# final report

| | |
|---|---|
| Project code: | MLA L.PDS.1604 |
| Prepared by: | Felicity Turner<br>MacKillop Farm Management Group |
| Date published: | 19 June 2019 |

PUBLISHED BY
Meat and Livestock Australia Limited
Locked Bag 1961
NORTH SYDNEY NSW 2059

## PDS: Seed Free Lamb

Meat & Livestock Australia acknowledges the matching funds provided by the Australian Government to support the research and development detailed in this publication.

# Executive summary

The project "Seed Free Lamb" aimed to explore alternative forage sources for producers to utilise to try and achieve a seed free environment for finishing lambs. Grass seeds in lambs can be a large problem in the region and it has large flow-on effects throughout the industry impacting on carcase quality.

In summary, throughout the project we;

- Initially tested seven cereal varieties and six alternative forage varieties in year 1 on small plots to identify most suitable species on two varying soil types to increase pasture quality and production with reduced grass-seed set in the paddock
- Had eleven demonstration sites test three varieties on a commercial scale on 290 ha over two years
- Have increased annual pasture production by an estimated 1500 kg DM/ha over normal practices in the area by oversowing cereal varieties for fodder into existing Lucerne stands
- Have increased lamb growth rates by an average of 20% when grazing improved pastures (either Scope CL or forage ryecorn) when compared to normal practice
- Have increased carrying capacity of the demonstrated paddocks resulting in an additional $90 - $340/ha of income being generated (depending on the forage system)
- Had 10 core producers directly involved in the project with an additional 47 attending field days and events directly related to the project
- Have seven core producers now oversowing with alternative species as a result of this PDS
- Have increased the confidence of ten core producers in their ability to finish 'seed free lambs' by 24% (from 61% to 85%)
- Have demonstrated changes in practice by 43% of observer producers, and intent to change practice by 5% of observer producers
- Have had all core producers delivering lambs to slaughter with no seed infestation issues

Throughout the project, producers have actively demonstrated the benefits of improving their feed sources using either the Clearfield Technologies (predominantly Scope CL barley) or alternative forages (newer forage ryecorn) by oversowing these varieties into existing Lucerne stands and providing crop competition and/or herbicide alternatives to control grass weeds in these systems.

These practices have allowed producers to either finish lambs earlier (due to increased feed quality and quantity in the winter period), or have provided a seed free environment in spring (where Clearfield Technologies have been utilised) allowing producers to hold lambs with confidence on paddocks until their stubbles are ready to be grazed (or until they achieve slaughter weight).

A decrease in the number of lambs presenting to processors with grass seed infestations has a positive impact on the efficiency of the whole supply chain as well as the welfare of the individual animal. By implementing different management practices, producers have been able to produce more feed and are achieving increased stocking rates on these paddocks, allowing them to potentially increase the overall farm stocking rates and has the potential to produce more lambs annually.

The process of different producers trying new things and feeding information back into the group has provided valuable information around best management practices for the different options demonstrated, including the sowing conditions and grazing management to maximise the benefits of forage ryecorn, and the herbicide options in mixed cereal Lucerne swards.

# Table of contents

# 1 Background

## 1.1 Sherwood Farm Management Group

The Sherwood Farm Management Group is a group of 13 farm businesses who meet monthly to discuss issues affecting on-farm productivity and profitability. These producers have long identified seeds in lambs as a major risk to their farm businesses and wanted to explore different practical alternatives to try and manage grass seeds and their impact on their businesses.

They are supported by the MacKillop Farm Management Group (MFMG) who provide facilitation, and project management support to the group, and the ability to extend the findings to the wider community.

The MFMG was established in 1998, and is a partnership between the farming community, research and extension agencies and agribusiness. It is a not-for-profit organization that develops and communicates innovative and sustainable farming practices through research, development and extension programmes in the South-East of South Australia and Western Victoria from Tintinara to the west through to Goroke, Victoria and to Mount Gambier in the south. The group has a current membership of 295 made up of farmers, agribusiness and industry representatives.

## 1.2 Issues faced by group members

The infestation of lambs with problem seeds is a major issue in the Upper South East of South Australia. Production losses result in reduced on-farm productivity through reduced growth rates, reduced wool values, and increased animal health issues. Compounding this is the effect on skin and carcase values, along with the huge costs to the processing sector, which are passed on to producers. The main problem species in the region are Silver grass (*Vulpia* spp.), Geranium (*Erodium* spp.), Barley grass and Brome grass.

Data from the PIRSA Enhanced Abattoir Surveillance (EAS) Program showed that, in 2014, 24% of producers from the Upper South East consigning lambs to Thomas Foods International (TFI) had significant carcase seed contamination problems. Within the contaminated lines of sheep, an average 80% of animals were affected. It is estimated that the cost to industry of this contamination could be as much as $30 per affected animal. Contaminated carcases may be trimmed excessively before they are weighed and penalties applied as high as $1.00 per kg.

The EAS data only captures lambs sent direct to slaughter (and currently to only one works) and does not account for lambs which are sold through the saleyard system, which anecdotally will have higher levels of contamination.

The problem of grass seed contamination of lamb carcases is a nation-wide one, with significant issues also occurring in regions of NSW, WA and Victoria.

## 1.3 Producer management practices

A large proportion of producers try to market lambs prior to the onset of seed issues. They are lambing earlier than ideal (in early autumn) when there is often a lower amount of paddock feed on offer and a lower plane of nutrition; this often requires supplementary feeding (an additional expense) until the winter feed supply increases.

This current practice allows the majority of lambs to be marketed by the 1st October; after this time, the risk of grass-seed infestation increases greatly, and to minimise seed issues after this time some producers either start containment feeding or put lambs onto winter-cleaned or spray topped

pastures or lucerne paddocks that have been over sown with cereal crops to try and provide a seed-free environment.

In recent years, and with increasing climate variability, this rule of thumb (market lambs by the 1st October) has been tested with later opening breaks and earlier finishes compounding the issue. Under these varying climatic conditions, grass seed maturity has been occurring earlier when compared with the longer-term average seasons experienced in the past. As producers try to reduce the amount of supplementary feeding, and pressure is placed on later lambing times, increased pressure is placed on the ability to finish lambs on clean 'seed free' pastures.

