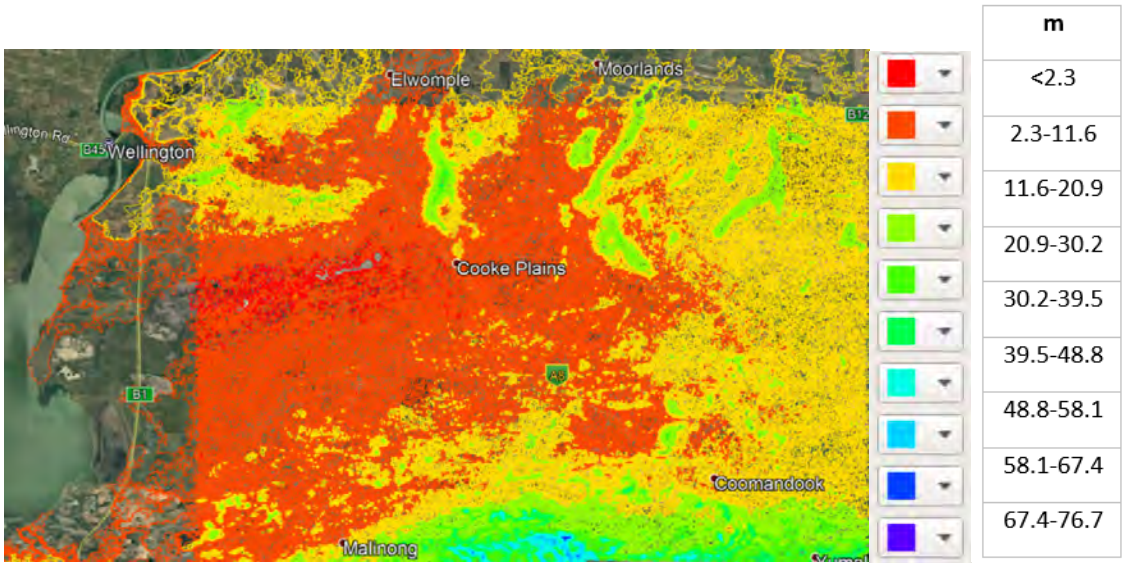


Figure 2. DEM of the Cooke Plains/Coomandook region (m above sea level)

Identifying areas that may be prone to salt scalds

As the water table below the surface rises, it brings with it dissolved salts to the root zone of crops, pastures, and native vegetation and potentially the soil surface. The first areas affected are often the low-lying areas within paddocks.

There appears to be two main processes occurring across the region leading to soil salinity;

- **Discharge -** where the water table intercepts with the ground surface creating an area that becomes waterlogged over a period of time
- **Capillary action** ('wicking') - where evaporation at the soil surface draws the water up through the soil. Capillary action is strongly influenced by soil type with water moving most easily through clay soils and less so through sandy soils making clay soils with a similar water table level more prone to salinity scalding.

Throughout the life of the project, various observations have been made by farmers around those areas that become saline over recent years. These include;

- **Annual Ryegrass (ARG) appearing in low lying areas**. This has largely been observed in cropping paddocks. ARG is much more tolerant of waterlogging than crop species and will often outcompete crops in wet conditions. The appearance of large patches in low lying areas (Fig.3) suggests that groundwater has risen within the plant root zone. If the ARG is controlled, it can leave the area largely bare and exposed increasing evaporation potential over the summer months. This is likely to result in an increase in the accumulation of salts at the plant root zone and soil surface.

Figure 3. ARG in a waterlogged area of a paddock

- **High biomass production in the year prior to dryland salinity appearing**. This has been observed in both crop and pasture situations (including Dryland Lucerne – Fig.4). The increase in biomass is thought to be due to the increase in available fresh water within the root zone (without the water actually reaching the surface) in that season. Fresh water is lower in density than saline water. Fresh water can sit in a lens on top of the saline groundwater. However once this fresh water source has been exhausted, the saline water is left behind. If the plants aren't tolerant to this saline water, they then die leaving bare exposed areas with the potential for increased wicking to occur.

Figure 4. Increased Lucerne growth in a low-lying area

Understanding Soil Salinity Levels

Knowing the soil salinity level of your soil is critical; particularly if you are looking to try and remediate the site by establishing pasture species.

Soil salinity is usually referred to as either EC 1:5 (where 1 part soil is mixed with 5 parts de-ionised water) or as ECe (dS/m) – an estimated amount of salt in the soil accounting for soil type.

Full methods for measuring soil salinity are available at:

https://www.publications.qld.gov.au/dataset/05c87bc5-6048-4767-85c8-36e660c38b1d/resource/6205ff5f-92b6-444b-95b7-f195fe4a64d6/fs_download/sn-l137-measuring-salinity.pdf

Soil sampling through a laboratory analysis is the most accurate way to determine soil salinity levels. Soil salinity levels across a paddock can vary greatly (Fig 5). In this instance it is probably worth conducting multiple tests.

The time of sampling can also impact results, with a sample taken at the end of summer most likely to show the maximum level of soil salinity. A winter sample is likely to show a lower result due to the flushing of salts through the profile from natural rainfall (see time of sowing below).

Figure 5. Variations in soil salinity across Coomandook site, 2018

Management options for Saltland Remediation

1. Varietal selection

There is a wide range of tolerance of different crop and pasture species to soil salinity as shown in Figure 6. The recently released salt tolerant legume Neptune Messina is adapted to winter-waterlogged areas where soil salinity in the top 10cms is 8-30 dS/m ECe in summer-early autumn. (https://www.agric.wa.gov.au/neptune)

Farmer demonstrations from 2017-2019 largely focused on the new salt tolerant (and waterlogging tolerant) pasture legume Neptune Messina (Figure 7a-c). It was assessed in different soil types and situations as both a stand-alone salt tolerant pasture, and as part of a saltland pasture mix where it's role was to add protein to the feed mix and to provide nitrogen to the system (all seed was inoculated with the salt tolerant Rhizobium strain for Messina).

