

MLA PDS L.PDS.2203 HOUSE PDS REPORT







About the Project

2022-2027

In early 2022 the Gillamii Group was successful in obtaining funding for a new project through Meat and Livestock Australia (MLA) Producer Demonstration Sites (PDS) Program. The project is called 'Productive Saltland Pastures for Southern WA' and is a continuation of Gillamii's commitment to the remediation of salt-affected land into productive pasture systems for livestock grazing.

This PDS Project aims to improve members' knowledge and skills in the establishment, management, and benefits (profitability, productivity, and sustainability) of salt-tolerant forage systems on moderately salt-affected land. The objective of this program is to establish 150 hectares of salt-tolerant forage pastures on 6 local sites to demonstrate variation in productivity of key shrub and understory varieties and a paddock scale increase in:

- a. late summer/autumn (February April) biomass production (up to 300%)
- b. soil organic carbon and total carbon

A cost-benefit analysis will also be conducted at each site to determine relative economic performance of the salt-tolerant feed-base systems as well as key livestock data (stocking rates, grazing days and liveweight gain of livestock).

This project is funded through Meat and Livestock Australia's (MLA) Producer Demonstration Sites (PDS) Program, supported by a group of dedicated host farmers.

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Project Stakeholders

The Team

Role

Responsibility

National PDS Program.

Project Deliverables: Landholder

Freya Spencer Gillamii Centre **Project Manager** Responsible for the management of the project (deliverables as per Project Deliverables: Gillamii Responsibility section of landholder agreement, milestone stones, organisational structure, reporting and finances).

Alana McEwan MIA Project Manager

Hilary Waterson Gillamii Centre **Financial Manager** Responsible for day-to-day management of project finances and financial audits.

PDS Host Landholder Tomlinson Addis Standish House

Project Partners

Role	Responsibility
Meat & Livestock Australia	Provide main financial support for site establishment, monitoring and extension.
CSIRO	Provide technical support for site establishment, extension and in-kind past analysis (nutrition and biomass).
DPIRD	Provide technical support for site establishment and extension.

..

agreement.



Site Overview



House Family

14



South Pallinup Road, Toobrunup

Site 1: 20 hectares (14 hectares to establish) Site 2: 36 hectares (30 hectares to establish)

Site 1

Site 2

30

Site Plan & Establishment

Overview

On the 23rd of June 2022 a group of local producers and Department of Primary Industries and Regional Development (DPIRD) staff, hosted by Gillamii, spent the day visiting the MLA PDS Sites to workshop ideas for saltland pasture establishment.

This planning workshop was developed in partnership with the Department of Primary Industries and Regional Development, supported by funding through the Western Australian Government's State NRM program.

The aim of the workshop was to utilise the knowledge of Gillamii's producers, experienced in productive saltland pastures, and connect them with the new PDS producers, aided by expertise from DPIRD to discuss the best pasture mixes, site design and establishment plan, tailored to our local conditions and based on producer experiences.

The outcome of the workshop was the site plan on the following page, designed to help guide the establishment of the PDS sites in 2022. Baseline monitoring (presented in the first section of this report) was used to provide the group with additional information allowing for efficient and robust discussions out on site.



Site planning workshop at House PDS Sites



natural resource management program





20 hectare site including established saltbush, 14 hectares to be established with saltland pastures.

Site Preparation

1. Winter Spray on the 20th July 2022 (1st Knockdown)

- 10kg/ha (1kg/100L) Ammonium Sulphate Herbicide Adjuvant
- 20g/ha Terrad'/700WG Herbicide
- 1.75L/ha Glyphosate 450
- 10kg/ha (1L/100L) Loveland MSO with Leci-Tech Spray Adjuvant

Site Seeding

1. Pre Plant Incorporation on the 1st September 2022 (2nd Knockdown)

- 1.75L/ha Paraquat
- 1.5L/ha Trifluralin 480
- 300ml/ha Chlorpyrifos 500EC
- 2.1L (0.2%) Wetter 1000