## 1.4 Group's motivation

Being able to provide good quality, early feed to try and boost lamb growth rates early, or alternatively having clean 'seed-free' pastures going into spring to finish lambs will provide more flexibility in the system and reduce the financial burden of supplementary feeding. It will also assist in off-setting the issue of seasonal variability where the onset of seed issues can be earlier than 1st October, making it increasingly challenging for producers to market quality seed-free lambs that meet market requirements.

Herbicides that have traditionally been used to improve pasture quality and control problem grasses (either through winter cleaning or spray topping) appear to be having reduced efficacy, and so producers feel that it is time to reassess and look at alternative options.

## 1.5 MLA Priority areas

This project addressed the MLA priority areas of:

- Pasture and grazing management – weed management; fodder management and utilisation; matching feed supply and demand; improved quality of feed supply; increased productivity on poorer soils
- Meeting market specifications and compliance – supplying seed free lambs
- Improving liveweight gain – improved productivity through improved growth rates from improved feed supply
- Enhancing enterprise efficiency – early feed supply enabling earlier turn off; managing climate variability

## 1.6 SASAG contribution

This project was also supported by the South Australian Sheep Advisory Group (SASAG) through the contribution of funds from the SA Sheep Industry Fund. The SASAG have been an active participant in the National Grass Seed Leadership Group, and have been proactive in confronting the problem of seed contamination by funding, within South Australia, the Winning Against Seeds project.

# 2 Project objectives

By December 2018, in the South-East of South Australia, we will:

1. Understand the current herbicide resistance status of common grass seed species in the region
2. Have demonstrated and assessed the potential of Clearfield® cereal varieties sown into established lucerne stands to provide a balanced fodder source on which to finish seed free lambs through:
    - Demonstrating the effectiveness of Clearfield® herbicides for barley grass, silver grass and brome grass control while maintaining lucerne stands providing a quality balanced feed option that has the ability to decrease the levels of seed contamination in the skin and carcase of lambs sent to slaughter. This will be done by monitoring of the weed population, and measurement of the forage quantity (kg DM/ha) and quality (feed tests).
3. Have demonstrated and assessed the potential of new forage rye corn varieties to provide an alternative feed source with the ability to finish lambs prior to the seed onset on poorer sandy country prone to problems with silver grass through:
    - Providing species competition to assist with control of silver grass, while producing a higher quality fodder that aims to finish seed free lambs. This will be done by monitoring the weed population, and measurement of the forage quantity (kg DM/ha) and quality (feed tests).
4. Conducted a cost benefit analysis to determine the cost effectiveness of the Clearfield® cereal varieties and rye corn varieties being demonstrated compared with current standard practice (including level of supplementary feeding, kg red meat per unit area produced, turn-off time and carcase quality).
5. At least eight producers (producing 20,000 lambs) will have increased their knowledge and skills with all having implemented and tested practices that increase pasture quality and production with reduced grass-seed set in the paddock, resulting in improved growth rates of lambs that allow them to increase the number of seed free lambs with improved carcase quality, therefore better meeting market requirements.
6. At least fifty producers (40,000 lambs) will have direct contact with the project through extension activities allowing them to increase their knowledge and skills around the issues relating to seed contamination in lambs and how to mitigate these issues, with 50% of these producers intending to implement change into the future

# 3 Methodology

## 3.1 Replicated trials 2016 (Year 1)

Two replicated trial sites were sown in 2016 (Year 1); the "Cereal Technologies Site" Site 1 in Sherwood, and the other the "Alternative Forage Site" Site 2 Senior as a 'proof of concept' to assess the suitability of varieties prior to taking out to a larger paddock scale demonstration.

Both sites were sown later than ideal due to weather conditions (late break to the season and then lack of trafficability), however with the mild spring conditions, the impacts of this were offset slightly. Both sites were located off of clay tracks and became impassable at various times affecting some of the timing of measurements.

### 3.1.1 Cereal Technologies

The cereal technologies site was sown into a sand over clay soil that had been delved and spaded. The existing Lucerne stand was 5 years old and starting to decline – Scope CL barley was sown into the paddock to provide increased feed quantity and allow for the control of grass seeds. The small plot trials located in this paddock compared various cereal varieties (all sown at 60kg/ha) and their value in providing additional feed over the winter period (Figure 1); it also looked at the level of weed control achieved between the Clearfield varieties that were sprayed with Intervix and the other cereal varieties that weren't sprayed and also the persistence of Lucerne; particularly in the sprayed plots.

Table 1. 2016 MFMG MLA Cereal Technologies Site

| | |
|---|---|
| **Property** | Site 1 |
| **Plot size** | 12m x 1m |
| **Sowing date** | 7th June 2016 |
| **Sowing rate** | 60kg/ha |
| **Soil type** | Modified sand over clay (delved) |
| **Fertilizer** | 140kg/ha 18:13:0:10 with 400 ml/ha Impact at sowing |

| Buffer | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | Scope CL Barley | | 8 | Grenade CL Wheat | | 15 | Mundah Barley |
| 2 | Compass Barley | | 9 | Southern G Ryecorn | | 16 | Manning Wheat |
| 3 | Mundah Barley | | 10 | Moby Barley | | 17 | Compass Barley |
| 4 | Moby Barley | | 11 | Compass Barley | | 18 | Grenade CL Wheat |
| 5 | Southern G Ryecorn | | 12 | Mundah Barley | | 19 | Scope CL Barley |
| 6 | Manning Wheat | | 13 | Scope CL Barley | | 20 | Moby Barley |
| 7 | Grenade CL Wheat | | 14 | Manning Wheat | | 21 | Southern G Ryecorn |
| Buffer | | | | | | | |

Level of weed control, effect of herbicide on Lucerne persistence, biomass production and feed quality were all measured.