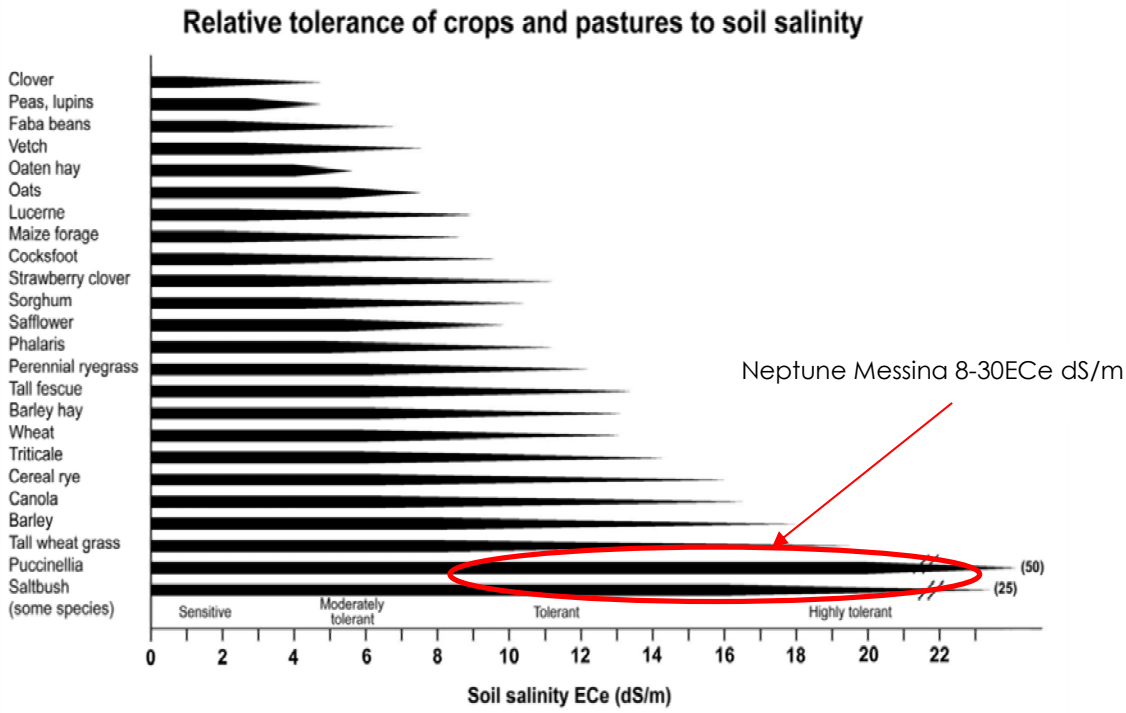


Figure 6. Relative tolerance of crops and pastures to soil salinity (Hermann, 1995)

Figure 7a – Messina establishment, Cooke Plains 2019

Fig 7b – Messina growing in waterlogged conditions, Meningie East 2017

Fig 7c – Seedling Messina, Coomandook 2018

Feed quality samples were taken from the Cooke Plains_2 site in 2017. This testing found that the Messina was comparable in feed quality to other legume species (Figure 8), however farmer experience has been that in larger paddocks with a mixture of soil types and pasture species the Messina can remain largely ungrazed but still provide valuable groundcover. In the absence of other feed sources, the stock will graze it.

Test	Messina	Nitro Persian	Balansa
Dry Matter (DM) (%)	12.3	10.9	7.8
Moisture (%)	87.7	89.1	92.2
Crude Protein (% DM)	32.7	26	25.3
Acid Detergent Fibre (% DM)	19.6	18.5	20
Neutral Detergent Fibre (%DM)	25	31	34.3
Digestibility (DMD % of DM)	82.9	80.5	78.1
Digestibility (DOMD) (Calculated % of DM)	77	75	73
Est. Metabolisable Energy (Calculated MJ/kg DM)	12.6	12.2	11.8
Fat (% of dry matter)	4.8	4.5	4.7
Ash (% of dry matter)	13.7	13.5	12.9

Figure 8. Feed test data (summarised), Cooke Plains_2, 2017.

Nodulation of the root system of Neptune Messina (Fig 9) was still evident in 2019 in a four-year old stand showing the ability of the rhizobia to survive in the hostile soils in the district.

The persistence of the Messina and Rhizobia over four years has shown the role that the Messina is likely to play in saltland pastures;

- As part of a diverse species mix (as opposed to a monoculture).
- As part of a mixed salt tolerant pasture sward providing maximum levels of groundcover and water extraction across the saline area.
- Providing the vital role of a salt tolerant legume (other than Balansa or Persian Clover) to provide nitrogen fixation in a salt tolerant pasture mix.

Figure 9. Nodulation of Messina, Coomandook, September 2019

2. Time of sowing

The time of sowing is critical in trying to remediate saline country. To improve the chances of plant germination, a 'flush' is thought to be required. In 2017-2018 this 'flush' wasn't received and there was poor germination across all sites. In 2019, exceptional germinations were observed on hostile, saline soils and the late time of sowing after the salts had flushed through the soil was thought to be the key difference driving this success.

Figure 10 shows the effectiveness of the rainfall events received 12-June 2019 at a nearby Coomandook soil moisture probe in pushing water down through the profile (taking salts with it).