1. Pasture Seeded on the 1st September 2022

- Fertiliser:
 - 10L/ha CS Calx Concerntrate
 - 100kg/ha K-TILL Extra
- Seed:
 - 0.2kg/100kg of seed Nodulaid Group AL
 - 2kg/ha Megamax Panic
 - 2kg/ha Howlong Cocksfoot
 - 3kg/ha Lucerne SARDI 7 Series 2
 - lkg/ha Commander Chicory
 - 2kg/ha Fortune Tall Fescue

Post Seeding

1. Lucerne Insecticide Spray on the 15th September 2022

- 80ml/ha Talstar 250 EC Insecticide/Miticide
- 150ml/ha Le-Mat 290 SL Insecticide



Site 1 Final Saltland Pasture Plan (Green)



House1PP2 Photo Point - Post Seeding October 2022



Site 1 Germination October 2022



Site 1 Germination - Lucerne, Chicory and grasses present October 2022



Site 1 Germination - Lucerne, Chicory and grasses present October 2022

36 hectares total including established saltbush, 30 hectares to be established with saltland pastures (25ha Shotgun Mix & 5ha Salt Mix).

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 - 3kg/ha Lucerne SARDI 7 Series 2
 - lkg/ha Commander Chicory
 - 2kg/ha Fortune Tall Fescue
 - 10kg/ha Tall Wheat Grass
 - 2kg/ha Puccinellia

Post Seeding

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- 80ml/ha Talstar 250 EC Insecticide/Miticide
- 150ml/ha Le-Mat 290 SL Insecticide



Site 2 Final Saltland Pasture Plan with Shotgun Mix of Lucerne, Chicory, Cocksfoot, Tall Fescue and Panic (Green) going over 25ha and Salty Shotgun Mix of Tall Wheat Grass and Puccinellia (Blue Dots) going over roughly 5ha of more severe salt affected land. Red line indicates an optional shallow drain to manage potential waterlogging in the northern section of the paddock.



House2PP2 Photo Point - Post Seeding October 2022



Site 2 Germination October 2022



Site 2 Germination - Lucerne, Chicory and grasses present October 2022



Site 2 Germination - Lucerne and grasses present October 2022

Pasture Nonitoring

2022 - 2027



Soil Analysis



The Veris U3/iScan scans a field's major physical, biological and chemical properties to help manage each hectare to its full potential. The Veris U3 allows rapid data collection over a wide window of soil and cropping conditions.

Note: Soil Analysis to be conducted twice only (2022 & 2027)

Soil - Elevation

Topographic attributes are calculated from elevation measurements collected simultaneously with the on-the-go sensing systems using a real-time kinematic GPS.

Soil - pH

Veris on-the-go pH sensor has only one moving part – a soil sampler shoe. When the hydraulic cylinder pushes it in the ground, soil flows through. When the cylinder picks up the shoe, the soil in the shoe trough is pressed against the pH electrodes. After a few seconds the shoe is lowered again to collect more soil. As it does, the new soil coming in moves the previous soil sample out the back of the shoe trough and spray nozzles clean the pH electrodes.

Soil - OM (%)

Soil organic carbon is a component of soil organic matter. Organic matter is primarily made up of carbon (58%), with the remaining mass consisting of water and other nutrients such as nitrogen and potassium. The OpticMapper sensor module is an optical sensor that measures soil reflectance. Soils that are higher in organic matter (OM) absorb more light, but can also appear darker when moist. The OpticMapper senses the subsurface where the moisture effect is minimized, and where soil color is primarily related to soil organic matter variations. Soil measurements are acquired through a sapphire window on the bottom of a furrow 'shoe' underneath crop residue and dry surface soil. Readings are collected every second and matched to their GPS location.