### 3.1.2 Alternative Forages

The alternative forage site was a deep sandy soil that had not been modified. The surrounding paddock was sown with barley for feed. The small plot trials in this paddock compared some of the newer forage ryecorn varieties to barley varieties and assessed their ability to produce high levels of quality feed to enable lambs to be finished earlier prior to the onset of grass seeds (Table 2).

Table 2. 2016 MFMG MLA Alternative Forage Site Trial Plan

| | |
|---|---|
| **Property** | Site 2 |
| **Plot size** | 8m x 8rows x 15cm |
| **Sowing date** | 15th June 2016 |
| **Sowing rate** | 120 kg/ha (Cereals), 60Kg/ha (Ryecorn) |
| **Soil type** | Sand |
| **Fertilizer** | 140kg/ha 18:13:0:10 with 400 ml/ha Impact at sowing |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Buffer Compass | | | Buffer | | | Buffer |
| 1 | Southern G Ryecorn | | 7 | Moby Barley | | 13 | Scope CL Barley |
| 2 | Vampire Ryecorn | | 8 | Tuckerbox Triticale | | 14 | Cape Barley |
| 3 | Moby Barley | | 9 | Cape Barley | | 15 | Southern G Ryecorn |
| 4 | Scope CL Barley | | 10 | Vampire Ryecorn | | 16 | Tuckerbox Triticale |
| 5 | Cape Barley | | 11 | Scope CL Barley | | 17 | Vampire Ryecorn |
| 6 | Tuckerbox Triticale | | 12 | Southern G Ryecorn | | 18 | Moby Barley |
| | Buffer | | | Buffer | | | Buffer |

Dry matter production and feed quality assessments at peak biomass were measured.

## 3.2 Producer demonstrations

### 3.2.1 Producer Demonstrations 2017 (Year 2)

Four producer demonstration sites were established in 2017 across three different farms to look at Clearfield Technologies and the newer forage ryecorn varieties in controlling seeds and finishing lambs quicker prior to the onset of seed set.

Each producer followed a slightly different methodology depending on his individual circumstances, infrastructure available and fodder requirements in that season. The locations and site activities and measurements taken are summarised in Table 3.

Table 3. 2017 Producer Demonstration sites

| **Producer**<br>**Soil type** | **Site 1**<br>Modified sand* | **Site 2**<br>Deep Sand | **Site 3**<br>Modified sand* |
|---|---|---|---|
| **Cereal Technologies Demonstration** | Scope CL sown into dwindling lucerne stand | | Scope CL sown into dwindling lucerne stand to improve early feed production and achieve grass control |
| Area (ha) | 11 ha | | 55 ha |
| - Methodology | Sown 3-May 2017 with an airseeder fitted with knife points for winter and spring feed. Sown with 60kg/ha DAP. Scope CL sprayed for grass weed control on 11-July 2017. | | Sown 15-May 2017 with an airseeder fitted with knife points to provide late winter, early spring feed for weaned lambs. Intervix applied for grass weed control. |
| - Measurements | Feedtests of forage prior to lamb entry (27-July 2017)<br>Lamb growth rates<br>Lamb stocking rates<br>Dry matter production pre-grazing<br>Weed observations | | Weed density observations pre and post-spraying<br>Lucerne observations and plant density pre and post-spraying<br>Grain yield (feed wasn't required) |
| **Alternative Forages Demonstration** | Two forage ryecorn varieties sown to compare growth to cereal technologies | Two forage ryecorn varieties sown to assess suitability in system | |
| Area (ha) | 27.5 ha | 28 ha | |
| -Methodology | Sown 5-May 2017 with an airseeder fitted with knife points for winter and spring feed. Sown with 60kg/ha DAP. Spraytopped on 5-October to reduce grass seed set in barley grass present | Sown 7-May 2017 (broadcast and incorporated by prickle chain) to ensure seed wasn't sown too deep. Single Super applied at 60kg/ha. | |
| -Measurements | Feedtests of forage prior to lamb entry (27-July 2017), and additional feedtest 13-Sept 2017 prior to re-entry<br>Dry matter production pre-grazing<br>Weed observations | Lamb growth rates<br>Weed observations | |

*Modified sand is a sandy soil that has been modified using clay - either through clay spreading, delving and/or spading to increase the water holding capacity of the soil

### 3.2.2 Producer Demonstrations 2018 (Year 3)

Table 4. 2018 Producer Demonstration Sites

| **Producer** | **Site 1** | **Site 4** | **Site 3** | **Site 5** | **Site 6** |
|---|---|---|---|---|---|
| **Soil type** | Modified sand* | Sand | Modified sand* | Deep Sand | Sand |
| **Area (ha)** | 80ha (2 x 40ha paddocks) | 18ha (9ha each variety) | 20ha | 15ha | 38ha (18ha ryecorn, 20ha Scope CL) |
| **Cereal Technologies Demonstration** | Scope CL sown into dwindling lucerne stand | | Scope CL sown into dwindling lucerne stand to provide flexibility for late sheep feed that is free from seeds if season falls short | | Scope CL sown into an existing lucerne stand to utilise for hay production and then a clean fodder paddock in spring. |
| - Methodology | Sown 8-May 2018 with an airseeder fitted with knife points for winter and spring feed. Sown with 40kg/ha DAP. Scope CL sprayed for grass weed control on 22-Aug 2018. | | Sown 18-May 2018 with an airseeder fitted with knife points. Intervix applied for grass weed control. | | Sown 3-May 2018 with an airseeder fitted with knife points. DAP applied @ 80kg/ha. Intervix applied for grass control 25-July 2018. |
| - Measurements | Stocking rates<br><br>Weed observations pre and post-sowing<br>Lucerne observations pre and post-spraying | | Weed density observations pre and post-spraying<br>Lucerne observations and plant density pre and post-spraying<br>Grain yield – paddock was too unstable post-fires to grain | | Weed observations pre and post-sowing<br>Lucerne observations pre and post spraying<br>Initial dry matter production |
| **Alternative Forages Demonstration** | Sowed Southern Green Forage Ryecorn to increase winter feed production | Two forage ryecorn varieties sown to assess suitability in system | | Assessment of Southern Green Forage ryecorn production on deep sandy soils as a fodder source for lambs | Assessing Southern Green Forage Ryecorn as a winter feed option to finish lambs quickly. |
| -Methodology | Sown 7-May 2018 with an airseeder fitted with knife points for winter and spring feed. Sown with 40kg/ha DAP. | Sown 5-May 2018 into sandy soils with 60Kg/ha DAP. | | Dry sown on 29-June 2018 into non-wetting sand that had been spraytopped in 2017. | Sown 12-May 2018 with an airseeder fitted with knife points. DAP applied @ 80kg/ha at seeding. |
| -Measurements | Stocking rates<br><br>Weed observations | Dry matter production<br><br>Weed observations | | Stocking rates<br><br>Ground cover assessments | Initial dry matter production<br><br>Weed observations<br>Lamb growth rates and red meat production (kg/ha) from paddock |