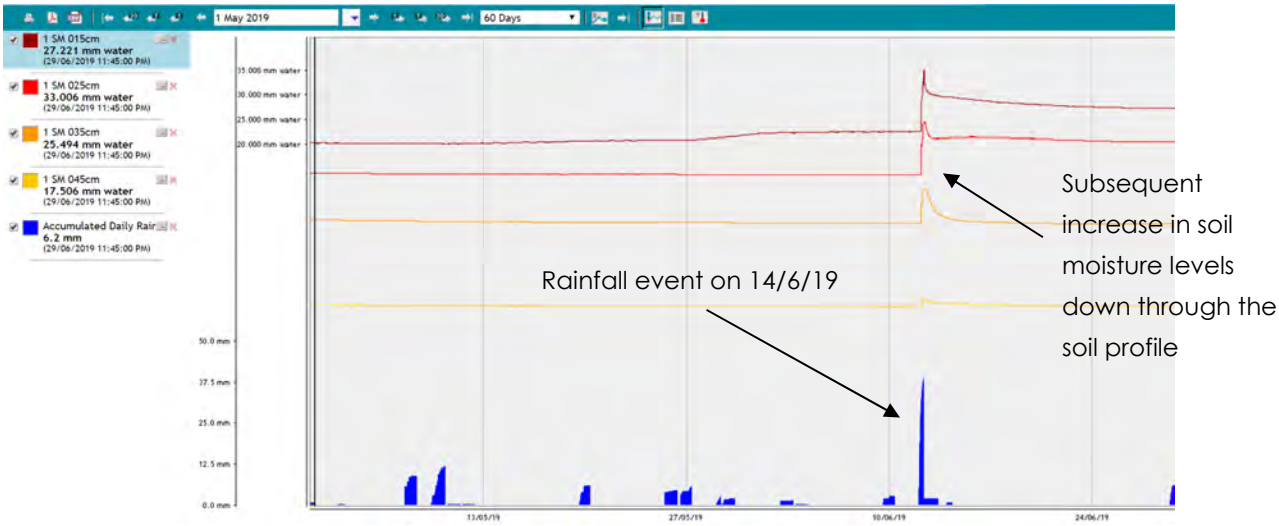


Figure 10. Coomandook soil moisture probe 1-May to 1-July 2019 (Data courtesy of SAMDB NRM Soil moisture probe network)

This is further supported by the Moorlands soil moisture probe data where the 2018 and 2019 data can be compared. In 2018 (Fig 11a) there was very little change in soil moisture levels from the 25-May to 25-June 2018, with the 50cm zone actually drying out further. This is in contrast to 2019 (Fig 11b) where there was an increase in the soil water through the profile down to 50cms.

Sensor depth	25-May	25-Jun	**CHANGE**
(cms)	mm water		
20	12.97	13.66	**0.69**
30	14.82	15.23	**0.41**
40	15.04	15.08	**0.03**
50	13.84	13.73	**-0.11**

Sensor depth	25-May	25-Jun	**CHANGE**
(cms)	mm water		
20	11.27	15.42	**4.15**
30	12.62	17.68	**5.07**
40	12.94	16.96	**4.03**
50	11.53	12.98	**1.46**

Fig 11. Moorlands soil moisture levels (a) 2018 (b) 2019
(Data courtesy of SAMDB NRM Soil moisture probe network)

3. Use of groundcovers and providing micro-climates

Throughout the life of the project, the areas where successful establishment of pastures occurred were those where there was evidence of groundcover (green or dead plant material) or areas where the surface was slightly elevated.

It is thought that retaining some level of groundcover over the summer period may assist in shading the area and reducing the evapoconcentration of salts in the soil over the summer period. In 2019-20, three sites were monitored to see if groundcover/shade over the summer period assisted in reducing the evapoconcentration. Soil samples were taken on 30-Jan 2020 prior to a rain event. The results are shown in Figure 12 where it can be seen that the groundcover appeared to reduce the soil surface salinity levels across all sites both at the soil surface further emphasising the importance of trying to retain groundcover to reduce the level of salt scalding.

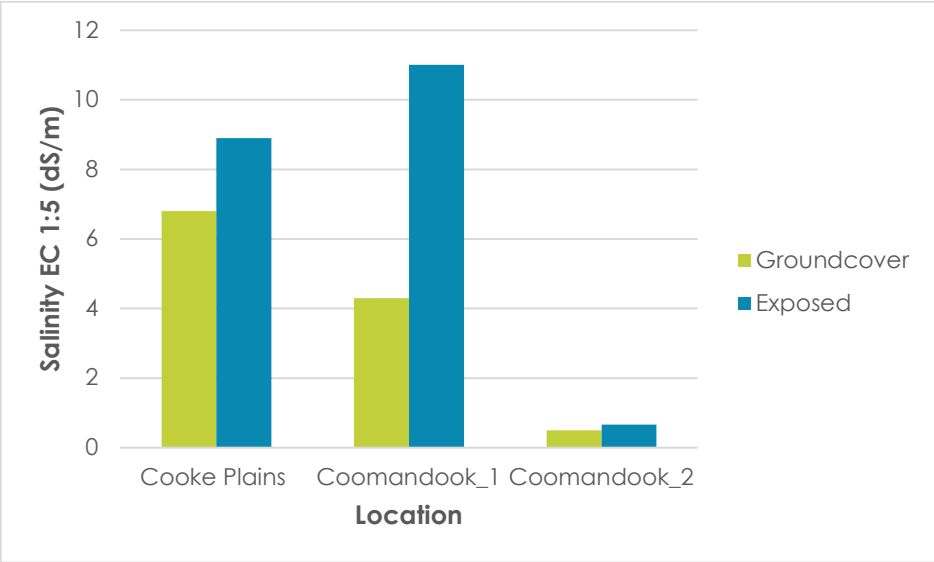


Figure 12. Impact of groundcover on soil surface salinity (0-10cms), 2020

This groundcover is also thought to provide a micro-climate for germinating plants. It not only provides an area that is lower in salinity levels, often the soil deposits lodge at the base of these areas providing a mounded area that appeared to be less hostile (thought to be due to reduced evapotranspiration, and more rapid leaching of salts when rainfall occurs). The natural colonisation of plants in areas where there was groundcover was evident across all sites throughout the life of the project (Figure 12). This prompted the thought of using mounds or organic matter to simulate what was being observed in nature.

4.Mechanical intervention

Throughout the project, different seeding techniques were used with varying success. The common method of seeding into the furrow and then providing a furrow with the press wheel was found to be detrimental to establishment of pastures in saline soil as the press wheel tended to create soil surface sealing impacting on germination. Those seeds that weren't placed in the base of the furrow rather on the sides of the furrow were those that germinated more effectively (and were more likely to survive).