Soil - Salinity (ECa ms/m)

Electrical Conductivity: the ECa collected by the iScan is technically 'bulk apparent electrical conductivity' and is measured in situ primarily to map differences in soil texture (sand/silt/clay) across a paddock. When harmful levels of salinity are present in a paddock, the Veris iScan ECa can identify these areas. The more commonly known ECe measured in the lab is typically a saturated paste extract that removes any signal from the soil texture particles.









ideal Range 5.5-7.5









Salinity class	EC _e all soils (mS/m)	EC _a EM38 horizontal mode (mS/m)
Non-saline	<200	<50
Slightly	200–400	50–100
Moderately	400-800	100–150
Highly	800-1600	150–200







Ideal Range 5.5-7.5









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Slightly	200-400	50-100
Moderately	400-800	100–150
Highly	800–1600	150–200

Site 1: Photo Points

Year 1: March 2023 (Baseline Prior to Establishment)



PP3

PP4



Photo Point Map



Site 1: Establishment Photos

Year 2 - December 2022



Site 1: Photo Points

Year 2 - April 2023 (After First Summer & 1 grazing since establishment)



PP3 PP4

Photo Point Map



Site 1: Summer-Autumn Photos Year 2 - April 2023 (1 grazing since establishment)



Site 2: Photo Points

Year 1 - March 2023 (Baseline Prior to Establishment)



Photo Point Map



Site 2: Establishment Photos

Year 2 - December 2022



Site 2: Photo Points

Year 2 - March 2023 (After First Summer & 1 grazing since establishment)



PP3

PP4



Photo Point Map



Site 2: Summer-Autumn Photos Year 2 - March 2023 (1 grazing period since establishment)



Year 1: Biomass

Biomass Breakdown

Site 1 sampled on the 10th March 2022 Site 2 sampled on the 17th March 2022 Site 1 Summer-Autumn Rainfall to Date: 8.8mm (GN DPIRD Station) Site 2 Summer-Autumn Rainfall to Date: 17.2mm (GN DPIRD Station)

Site 1: Mean rank = 2.4 biomass/ha = 1835kg DM biomass/site = 36699kg DM Site 2: Mean rank = 2.4 biomass/ha = 2679kg DM biomass/site = 96434kg DM

Please note that total biomass is not FOO and therefore does not represent total feed available to stock - see Pasture Nutrition section below for further information.









Year 2: Biomass

Biomass Breakdown

Site 1 Sampled on the 4th April 2023 Site 2 sampled on the 31st March 2023 Site 1 Summer-Autumn Rainfall to Date: 37.4mm (GN DPIRD Station) Site 2 Summer-Autumn Rainfall to Date: 37.4mm (GN DPIRD Station)

Site 1: Mean rank = 2.5 biomass/ha = 1754kg DM biomass/site = 35075kg DM Site 2: Mean rank = 2.8 biomass/ha = 1214kg DM biomass/site = 43717kg DM

Please note that total biomass is not FOO and therefore does not represent total feed available to stock - see Pasture Nutrition section below for further information.









Year 1: Nutrition

Note: Sampling has been conducted during the summer-autumn period as this project focuses on that specific seasonal feed gap

Species Composition

Site 1	Site Composition	Kg DM/Ha	DMD (%)
Barley Crop Stubble	68.0%	1248	37.85
Rye Grass	13.2%	242	37.38
Old Man Salt Bush	12.0%	220	57.07
Spear Grass	6.8%	125	38.43
Site 2	Site Composition	Kg DM/Ha	DMD (%)
Site 2 Wheat Crop Stubble	Site Composition 63.2%	Kg DM/Ha 1693	DMD (%) 34.62
Site 2 Wheat Crop Stubble Rye Grass	Site Composition 63.2% 9.3%	Kg DM/Ha 1693 250	DMD (%) 34.62 35.86
Site 2 Wheat Crop Stubble Rye Grass Old Man Salt Bush	Site Composition 63.2% 9.3% 8.6%	Kg DM/Ha 1693 250 230	DMD (%) 34.62 35.86 51.47
Site 2 Wheat Crop Stubble Rye Grass Old Man Salt Bush Wavy Leaf Salt Bush	Site Composition 63.2% 9.3% 8.6% 7.2%	Kg DM/Ha 1693 250 230 193	DMD (%) 34.62 35.86 51.47 52.87

Barley Grass, Samphire and Melons made up the remainder 6% (not economical to analyse).