## 3.3 Herbicide resistance

Plant samples were collected from key sites and sent to Plant Science Consulting Laboratory for a weed resistance quick test as per the protocol supplied on the Plant Science Consulting website at http://www.plantscienceconsulting.com.au/weed-resistance-quick-test/

## 3.4 Lambs at Slaughter

### 3.4.1 Participant data

Key producers were surveyed initially about the number of lambs that they had sold "seed free" in the past 5-10 years. They were then surveyed again at the end of the project. Feedback around producers current seed status (and if any lambs had been detected since the projects inception) was also sought from producers that attended the JBS abattoir site visit in February 2017.

### 3.4.2 Enhanced abattoir surveillance data

Data from the Enhanced Abattoir Surveillance (EAS) program was utilised to provide a regional snapshot of the issue in grass seeds in lambs and if there were any changes in the number of producers sending lambs to slaughter infested with seeds over the life of the project. Note that only Thomas Foods International abattoirs (Murray Bridge and Lobethal) were participating in this program at the time of the project.

## 3.5 Economic analysis

Economic analysis was conducted utilising either the producer costs, or those provided in the "Farm Gross Margin and Enterprise Planning Guide" for South Australia in the year that the analysis was conducted. Producer returns were calculated by using the net return (c/kg) received by producers at the time of slaughter.

## 3.6 Extension and Communication

Extension documents were prepared and approved by MLA prior to public release. Additional newspaper articles were written by Rural Press and distributed through their networks.

## 3.7 Monitoring and Evaluation

Monitoring and Evaluation was conducted as per the MERI plan established in consultation with MLA. Data around participants and evaluation (both verbal and some surveys) were conducted as required.

# 4 Results

## 4.1 Replicated trials 2016 (Year 1)

### 4.1.1 Cereal Technologies

This site was demonstrating and assessing the potential for "Clearfield Technologies"; both barley and wheat varieties. Seven cereal varieties were assessed (5 non-Clearfield, and 2 Clearfield varieties) for the level of dry matter production throughout the season, if there was increased weed control in Clearfield Technology plots once they were sprayed and the impacts on Lucerne production and persistence after an Intervix application. Feedtests were taken in spring and the quality of feed at that time (when grass seeds would be having an impact in unsprayed paddocks) was measured (tested by AgriFood Technology).

Figure 1 shows the site on 5th August, and Figure 2 shows the site on the 26th September at the time that the biomass and quality samples were taken.

Figure 1. Initial establishment at site

Figure 2. Growth at time of sampling (Ryecorn on LHS, Moby barley on RHS)

Weed control: Initial weed assessments were made at the site, and then again assessed after spraying the Clearfield technology plots with Intervix – the dominant grass weed species being controlled was barley grass with an initial population of 12 plants/$m^2$ across the site. After the spray application in the Scope CL and Grenade CL plots, the barley grass populations were reduced to 2 plants/$m^2$ in these plots.

Lucerne persistence: Lucerne plants were measured in the Clearfield plots before and after spraying with Intervix; there appeared to be no reduction in plant numbers due to herbicide application. The herbicide application did slow the growth slightly but the Lucerne had fully recovered when compared to the other plots by September.

Biomass production: The total biomass produced across the plots was measured in September (Figure 3). The Compass barley produced the greatest level of biomass, however it is an early maturing variety and tends to mature quicker than the other varieties. This affected its Australian Fodder Industry Association (AFIA) quality grading as shown in Table 5. In contrast Manning wheat – a long season winter wheat variety was still vegetative at the time of sampling and still had not produced a lot of biomass, however the quality of biomass produced was a lot greater.

The Scope CL had similar biomass production and quality to Moby barley; a forage barley, however it provided increased weed control through the use of Intervix herbicide highlighting its potential to be used as a good grazing option while managing weeds. Figure 4 shows lambs grazing on the surrounding paddock where Scope CL was oversown into an existing Lucerne stand.

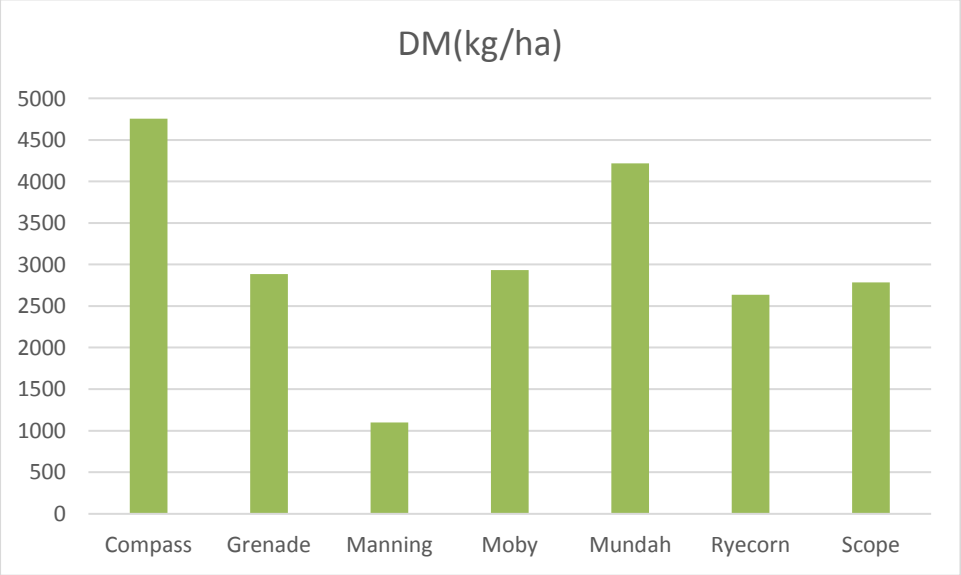


Figure 3. Biomass Production at Cereal Technology site (measured 26th September 2016)

The site was often unaccessible during the season so measurements couldn't be taken earlier. These samples were then sent away for analysis at Agrifood Technology.