The paddocks that were very roughly worked were those that appeared to have improved establishment. Mounding of a site at Coomandook in 2019 did not appear to improve establishment, however the time of sowing was very delayed at this site and the site may require rainfall to flush the salts out of the mounded area. This site will continue to be monitored as future opportunities allow.

In 2018 at the Cooke Plains_1 site the application of organic matter was demonstrated to see if this mulch effect provided a micro-climate to improve establishment of the Messina. Straw was chopped up through a Tomohawk bale shredder (Figure 13 a-b) and then incorporated with a chopper chain increasing the amount of organic matter in the soil. Germination in 2018 at this site was minimal, however the presence of the straw assisted in reducing wind erosion in 2018 and the summer/autumn of 2019. In 2019 good pasture establishment occurred across this (and all other sites). This has mainly been attributed to the rainfall 'flush' events, but areas where the straw had been incorporated appeared to visually have improved ground cover in 2019.

Figure 13 (a) Tomohawk Bale Shredder **(b) Straw on surface at site (August 2018)**

In 2019, a paddock at Cooke Plains that had been impacted by salt since 2013 was deep ripped to 400mm in a series of strips to see if cracking open the soil or reducing a hard pan layer had an impact on the soil salinity levels and establishment of pasture species. A mixture of crop and pasture species was then sown 11th June 2019 across the site.

The ripping was very successful in improving the pasture production and overall health of the plants (Fig 14). Establishment of the small seeds in the mix was reduced (thought to be due to seeding depth on the soft ripped area). Ripping was also effective in decreasing the salinity levels in the treated area, both at the surface, and at the 10-30cm layer (Fig 15).

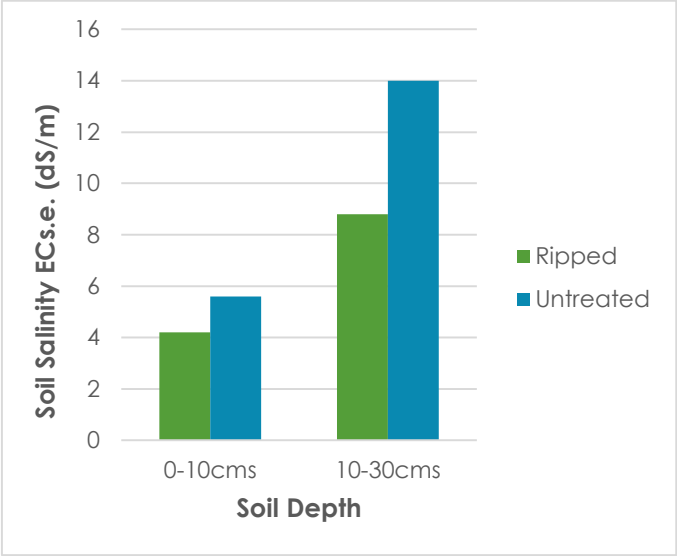


Figure 14. Ripped (LHS) vs Unripped (RHS), Cooke Plains 2019

Figure 15. Soil Test Results, Cooke Plains 2019

Conclusion:

Throughout the life of the project, various saltland remediation techniques were demonstrated to improve farmer understanding of their effectiveness in remediating salt scalds. Varying success was achieved depending on the technique being demonstrated and the seasonal conditions being experienced.

Key Lessons learned;

- Maintain groundcover
- Wait until the soil has been 'flushed' before sowing
- Use a mixture of salt tolerant species

Gathering the following information will also assist in decision making in regard to the best way to manage a salinity impacted site;

- Knowing the soil salinity levels
- Is there a hardpan?
- The depth and seasonal variation of the saline water table

The use of mechanical interventions needs further exploration to improve understanding of the effect of different ripping techniques across a range of soils and the impact that it has on the movement of salts within the season.

There also needs to be a continued focus on prevention of saline areas (as opposed to cure). Further work needs to be done around suitable land use, the water use of different crops, pastures and other perennial vegetation to reduce the recharge of ground water across the landscape.

This project is supported by the National Landcare Program – Smart Farms Program, an Australian Government Initiative

Tall Wheat Grass Feed Quality
It is better than you think!

This article has been reproduced with the permission of Leeanne Fairbairn,
Salinity and Catchment Management Officer,
Department of Primary Industries,
Hamilton Vic. 3300.

At a Field Day on Wayne and Di Bryce's property "Tea Tree South", Caramut. Participants saw how the pasture mulching technique can assist in the management of tall wheatgrass with a demonstration of the Nobili mulcher.

Tall Wheatgrass *Thinopyrum ponticum* can provide many productive and environmental benefits for farmers who have salt affected land. When most pastures are dormant or dead during summer early autumn tall wheatgrass is green and actively growing. Grazing should commence in August within the first year of sowing after the plants have firmly established their root systems. If rotational grazing principles are applied to tall wheatgrass dominant-legume pastures they will remain green and palatable from September through until the end of April, with the potential of increasing stocking rates from 0.5 to 16 DSE/ha.

From studies conducted at the Pasture and Veterinary Institute at Hamilton Victoria it was found that the feed test values for tall wheatgrass are similar to that of perennial ryegrass while the plants are still in the vegetative state. From feed test results taken in June 2001 (see table 1) it can be seen that metabolisable energy (ME) in other productive pasture species is only slightly greater than tall wheatgrass. Crude Protein (CP) of other productive pasture species is higher but when legumes are added to the tall wheatgrass dominant mix CP can be increased up to approx 18% which is the desirable level for most stock types.

Table 1. **Average Feed Test Results – June 2001**

	Metabolisable Energy (MJ/Kg DM)	Crude Protein (% DM)
Perennial Ryegrass	**11.3**	**26.1**
Phalaris	**11.8**	**23.4**
Tall Fescue	**11.4**	**22.6**
Tall Wheatgrass		
Dundas	**9.7**	**14.3**
Tyrell	**9.4**	**14.4**

Other experimental studies carried out on silage comparisons between perennial ryegrass-sub clover pasture and tall wheatgrass-legume pasture on dairy farms in south west Victoria, indicate that the two types have similar metabolisable energy and crude protein levels (see table 2).