Species Nutrition

Site 1	ME (Mj/Kg)	Crude Protein (%)
Barley Crop Stubble	4.80	3.52
Rye Grass	4.72	3.38
Old Man Salt Bush	8.11	9.18
Spear Grass	4.90	3.86

Total Kg DM/Ha = $1835 \sim \text{Total Kg of DDM/Ha} = 736$ Average DMD = $40\% \sim \text{Average ME}(Mj/Kg) = 5.2$ Average Crude Protein = 4.2%

Site 2	ME (Mj/Kg)	Crude Protein (%)
Wheat Crop Stubble	4.25	3.21
Rye Grass	4.46	3.59
Old Man Salt Bush	7.15	6.38
Wavy Leaf Salt Bush	7.39	10.08
Barley Grass	5.13	3.90

Total Kg DM/Ha = $2519 \sim \text{Total Kg of DDM/Ha} = 957$ Average DMD = $36\% \sim \text{Average ME}(Mj/Kg) = 4.5$ Average Crude Protein = 3.9%

Year 2: Nutrition

Note: Sampling has been conducted during the summer-autumn period as this project focuses on that specific seasonal feedd gap

Species Composition

Site 1	Site Composition	Kg DM/Ha	DMD (%)
Howlong Cocksfoot	30.9%	542	31.90
Rye Grass	22.5%	394	29.60
Commander Chicory	19.2%	337	68.70
Spear Grass	8.7%	152	34.10
Sardi 7 Lucerne	8.1%	142	59.20
Old Man Saltbush	5.8%	101	51.47
Fortune Fescue	4.9%	85	30.00
Site 2	Site Composition	Kg DM/Ha	DMD (%)
Site 2 Howlong Cocksfoot	Site Composition 35.0%	Kg DM/Ha 425	DMD (%) 41.00
Site 2 Howlong Cocksfoot Tall Wheat Grass	Site Composition 35.0% 11.4%	Kg DM/Ha 425 139	DMD (%) 41.00 43.30
Site 2 Howlong Cocksfoot Tall Wheat Grass Puccinellia	Site Composition 35.0% 11.4% 10.5%	Kg DM/Ha 425 139 128	DMD (%) 41.00 43.30 27.50
Site 2 Howlong Cocksfoot Tall Wheat Grass Puccinellia Commander Chicory	Site Composition 35.0% 11.4% 10.5% 7.8%	Kg DM/Ha 425 139 128 94	DMD (%) 41.00 43.30 27.50 71.80
Site 2 Howlong Cocksfoot Tall Wheat Grass Puccinellia Commander Chicory Rye Grass	Site Composition 35.0% 11.4% 10.5% 7.8% 6.3%	Kg DM/Ha 425 139 128 94 77	DMD (%) 41.00 43.30 27.50 71.80 40.50

Panic, Barley Grass, Lucerne, Wavy Leaf, River and Old Man Saltbush and Wire Weed made up the remainder 22.8% (not economical to analyse). This has been added to total Kg/DM/ha for analysis.

Species Nutrition

Site 1	ME (Mj/Kg)	Crude Protein (%)
Howlong Cocksfoot	3.8	4.1
Rye Grass	3.4	2.4
Commander Chicory	10.1	19.4
Spear Grass	4.2	4.4
Sardi 7 Lucerne	8.5	17.9
Old Man Saltbush	7.2	9.18
Fortune Fescue	3.4	3.3

Total Kg DM/Ha = 1753 Total Kg of DDM/Ha = 734.40 Average DMD = 42% Average ME(Mj/Kg) = 5.5 Average Crude Protein = 8.1%

Site 2	ME (Mj/Kg)	Crude Protein (%)
Howlong Cocksfoot	5.3	5.5
Tall Wheat Grass	5.7	4.2
Puccinellia	3.0	4.8
Commander Chicory	10.6	15.0
Rye Grass	5.3	4.9
Tall Fescue	4.4	3.2

Total Kg DM/Ha = 1215 Total Kg of DDM/Ha = 395 Average DMD =33% Average ME(Mj/Kg) = 4.3 Average Crude Protein = 4.6%

Species Nutrition

Dry Matter Digestibility (DMD)

DDM (or DMD) is the portion of the dry matter in a feed that is digested by animals at a specified level of feed intake.