Table 5. Biomass production and Feed Quality at Cereal Technology site.

| Cereal Variety | DM(kg/ha) | Crude Protein | Acid Detergent Fibre | Neutral Detergent Fibre | Dry Matter Digestibility (%) | Metabolisable Energy | Fat (%) | Ash (%) | AFIA Grading (Cereal hay and silage) |
|---|---|---|---|---|---|---|---|---|---|
| **Compass** | 4754 | 7.8 | 38.2 | 68.4 | 55.5 | 7.9 | 2.4 | 4.2 | C2 |
| **Grenade** | 2884 | 10.4 | 38.4 | 65.2 | 54 | 7.7 | 2.6 | 10.5 | C1 |
| **Manning** | 1099 | 13.6 | 36 | 60.6 | 65.5 | 9.6 | 3.2 | 11 | A1 |
| **Moby** | 2933 | 10.8 | 37.1 | 63 | 60.8 | 8.8 | 2.8 | 9.4 | B1 |
| **Mundah** | 4216 | 11.6 | 36.8 | 64.9 | 56.6 | 8.1 | 2.4 | 6.9 | C1 |
| **Ryecorn** | 2636 | 10.6 | 40.3 | 68 | 52.8 | 7.5 | 2.5 | 9.4 | C1 |
| **Scope** | 2786 | 10.8 | 37.9 | 63.2 | 57.7 | 8.3 | 2.6 | 9.3 | C1 |

Figure 4. Lambs grazing Scope CL oversown into an existing Lucerne stand at “Site 1”.

### 4.1.2 Alternative Forages

This site was demonstrating and assessing the potential for new “Alternative Forage” cereal varieties; mainly the newer forage ryecorn varieties Southern Green forage ryecorn and Vampire Ryecorn in filling an early winter feed gap in sandy soils. The two forage ryecorn varieties were compared to three barley varieties and one triticale variety and the dry matter production and feed quality assessed.

Despite the late start, the two forage ryecorn varieties produced the greatest amount of biomass at the site even though early vigour (particularly of the Southern Green Forage ryecorn) was reduced (Figure 5). It is thought the seed may have been sown too deep affecting initial vigour of the ryecorn when compared to a cereal (ideal seeding depth of Southern Green Forage ryecorn is 10-25mm). Figure 6 shows the site at the time of sampling.

Figure 5. Initial establishment at the site

Figure 6. Growth at time of sampling

Despite poor establishment, the growth of the ryecorn on these sandy soils was superior to all other species sown (Figure 7) with the two new forage ryecorn varieties producing increased levels of biomass. Feedtests were taken in spring and the quality of the fodder assessed compared to the cereal varieties. The quality data is shown in Table 6. The Southern Forage ryecorn achieved the same AFIA grade as the barley varieties grown (including that of Moby barley – a forage barley variety) with the Vampire Forage ryecorn achieving a slightly lower grade (lower Dry Matter Digestibility); possibly due to the stage of maturing.

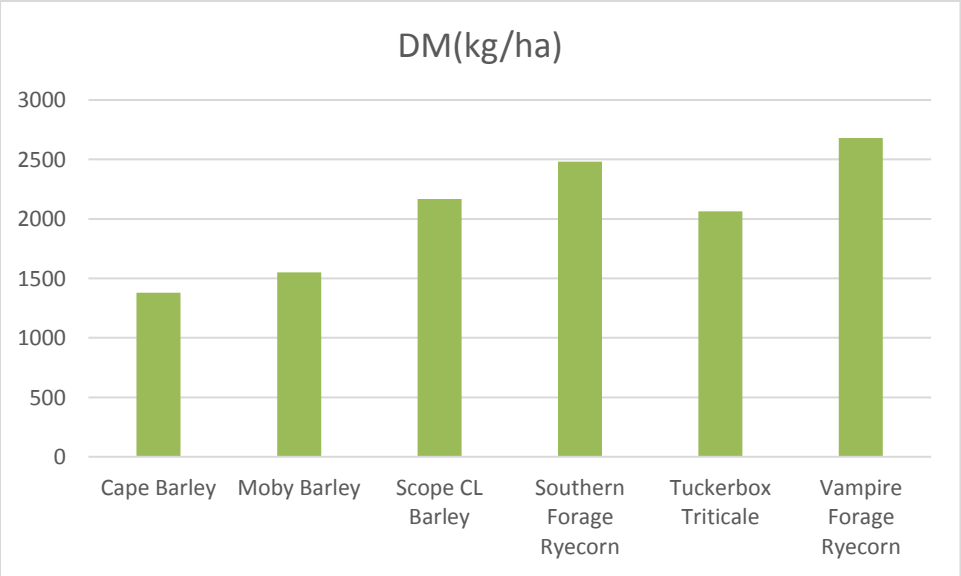


Figure 7. Dry Matter production at the Alternative forage site

Table 6. Biomass production and quality data at Alternative Forage site.