Table2. **Average Feed Test Results – 1997 Season**

	Metabolisable Energy (MJ/Kg DM)		Crude Protein (%DM)	
	Pasture Cutting	**Silage**	**Pasture Cutting**	**Silage**
Perennial Ryegrass/ Legume	**11.2**	**9.8**	**21**	**18.4**
Tall Wheatgrass/ Balansa	**10.8**	**9.5**	**17.9**	**15.6**

These studies show that tall wheatgrass-legume pastures are high quality pastures if effectively managed and can successfully fill the summer/autumn feed gap.
The challenge with tall wheatgrass is its grazing management. Due to the significant increase in temperature levels over summer tall wheatgrass grows at a rapid rate, sometimes reaching the reproductive stage before farmers can get stock onto the pasture. This situation has happened during the last season where there was an excess of dry feed at the end of spring/early summer. Farmers should have moved stock onto their tall wheatgrass pastures in December when other pastures were drying off and loosing pasture quality while the tall wheatgrass was still good quality green feed. But in most cases this did not occur. A lot of tall wheatgrass pastures around the district were let go rank which causes the pasture quality to reduce dramatically and is deemed useless for

young stock and poor for most stock types. It is important to manage tall wheatgrass by rotational (crash) grazing keeping the grass in the vegetative stage between 10-30cm is ideal. If heavy grazing is not an option it has been shown that slashing, mulching or burning can rejuvenate tall wheatgrass stands that have been allowed to become rank. It is also important to prevent the spread of tall wheatgrass seeds to unwanted parts of the catchment. By managing tall wheatgrass before the seeds mature the potential adverse spread of this grass can be avoided.

If timely grazing management is not possible during November-February pasture mulching is seen to be the next best alternative.
Mulching has several advantages:

- Breaks up the tall wheatgrass plant into small pieces (4-8cm) which allows for quicker breakdown of the plant by soil biota to form an organic layer, increasing valuable topsoil.
- Spreads out the cut grass creating enough open spaces for fresh green pasture growth.
- More environmentally friendly than burning which releases CO_2 into the atmosphere increasing greenhouse gasses and air pollution.
- Doesn't leave the soil bare and vulnerable to blowing away like burning.
- Better than slashing which tends to smother pasture regrowth and takes longer to breakdown due to the increases grass length.

When managed correctly, tall wheatgrass has the potential to cut high quality silage or hay. It is also a great fodder reserve in summer and is very effective in stabilising and rehabilitating saline areas.

LEFT: Colebatch Downs. Puccinellia in foreground, Tall Wheat Grass in background

COORONG DISTRICT COUNCIL

Coorong Tatiara

Sustainability, Agriculture & the Environment

Tatiara the good country

Water Harvesting and Lined Catchments

This fact sheet covers the basic considerations & steps involved in constructing a lined catchment. Maintaining a reliable & sustainable farm water supply is a major concern for livestock producers today. Many farmers have invested in lined catchment areas across SA. A lined catchment is a poly lined catchment area that runs into a poly lined dam. A lined catchment will capture water in any rainfall or dew event, where as an earthen dam needs the soil profile to be fully wetted up for water to run off the catchment & into the dam.

The motivation for implementing a lined catchment area varies, but the most common reasons are;

- The cost of mains water.
- Low annual rainfall levels.
- Poor quality groundwater is not an option.
- Sandy soils are too porous to install earthen dams.
- Lined catchments produce high quality water suitable for use by all livestock, intensive agriculture, spraying, and domestic use.

Site selection and preparation

Some points to consider when selecting a site:

- A steep gradient is not required.
- A level area with a slight fall is ideal.
- Siting on elevated area, or the highest point in the landscape can negate water pumping costs.
- If this is not possible the location of storage tanks need to be considered.
- The catchment can be placed on land that is deemed otherwise unproductive.
- Can drains or roads run into the catchment area?

Poly Liners

There are a range of different quality liners including;

- High Density Polyethylene - HDPE
- Linear Low Density Polyethylene - LLDPE
- Polypropylene -PP and Poly Vinyl Chloride—PVC

High Density Polyethylene (HDPE) geomembrane, is a polyethylene thermoplastic. HDPE provide excellent durability and resistant properties due to its large strength to density ratio. This is the most common liner used in lined catchments.

Linear low-density polyethylene (LLDPE) geomembranes are very flexible, tear resistant and durable. LLDPE has a higher tensile break elongation than HDPE, however HDPE has an excellent ultraviolet (UV) and chemical resistance

What is the difference between HDPE and LLDPE Plastic Sheets?

- Although both materials are polyethylene, they do have different properties.
- LDPE is softer, more flexible and melts at a lower temperature than HDPE.
- HDPE is harder, has a higher chemical resistance and can withstand higher temperatures.

Poly liners come in a range of thicknesses, and qualities

Planning and Regulation

Introduction

Regulatory requirements have been established primarily in response to issues that have arisen over the years that have created either environmental damage, over-use of resources, infrastructure damage or even conflict between land users. Often these issues were not foreseen, and as such the regulatory frameworks have been put in place to prevent or limit any such adverse impacts occurring. In regard to water harvesting the following may need to be considered as part of the overall plan (noting that this is based on livestock water used only).

Dams

Dams that do not meet certain exemption criteria will be required to be assessed as development. Depending upon the location, this might necessitate referral to the Landscapes SA Boards and or the Department for Environment, Water and Natural Resources. Impact on water resources and ecology are important considerations.

Dams are exempt from development approval, except:

- Where a levee or mound with a finished height greater than 3 metres above the natural ground is to be formed; or
- Where a retaining wall which retains a difference in ground levels exceeding 1 metre is to be used or formed; or
- Where the dam is in the Flood Zone or Flood Plain delineated by Council's Development Plan, or in any other zone or area shown as being subject to flooding or inundation in Council's Development Plan; or
- Where the dam is to have a capacity exceeding 5 megalitres.