Metabolisable Energy (ME)

The energy value of a feed available for an animal's maintenance or growth, and can be expressed in megajoules per kilogram of dry matter (MJ/kgDM). ME is calculated from feed digestibility and estimates the total energy available to the animal.

Crude Protein (CP)

The protein in a feed is estimated from the measured nitrogen (N) content of that feed. The estimate is termed crude protein, and is expressed as a percentage.

- Weaner lambs and pregnant or lactating ewes need 15% protein
- Growing adult sheep need 12% protein
- 9% protein is needed for survival

Site 1 Nutritional Interpretation: Grazing Days and Stocking Rates Over Time

Assumptions/Notes:

- 1. One DSE is based on the feed energy required to maintain a 45 kilogram liveweight Merino wether with zero weight change, no wool growth additional to that included in maintenance, and walking 7 km/day. 1 DSE has an energy requirement of approximately 8.7 MJ ME/day (DPIRD 2023).
- 2. Stocking rate of 4 DSE/Ha during the summer-autumn period
- 3. Site had been grazed prior to analysis

2022

Based on Species Composition, Kilogram of Dry Matter per hectare (Kg DM/Ha), Dry Matter Digestibility (DMD) and Metabolisable Energy (ME) 80 Merino wethers could graze this site for 110 days (4h/ha) before a paddock rest period would be required. Protein is below 9% and full nutritional analysis has not been conducted, supplementary feeding would be required.

2023

Based on Species Composition, Kilogram of Dry Matter per hectare (Kg DM/Ha), Dry Matter Digestibility (DMD) and Metabolisable Energy (ME) 80 Merino wethers could graze this site for 116 days (4h/ha) before a paddock rest period would be required. This is a 5% increase in grazing days within the 1st year of establishment. Protein is still below 9% and full nutritional analysis has not been conducted, so some sort of supplementary feeding would still be required.

Summary

- 4.6% decrease in Total Kg DM/Ha
- 0.2% decrease in Total Kg of DDM/Ha
- 5% increase in Average DMD
- 5.2% increase in Average ME(Mj/Kg)
- 93% increase in Average Crude Protein

Site 2 Nutritional Interpretation: Grazing Days and Stocking Rates Over Time

Assumptions/Notes:

- 1. One DSE is based on the feed energy required to maintain a 45 kilogram liveweight Merino wether with zero weight change, no wool growth additional to that included in maintenance, and walking 7 km/day. 1 DSE has an energy requirement of approximately 8.7 MJ ME/day (DPIRD 2023).
- 2. Stocking rate of 4 DSE/Ha during the summer-autumn period
- 3. Site had been grazed prior to analysis

2022

Based on Species Composition, Kilogram of Dry Matter per hectare (Kg DM/Ha), Dry Matter Digestibility (DMD) and Metabolisable Energy (ME) 144 Merino wethers could graze this site for 117 days (4h/ha) before a paddock rest period would be required. Protein is below 9% and full nutritional analysis has not been conducted, supplementary feeding would be required.

2023

Based on Species Composition, Kilogram of Dry Matter per hectare (Kg DM/Ha), Dry Matter Digestibility (DMD) and Metabolisable Energy (ME) 144 Merino wethers could graze this site for 48.88 days (4h/ha) before a paddock rest period would be required. This is a 58% decrease in grazing days in the 1st year of establishment when compared to the wheat stubble.

Summary

- 107% decrease in Total Kg DM/Ha
- 142% decrease in Total Kg of DDM/Ha
- 9% decrease in Average DMD
- 4.6% decrease in Average ME(Mj/Kg)
- 18% increase in Average Crude Protein

Animal Productivity Nonitoring

2023 - 2027



Grazing Days - Year 1 (2022)

Site 1

• 500 Ewes (1.2 DSE) for 4 days - December

Site 2

• 900 Wether Lambs (1 DSE) for 7 days - December

Grazing Days - Year 2 (2023)

Site 1

• 71 Twin Bearing Ewes (3.2 DSE) for 20 Days - June

Site 2

• 120 Twin Bearing Ewes (3.2 DSE) for 20 Days - June

Liveweight Gain - Year 2 (2023)