| ***Cereal Variety*** | **DM(kg/ha)** | **Crude Protein** | **ADF** | **NDF** | **DMD** | **ME** | **Fat %** | **Ash %** | **AFIA Grade** |
|---|---|---|---|---|---|---|---|---|---|
| *Cape Barley* | 1380 | 14 | 34.6 | 60 | 65.4 | 9.6 | 3.1 | 9.6 | B1 |
| *Moby Barley* | 1550 | 11.9 | 36.6 | 62.3 | 64.8 | 9.5 | 3 | 9.7 | B1 |
| *Scope CL Barley* | 2168 | 11.3 | 34.9 | 59.4 | 64.8 | 9.5 | 2.9 | 8.5 | B1 |
| *Southern Forage Ryecorn* | 2481 | 14 | 33.5 | 60.4 | 63.1 | 9.2 | 2.9 | 6.7 | B1 |
| *Tuckerbox Triticale* | 2063 | 10.5 | 36.7 | 64 | 59.6 | 8.6 | 2.9 | 8.4 | C1 |
| *Vampire Forage Ryecorn* | 2681 | 12.7 | 36.2 | 62.5 | 58 | 8.4 | 2.8 | 8 | C1 |

## 4.2 Producer Demonstrations

### 4.2.1 Producer Demonstrations 2017 (Year 2)

#### *4.2.1.1 Site 1*

The paddock was sown between the 3rd and 5th May 2017 with 11ha Lucerne oversown with Scope CL barley and 27.5ha sown with the two forage ryecorn varieties (13.5ha of Southern Green Forage Ryecorn and 14ha of Vampire Forage Ryecorn). The ScopeCL was sprayed for grass weed control on 11th July and the Forage Ryecorn was spraytopped on 5th October to reduce grass seed set. Fig.6 shows the growth mid-July 2017.

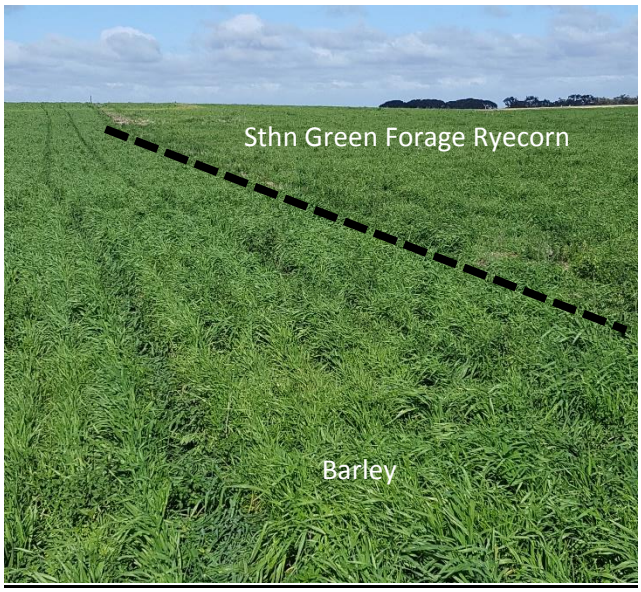


Fig 8. Pasture growth 20th July 2017

Feed samples were taken prior to initial entry of lambs on 27th July 2017 and sent to Agrifood Technology for analysis (Table 7). Additional feed samples of the ryecorn were taken on 13th September 2017 as lambs were being placed back on the paddock (Scope CL wasn't grazed at this time as there wasn't enough feed present). These feed sample results are shown in Table 8.

Table 7. Biomass production and Feed Quality 27th July 2017

| Forage Mix | DM(T/ha) | Crude Protein | Acid Detergent Fibre | Neutral Detergent Fibre | Dry Matter Digestibility (%) | Metabolisable Energy | Fat (%) | Ash (%) | AFIA Grading (Cereal hay and silage) |
|---|---|---|---|---|---|---|---|---|---|
| **Vampire+Lucerne** | 2.4 | 27.5 | 23.9 | 40.4 | 79 | 12 | 4.5 | 14.3 | A1 |
| **SthnGreen+Lucerne** | 3.08 | 24.7 | 22.8 | 36.7 | 75.6 | 11.4 | 4.4 | 12.5 | A1 |
| **Scope CL + Lucerne** | 2.36 | 24.2 | 23.1 | 38.5 | 80.1 | 12.2 | 4.2 | 11.1 | A1 |
| **Vampire** | 2.27 | 22.2 | 26.9 | 45.3 | 73.6 | 11 | 3.9 | 12.5 | A1 |
| **Southern Green** | 1.88 | 22.5 | 25.8 | 41.3 | 73.8 | 11.1 | 4 | 14.3 | A1 |
| **Scope CL** | 1.8 | 27.2 | 24.3 | 39.5 | 80.7 | 12.3 | 4.1 | 13.1 | A1 |

Table 8. Feed Quality data 13th September 2017

| Cereal Variety | DM(%) | Crude Protein | ADF | NDF | DMD | ME | Fat % | Ash % | AFIA Grade |
|---|---|---|---|---|---|---|---|---|---|
| **Vampire Forage Ryecorn** | 17.1 | 26.8 | 25 | 39.2 | 77.3 | 11.7 | 4.4 | 13.2 | A1 |
| **Southern Forage Ryecorn** | 16.4 | 27.5 | 24 | 37 | 78 | 11.8 | 4.4 | 11.2 | A1 |

Post-weaning, all lambs were placed in a Compass barley paddock that was being used under a 'grain and graze' scenario. They grazed this for 23 days prior to being yarded where a sub-sample of lambs were tagged and weighed in from each group and then weighed out to compare weight gains from each of the ryecorn varieties compared to the ScopeCL barley. The lambs that were run under standard farm practice (lucerne, clover and annual grasses) were those that were weaned at a lower weight as the standard paddock was further away from the yards.

The lambs were described as being 'social' and a single electric fence wire separating them from their mates didn't work very effectively. As a result, those grazing the two ryecorn varieties were unable to be segregated from each other. The lambs grazing the Scope barley had double electric wires separating them from the ryecorn area – this method worked much more effectively. Fig 9 shows lambs grazing Southern Green Forage Ryecorn in mid-September.

Fig 9. Lambs grazing mid-September

The growth rates of lambs grazing both the Scope CL barley and forage ryecorn varieties were very similar; achieving an average of 450g/day between the 3rd August and the 4th September. In addition to paddock feed, the stock were given access to grain in feeders (same amount per lamb per day). These growth rates are at the top end of what has been achieved on the farm, with standard growth rates generally being 350-420g/day.