For more information please visit :
http://www.coorong.sa.gov.au/waterplanningconsiderations
http://www.coorong.sa.gov.au/waterqualityandlivestockhealth
For a range of information please contact Natural Resources SA Murray Darling Basin or Natural Resources South East to check to for any 'Water Affecting Activities' regulations.

- Mount Barker P.08 8391 7500
- Mount Gambier P.08 8735 1177

Other Considerations

Shandying Water

Stock do not need mains or rain quality water to thrive so there is the potential to mix water from the lined catchment and bore water.
This can significantly boost the water output from the lined catchment or reduce the area of the catchment or the size of the dam. The water produced just needs to be fit for purpose.

Water Quality

Stock grazing green feed can tolerate higher salt concentrations than the same stock on dry feed. Stock grazing saltbush or salty feeds are less tolerant to saline water than stock grazing other types of pasture. Pregnant, lactating and young stock have a lower salt tolerance than older dry stock.

Algae

Build up of algae in dams can not only block outlets and pipes but also taint the water. Several species of algae are toxic to stock and cause deaths from poisoning. Algae can be controlled with several chemicals, including copper sulphate, calcium hypochlorite and fer-

Estimation of potential water harvested

The figures below can be used as a guide in determining your total stock water requirements.
It should be noted however that the following are average figures and variations will occur depending on weather conditions, the feed available, and the breed of animal.

Area		*Rainfall*		*Volume captured*	Value of same amount of SA Water mains supply *($3.413 kl - March 2020)*	Annual no of dry cows watered *(13,500 l/head)*	Annual no of cows & calves watered *20,000 l/head)*	Annual no of dry sheep watered *(2,070 l/head)*	Annual no of lactating ewes watered *(2,880 l/head)*
1 sq m	X	1mm rain	=	1 litre					
0.5ha	X	450mm rain	=	2,250,000 litres (2.25 megs)	$7,697	166	112	1,086	780
1 ha	X	450mm rain	=	4,500,000 litres (4.5 megs)	$15,358	333	225	2,173	1,560
2 ha	X	450mm rain	=	9,000,000 (9 megs)	$30,717	666	450	4,347	3,125
3 ha	X	450mm rain	=	13,500,000 (13.megs)	$46,075	1,000	675	6,520	4,685

CASE STUDY ONE

Owner	*'Orlunda Downs'*	**M & L Scobie**
Property size		**2,690ha**
Location		**Policemans Point**
Rainfall		**500mm**
Enterprises		**1,100 Cattle and 800 Sheep**
Annual water bill pre dam		**$40,000**
Annual water bill post dam		**< $1,000**
Catchment area		**2.3ha**
Catchment liner	Polydam	**1.5mm HDPE**
Dam Capacity		**11 mega litres**
Dam liner	Polydam	**1.5mm HDPE**
Shandying water		**yes**
Year established		**2016**
Cost		**$250,000**

Dam liner cost $40,000 - Catchment liner cost $120,000 (Includes freight and handling)

Benefits

Mark has now switched off his water meter but has left it connected to his farm watering system as "insurance" in case of emergency.

Mark turning off his SA Water meter

Commencing the instillation of the liner and the anchor trenches are clearly visible in the foreground.

Site selection was important and there is plenty of room to extend the catchment at a later date if necessary

Excess rock was used around troughs and on roads The site must be rock free or liner damage may occur

Poly liner initially weighed down with sandbags

The option to shandy bore water to increase the capacity of the lined catchment remains. Water only needs to be fit for purpose and stock don't need pure rainwater to

Project Steps

- Business case.
- Site selection.
- Earthworks carried out to build the dam and shape the catchment area.
- The dam and catchment surface to be lined must be smooth and free of rocks, sharp stones, sticks, roots, sharp objects, or other debris prior to laying liner.
- Ensure the catchment site is level to minimise water pooling and evaporation.
- Placement of liner in dam and on catchment.
- Liner cannot be laid when hot or windy.
- The liner must be laid loosely as it will tighten, and move when the temperature fluctuates.
- Ensure the liner is stable, weighed down, and fully welded to stop poly liner from flapping.
- Welding of liner by contractors (if using purpose made poly liner).
- Fencing the site to prevent wildlife being trapped and damaging the liner.
- Setting up other water infrastructure as required

Project Components

In approximate order of costs

1. Poly Liner	6. Water Pumps *
2. Earthworks	7. Remote Monitoring Telemetry*
3. Catchment Fencing	8. Pump Shed*
4. Tanks *	9. Sand Bags to weigh down liner
5. Power *	10.Tyres to weigh down liner

**May not be required at all sites*

A ladder into the dam is a useful safety feature.

Site selection is very important and it is advisable to do a test dig with a backhoe so there are no nasty surprises during construction

The whole site must be free of rocks and other debris otherwise liner damage may occur

Concrete sump and outlet

The liner needs to be weighed down to prevent lifting in the wind

The site needs 1.8m high secure fencing

CASE STUDY TWO

'Gundooee'		**Nick Daniel**
Location		**Field**
Property size		**1,230 ha**
Rainfall		**450mm**
Enterprises		**Cattle**
Annual water bill		**$28,000**
Catchment area		**12,200sq m**
Dam area		**3,200 sq m**
Total area		**1.54ha**
Catchment liner	Fabtech	**1mm HDPE**
Dam Capacity		**5 mega litres**
Dam liner	Fabtech	**1.5mm HDPE**
Year established		**2015**

Challenges

Have had issues with algae, but it was easily treated with copper sulphate.

Benefits

SA Water meter now switched off.
It remains connected and could be switched on in case of emergency.
The only SA Water charge is the annual connection fee.

Cost

Poly Liner 12,200 sqm + dam 3,200 sqm	$76,300
Earthworks	$28,200
2 pumps & telemetry (SMS)	$15,400
Tank and extra poly	$15,400
Pump shed	$250

Payback Period

Will capture 15,400 litres per millimetre rain, the lined catchment is working well
450mm rain will produce 6,930kl or 6.93 megs
This would equate to $23,000 for an equivalent amount of mains water at the current price (March 2020)

All joints double seem welded. The gap between the welds is pressure tested for any leaks

Completed dam with floating pump

Pump shed and storage tank

Dam evaporation losses

Evaporation losses from the dam will be between 1.5m and 2.0m and need to be factored into calculating catchment area.