Site 1

• TBC

Site 2

• TBC

Cost-Benefit Analysis

2022 - 2027



Site 1 Costings

Establishment Cost Summary - 2022

 Sardi 7 Lucerne Commander Chicory Howlong Cocksfoot Fortune Fescue Megamax Panic 	Amount 3kg/ha 1kg/ha 2kg/ha 2kg/ha 2kg/ha	Unit Cost \$16.70 \$18.90 \$16.80 \$15.00 \$23.00	Total Cost \$701.50 \$264.60 \$470.40 \$420.00 \$644.00
Fertiliser/Chemical			
Ammonium Sulphate	10kg/ha	\$1.00	\$140.00
 Terrad'/700WG Herbicide 	20g/ha	\$0.32	\$89.60
 Glyphosate 450 	1.75L/ha	\$8.00	\$196.00
• Loveland MSO with Leci-Tech	10kg/ha	\$6.00	\$840.00
• Paraquat	1.75L/ha	\$7.00	\$171.50
• Trifluralin 480	1.5L/ha	\$7.00	\$147.00
Chlorpyrifos 500EC	0.3I/ha	\$10.00	\$42.00
• Wetter 1000	2.1L/ha	\$5.00	\$147.00
Talstar 250EC	80ml/ha	\$0.03	\$33.60
• Le-Mat 290 SL	150ml/ha	\$0.03	\$63.00
CS Calx Concentrate	10L/ha	\$7.50	\$1050.00
• K-TILL Extra	100kg/ha	\$1.2	\$1680.00
Operational			
• Spraying X 3	14ha	\$5.00/ha	\$210.00
Seeding Pasture	14ha	\$5.00/ha	\$70.00

Cost/ha = \$527.00 Cost/Site = \$7,380.00

Maintenance Cost Summary - Annual

TBC	Amount	Unit Cost	Total Cost

Site 1 Income

Income Summary

Item

Value

2022 Grazing Value

\$432.00 (\$0.18/DSE/Day)

Site 2 Costings

Establishment Cost Summary - 2022

Seed	Amount	Unit Cost	Total Cost
• Sardi 7 Lucerne	3kg/ha	\$16.70	\$1252.50
 Commander Chicory 	1kg/ha	\$18.90	\$472.50
Howlong Cocksfoot	2kg/ha	\$16.80	\$840.00
Fortune Fescue	2kg/ha	\$15.00	\$750.00
Megamax Panic	2kg/ha	\$23.00	\$1150.00
 Tall Wheat Grass (5ha) 	10kg/ha	\$12.00	\$600.00
 Puccinellia (5ha) 	2kg/ha	\$32.70	\$327.00
Fertiliser/Chemical			
 Ammonium Sulphate 	10kg/ha	\$1.00	\$300.00
 Terrad'/700WG Herbicide 	20g/ha	\$0.32	\$192.00
 Glyphosate 450 	1.75L/ha	\$8.00	\$420.00
 Loveland MSO with Leci-Tech 	10kg/ha	\$6.00	\$1800.00
 Paraquat 	1.75L/ha	\$7.00	\$367.50
 Trifluralin 480 	1.5L/ha	\$7.00	\$315.00
 Chlorpyrifos 500EC 	0.3I/ha	\$10.00	\$90.00
Wetter 1000	2.1L/ha	\$5.00	\$315.00
Talstar 250EC	80ml/ha	\$0.03	\$72.00
 Le-Mat 290 SL 	150ml/ha	\$0.03	\$135.00
 CS Calx Concentrate 	10L/ha	\$7.50	\$2250.00
• K-TILL Extra	100kg/ha	\$1.2	\$3600.00
Operational			
 Spraying X 3 	30ha	\$5.00/ha	\$450.00
Seeding Pasture	30ha	\$5.00/ha	\$150.00

Cost/ha = \$528.00 Cost/Site = \$15,848.00

Maintenance Cost Summary - Annual

TBC	Amount	Unit Cost	Total Cost

Site 2 Income

Income Summary

Item

Value

2022 Grazing Value

\$1134.00 (\$0.18/DSE/Day)