There was a large difference in the total grazing days and stocking rates achieved between the two varieties over the target period in which they were compared (Table 9) suggesting a lot higher biomass production by the Vampire and Southern Green Forage Ryecorn varieties. Paddock management records are shown in Appendix 1.

Table 9. Stocking rates (dse/ha) for the target period (1-May 2017 to 10-Oct 2017)

| | d.s.e./ha |
|---|---|
| Forage Ryecorn | 12.83 |
| Scope CL barley | 10.57 |

#### *4.2.1.2 Site 2*

Due to the producer airseeder not being accurate in its seed placement and learning from 2016 observations, the cereal ryecorn was broadcast by spreader and incorporated by prickle chain to ensure that the ryecorn was sown shallow (in the top 10mm). This resulted in a reduced and patchy germination of seed which was also subject to mouse damage early on resulting in a patchy germination (Fig.10-11).

Fig 10. Patchy germination with mouse holes evident

Fig 11. Mouse Hole in paddock

Visually, the Vampire Ryecorn appeared to produce more biomass, however it was also planted on the heavier country making comparisons difficult.

The forage ryecorns were grazed post-weaning and weight gains of these lambs measured. The weight gain in the lambs was 280g/day. This was the same as 'standard practice' of sowing barley and grazing for winter-early spring feed.

Due to favourable winter conditions, lambs were sold earlier than anticipated, so stocking numbers were lower than expected. This resulted in the ryecorn running up to head and becoming unpalatable to young stock (Fig 12). When grazing cereal ryecorn, paddock size and the ability to graze heavily should be taken into account.

The ryecorn would suit a mixed farm operation with both sheep and cattle, where the cattle could capitalise on the feed once it became unpalatable to lambs.

It also suited dry sheep, as the ryecorn residue was a much tougher plant compared with the barley stubble and reduced the impact of sheep camping on sandhills; the ryecorn played an important role over the summer period in soil stabilisation compared with a cereal stubble or barley sown for feed.

Fig 12. Ryecorn growth (October 2017)

#### *4.2.1.3 Site 3*

The Scope CL barley was oversown into a Lucerne paddock on the 15th May 2017 to provide late-winter, early spring feed for weaned lambs. The crop established well, and after the spray

application of Intervix, the grass weed control was very good (with a slight checking of the Lucerne plants, but no visual loss of plant density). In late July prior to entry of the lambs, the decision was made to not graze and retain this paddock as a crop as there was an excess of late winter feed due to a good break and mild winter conditions. Grain yield of the paddock was 2.3T/ha, and the paddock was then grazed post-harvest over the summer period.

### 4.2.2 Producer Demonstrations 2018 (Year 3)

#### *4.2.2.1 Site 1*

Scope CL and Southern Green Forage ryecorn were sown on a paddock scale (40ha) in 2018 to overcome some of the issues in 2017 with stock getting through fences. Previous results had allowed the producer to change his management slightly, lambing down later when there was more food on offer as his confidence level had increased around managing seeds at the later end of the season. As a consequence of this, the paddocks were grazed with a mixture of ewes and lambs, as well as weaned lambs later in the season. The management and grazing details for each paddock (H5 – Southern Green Forage Ryecorn and I4 – Scope CL) are attached in Appendix 2.

Table 10 shows the grazing capacity of each of the different options over the time of the measured period (1-May 2018 – 23-Nov 2018). The Forage ryecorn was grazed very heavily to try and maximise the pasture utilisation. In doing this, the canopy was left quite open in August and September which resulted in late germinations of barley grass (Figure 13) having the potential to cause damage to lamb carcases in late Spring.

Table 10. Stocking rates (dse/ha) for the target dates 1-May 2018 – 23-Nov 2018

| | **d.s.e./ha (May-Nov)** |
|---|---|
| **Forage Ryecorn** | 10.24 |
| **Scope CL barley** | 7.53 |

The Scope CL barley wasn't sprayed with Intervix in 2018 as the previous management (spray topping spring prior and pre-emergent herbicide applications), along with the crop competition from the barley appeared to control the barley grass seed burden.

Table 11 shows a comparison between the annual stocking rates of the different management practices implemented, and compares them to the standard practice of grazing Lucerne stands on Site 1.

Table 11. Stocking rates (dse/ha) across the farm

| | **d.s.e./ha (Annually)** |
|---|---|
| *Forage Ryecorn* | 8.3 |
| *Scope CL barley* | 6.7 |
| *Lucerne pasture* | 5.7 |

#### *4.2.2.2 Site 4*

Two different forage ryecorn varieties (Southern Green Forage and Vampire Ryecorn) were sown in early May and the growth of the two varieties compared on sandy soils. The seed was sown into a

moist soil seedbed and so the initial germination was good. Both varieties appeared to suppress weeds with their strong competition with very little weeds being observed in the crop, but a lot being observed on the fence lines and on the edges of the wheat crop that was grown on the more productive soil in the paddock. Both varieties grew quite large amounts of biomass (Table 12), however it is difficult to make direct comparisons, as the areas planted were on different sandhills and not adjacent to each other.

Table 12. Forage ryecorn total biomass production, Site 4 2018

| | Biomass (T/ha DM) |
|---|---|
| **Vampire** | 10.6 |
| **Southern Green Forage** | 8.64 |

#### *4.2.2.3 Site 3*

Scope CL was again sown into a Lucerne pasture (one that had been impacted by the Sherwood fires in January 2018), with the tynes assisting in evening out some of the ground and the crop assisting with soil stabilisation. Due to concerns over the soil stability post-fire, the crop and subsequent stubble were not grazed to provide a stable environment to sow permanent pasture back into. The grain yields were much lower than expected (due to a lot of wind damage early on) at 1.8T/ha.

#### *4.2.2.4 Site 5*

Southern Green Forage Ryecorn was sown into dry sandy soil at the end of June 2018. This resulted in a very slow germination and the paddock wasn't able to be grazed until 1-September 2018. The slow germination and initial growth meant that the end use of the ryecorn changed, and it was used to finish growing out ewe hoggets and they were mated on the pasture.