Covers are expensive, and are in the range of $5 to $8 per sq m. The cheapest option to address losses may be to dig the dam deeper to compensate for the evaporation loss.

Floating Dam Covers - Benefits:

- Evaporation control
- Blocks sunlight preventing algae
- Protects water from bird droppings, pollens, air born and animal borne particulates
- Can acts as a catchment area, water is diverted to a drainage system and stored in the dam.

Catchment liners can save evaporation losses but are very expensive. It may be more cost effectives to dig the dam deeper or make the catchment larger to offset evaporation losses.

Factors to consider with dam covers:

- How stable will the cover/barrier be in high winds?
- How long will it last?
- Will it be stable when the dam is dry?
- Are there special requirements – at least one product requires 30cm or more of water in the dam at all times?
- Will it leach toxic substances into the water?
- How will it stand up to what is a corrosive environment – continual contact with water and air and some level of salinity; exposure to ultra-violet light that can degrade some plastics?
- Some products are easily and cheaply installed by the land owner, others require expensive installation by specialists.
- What warranty is there & is the company likely to be around in five years if you need to call on the warranty?
- Does the product need to cover only the water, or does it need to be large enough to allow for anchoring beyond the lip of your dam – making a big impact on the final price?
- Many of the products on the market are flammable.

Fencing the lined catchment is essential to prevent trapped wildlife and livestock damaging the liner or drowning.

Additional Resources

Water Harvesting and Lined Catchments
Coorong Tatiara Local Action Plan :
http://www.coorong.sa.gov.au/waterharvest

Planning information
http://www.coorong.sa.gov.au/waterplanningconsiderations

Water affecting activities regulations
Natural Resources SA Murray Darling Basin or Natural Resources South East

- Mount Barker P.08 8391 7500
- Mount Gambier P.08 8735 1177

Catchment and Dam Liners:
Fabtech: https://www.fabtech.com.au/
Tel: 1300 664 776 / 08 8347 3111

Poly Dam: https://polydam.com.au/
Mobile 0411 101 468

Other Fact Sheets in this series

http://www.coorong.sa.gov.au/watersecuritytech

Coorong Tatiara Local Action Plan
Tintinara Office

37 Becker Tce Tintinara
PO Box 399
Tailem Bend SA 5260
P: 1300 785277
F: (08)87 572 222

http://www.coorong.sa.gov.au/gotolap

'National Landcare Program: Smart Farms Program, an Australian Government initiative'.

Australian Government
National Landcare Programme

COORONG DISTRICT COUNCIL

Coorong Tatiara

Sustainability, Agriculture & the Environment

Tatiara the good country

Farm Water Infrastructure Tax Benefits

Use this document as a guide only
Tax legislation frequently change
The financial situation and structure of individual businesses varies

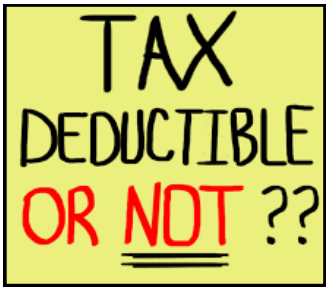
CONTENTS

- **$150,000 instant asset write-off and 50% instant depreciation write off (on assets over $150,000)**
- **On-farm Emergency Water Infrastructure Rebate Scheme**
- **ATO Guide to depreciating assets**
  - **Water facilities**
  - **Fencing assets**
  - **Fodder storage assets**
- **Capital Works Deductions**
- **Landcare Operations**
- **Environmental Protection Activities**

Primary Producer Concessions

If you are a primary producer, special tax concessions may inform the amount you include in your assessable income each year. These concessions also affect when you have to pay your income tax, as you may be able to make two Pay As You Go instalments each year, instead of four.

Primary producers also have access to primary production averaging, which may allow you to pay a lower tax rate in years where you earn above-average income.



PIRSA March 2020

The Coorong & Tatiara District Council areas are eligible

On-Farm Emergency Water Infrastructure Rebate Scheme

The South Australian Government in partnership with the Australian Government is providing a rebate of up to 50% (to a maximum of $50,000 - GST exclusive) to primary producers in drought affected areas for the costs associated with the purchase, installation and repairs to on-farm water infrastructure for livestock and permanent horticulture that:

- assists primary producers to be more productive
- assists in mitigating degradation of natural watering points
- addresses animal welfare needs
- assists primary producers to be more resilient for future droughts

PLEASE NOTE

PIRSA 17th June 2020

New applications will no longer be accepted

Funding for the On Farm Emergency Water Infrastructure Rebate has been exhausted and applications are no longer being accepted.

Information for applicants with pending applications

All pending applications will be assessed in the order received. Funding (if available) will be allocated to eligible applications in this same order.

We are currently assessing a large number of applications and expect delays in processing times. If you have recently submitted your application and are waiting for your assessment outcome, a PIRSA representative will be in contact.

More information

For more information, please contact the PIRSA Recovery Hotline:

Phone: 1800 931 314

$150k Instant Asset Write Off & 50% Instant Depreciation Deduction on over $150k Assets

June 9th 2020 via the Corona Virus Economic Stimulus Package.

SUMMARY

The Government is increasing the instant asset write-off (IAWO) threshold from $30,000 to $150,000 and expanding access to include all businesses with aggregated annual turnover of less than $500 million (up from $50 million) until 31st December 2020

THRESHOLDS

The IAWO threshold The higher IAWO threshold provides cash flow benefits for businesses that will be able to immediately deduct purchases of eligible assets each costing less than $150,000. The threshold applies on a per asset basis, so eligible businesses can immediately write-off multiple assets.

$150,000 Instant Asset Write Off

1. Any eligible asset (vehicles, machinery etc) with a purchase price of $150,000 or less (excluding GST) acquired from **March 12th to December 31st 2020.**

2. Asset can be NEW or USED (including Private Sales)

3. The $150,000 limit is available for each individual asset & therefore multiple assets (totalling more than $150,000) can be claimed under this arrangement.

4. There is NO LIMIT to the number of assets acquired under this initiative.

5. eligibility has been expanded to cover businesses with an aggregated turnover of less than $500 million (up from $50 million)

6. Assets can be purchased outright or financed on Chattel Mortgage or Commercial Hire Purchase. (Finance Lease will not work for this initiative).

7. FAST TRACK (No Financials) Finance is available on most assets across a broad range of Financiers.

8. This initiative has been extended until 31/12/2020

ELIGIBILITY AND EXEMPTIONS

See the ATO Fact Sheet by clicking on the link below'

The **Government Fact sheet** link below provides an excellent explanation with many clear examples;

https://treasury.gov.au/sites/default/files/2020-03/Fact_sheet-Support_for_business_investment.pdf

ATO Guide to depreciating assets 2019 (ATO June 2019)

Water Facilities

A water facility includes plant or a structural improvement that is primarily and principally for the purpose of conserving or conveying water. It also includes an alteration, addition or extension to that plant or structural improvement. Examples of water facilities are dams, tanks, tank stands, bores, wells, irrigation channels, pipes, pumps, water towers and windmills. The meaning of water facility has been extended to include certain other expenditure incurred on or after 1 July 2004:

- A repair of a capital nature to plant or a structural improvement that is primarily and principally for the purpose of conserving or conveying water (for example, if you purchase a pump that needs substantial work done to it before it can be used in your business, the cost of repairing the pump may be treated as a water facility)
- A structural improvement, or an alteration, addition or extension to a structural improvement, that is reasonably incidental to conserving or conveying water,
- A repair of a capital nature to a structural improvement that is reasonably incidental to conserving or conveying water.

You can fully deduct capital expenditure on a water facility if you incurred the expenditure at or after 7.30pm (AEST) on 12 May 2015. You fully deduct the expenditure in the income year in which you incurred it. The total deduction cannot be more than the amount of the capital expenditure. If you incurred the expenditure before this time, the previous uniform capital allowance (UCA) continue to apply.

For more information
https://www.ato.gov.au/Forms/Guide-to-depreciating-assets-2019/

Fencing Assets

A fencing asset is an asset or structural improvement that is a fence, or a repair of a capital nature, or an alteration, addition or extension, to a fence. The capital expenditure you incur on the construction, manufacture, installation or acquisition of the fencing asset must have been incurred primarily and principally in a primary production business that you conduct on land in Australia. You may claim the deduction even if you are only a lessee of the land.

You can fully deduct capital expenditure on a fencing asset if you incurred the expenditure at or after 7.30pm (AEST) on 12 May 2015. You fully deduct the expenditure in the income year in which you incurred it. The total deduction cannot be more than the amount of the capital expenditure.

Fodder Storage Assets

A fodder storage asset is an asset that is primarily and principally for the purpose of storing fodder. It is also a structural improvement, or a repair of a capital nature, or an alteration, addition or extension, to an asset or a structural improvement, that is primarily and principally for the purpose of storing fodder.

- Silos
- Liquid feed supplement storage tanks
- Bins for storing dried grain
- Hay sheds
- Grain storage sheds, and above-ground bunkers for silage.

The capital expenditure you incur on the construction, manufacture, installation or acquisition of the fodder storage asset must have been incurred primarily and principally for use in a primary production business that you conduct on land in Australia. You may claim the deduction even if you are only a lessee of the land.

Capital Works Deductions

Capital works used to produce income, including buildings and structural improvements, are written off over a longer period than other depreciating assets.
Note that the land itself can't be written off and its cost is not deductible.
The capital works deduction is available for:

- Buildings or extensions, alterations or improvements to a building
- Structural improvements such as sealed driveways, fences and retaining walls
- Earthworks for environmental protection, such as embankments.

If it isn't possible to determine the actual construction costs, you can get an estimate from a quantity surveyor or other independent qualified person. You can claim a deduction for the full cost of the estimate in the year it is incurred. Deduction rates of 2.5% or 4.0% apply, depending on the date on which construction began, the type of capital works, and how they're used.

https://www.ato.gov.au/business/depreciation-and-capital-expenses-and-allowances/capital-works-deductions/

Landcare Operations

You can claim an immediate deduction for capital spending on a Landcare operation in Australia.
The deduction is available to the extent you use rural land for a primary production or other business (other than including mining or quarrying).
You're entitled to the deduction even if you lease the land from the owner.

Useful Contacts

- Your accountant
- Rural Financial Counselling Service (RFCS)
  - Murray-Mallee and Upper South East
  - Lynton Keen
  - Phone: 1800 836 211
  - Mobile: 0448 092 294
  - Email: l.keen@ruralbusinesssupport.org.au

  - South East and Coorong
  - Lachlan Hood
  - Phone: 1800 836 211
  - Mobile: 0439 286 550
  - Email: l.hood@ruralbusinesssupport.org.au
- PIRSA Drought Support
https://pir.sa.gov.au/grants_and_assistance/drought_support

Other Fact Sheets in this series

- Water Harvesting and Lined catchments
- Farm Water Supply Pipelines
- Desalination for Livestock Water Supplies

These can be accessed at https://www.coorong.sa.gov.au/watersecuritytech

Grants and Financial Incentives updates

These may be available from time to time to assist with projects.
In time of drought, tax and financial incentives may be offered as part of Government drought assistance packages.
The Coorong Tatiara Local Action Plan will promote these in our e newsletter.

To subscribe to our newsletter please email tstrugnell@coorong.sa.gov.au

Coorong Tatiara Local Action Plan
Tintinara Office

37 Becker Tce Tintinara
PO Box 399
Tailem Bend SA 5260
P: 1300785277
F: (08)87 572 222

http://www.coorong.sa.gov.au/gotolap

'National Landcare Program: Smart Farms Program, an Australian Government initiative'.

Australian Government
National Landcare Programme