The weed control appeared to be adequate and the spray topping the season before appeared to have been fairly effective in reducing seed set. The ryecorn was grazed for a total of 300 days (2018 and into 2019) with a total stocking rate for this time of 8.14 dse/ha being achieved which is much higher than would normally be achieved on this country. The ryecorn has also kept the soil fairly stable in this paddock and the risk of wind erosion has been reduced.

#### *4.2.2.5 Site 6*

Both Southern Green Ryecorn (18ha) and Scope CL barley (150ha – 3 paddocks) were oversown into existing Lucerne stands. Both varieties were being assessed for their suitability in the grazing system to improve pasture quality and quantity when weaning lambs in winter.

Dry matter cuts were taken pre-grazing from two paddocks prior to entry of stock to compare the amount of dry matter available for the lambs (Table 13). The Scope CL was generally utilised for ewes with lambs at foot, with one paddock having lambs weaned onto it, and the ryecorn was utilised as a finishing paddock (due to its accessibility to the yards) where lamb weights were recorded pre and post-entry to assess growth rates of lambs and to try and determine the amount of red meat being produced from the paddock. After the initial draft of lambs was taken off and the remainder of the lambs weaned, the barley was also utilised for grazing by lambs and growth rates recorded (Table 14). The target weight gain on the farm is 250g/day, the results achieved exceeded these target weights.

Table 13. Pre-grazing food available (5-Aug 2018)

| | Biomass (T/ha DM) |
|---|---|
| **Scope CL Barley** | 2.9 |
| **Southern Green Forage Ryecorn** | 3.1 |

Table 14. Daily growth rates of lambs (g/day liveweight) on different feed sources

| | 17-8-18 to 3-9-18 | 3-9-18 to 26-9-18 |
|---|---|---|
| **Southern Green Forage Ryecorn** | 295 | 293 |
| **Scope CL Barley** | | 327 |

Both feed sources provided more feed when compared to Lucerne stands that had natural grasses (e.g. barley grass and silver grass) in it as a feed source, with the grazing from the ryecorn paddock exceeding the barley (even though later growth rates in the barley were better) possibly due to the Lucerne being overgrazed in the ryecorn paddock and a lower protein mix of feed being on offer compared with the barley paddock where the lucerne had the opportunity to regrow prior to grazing.

Fig 14. Lambs grazing forage ryecorn at Site 6, September 2018.

One of the Scope CL paddocks that was sown for early feed with the intention to lock up for hay was sprayed with Intervix during what turned out to be a dry spell. This resulted in unacceptable Lucerne damage and resulted in a hay cut not being made. It is thought that the dry conditions contributed to this, but as a result, recommend where Lucerne is present that Spinnaker (a product registered for use in Lucerne) is used to improve pasture safety.

#### *4.2.2.6 Additional producer sites*

During the final year of the project, one of the core producers sold their farm after implementing practices (sowing Scope CL into existing pastures). They have since purchased another farm in the district, and are waiting for weeds to germinate so that they can measure current herbicide resistance status on the farm to better manage their weeds. If there are herbicide resistance issues, they plan on utilising Scope CL in their existing Lucerne pastures to provide increased feed quantity and provide a seed free environment where they can finish their lambs.

## 4.3 Herbicide resistance status

Initial herbicide resistance sampling occurred on several farms (five) to identify the current herbicide resistance status – particularly of barley grass in the district. Of the populations tested, 2 (out of 5 sampled) were highly resistant (80% survival) to paraquat (a Group L herbicide) – a herbicide that is commonly used to control grass weeds in Lucerne stands (either as a winter clean or spray topping option).

## 4.4 Lambs at slaughter

### 4.4.1 Participant data

The majority of producers send lambs to JBS at Bordertown who are entering the enhanced abattoir surveillance program, but do not currently provide feedback.

All participants when asked, had not had any feedback from JBS with regards to seed infestations since the project began in 2016. At the abattoir visit in 2018, Trevor Schiller the JBS works manager told the group that if they had had carcases infested with seeds, then they would have been advised so the assumption can be made that all core producers participating in the project are successfully managing seeds on their farms.

### 4.4.2 Enhanced abattoir surveillance data

The Enhanced Abattoir Surveillance (EAS) program provides feedback to South Australian producers on conditions and diseases detected in sheep at Thomas Foods International abattoirs. Annual benchmarking data is provided by Primary Industries and Resources South Australia (PIRSA) to help producers improve sheep health and welfare, maximise farm productivity and increase profits. Table 15 below shows the data collected from 2014 (pre-project) to 2018 (end-project) and the changes in grass seed infestations in lamb over that time. Note that this doesn't include data from JBS Bordertown where the majority of participants deliver lambs, and also does not include lambs traded through the saleyards.

The results show the number of producers represented, the percentage of producers from the Upper South East (Zones S21, 22, 23, 24) with seed infected lambs and the average percentage of lambs within affected lines.

Table 15. Summary of EAS data (grass seeds) for Upper South East 2014-2018

| Year | No. producers consigning affected lines | Average % within affected lines | % change from 2014 (no. producers) |
|---|---|---|---|
| **2014** | 24% | 79% | - |
| **2015** | 14% | 67% | -10% |
| **2016** | 14% | 50% | -10% |
| **2017** | 22% | 42% | -2% |
| **2018** | 23% | 49% | -1% |

It is interesting to note that 2015 was a drier season across these PIC zones with less feed around and in that year there was a reduction in the number of producers consigning affected stock. Poor seasonal conditions in 2015 may have also impacted on the seed set going into 2016 potentially impacting on the number of producers consigning affected stock in that season.

Since the projects inception, the number of producers hasn't varied much, however the average percentage lambs within the affected lines has decreased. It is positive to see the numbers holding as more farmers are increasing their sheep numbers given the current wool and meat outlook.

## 4.5 Economic Analysis

Table 16 summarises the costs associated with planting either the Cereal technologies or the Forage ryecorns into straight Lucerne stands, and compares the additional income generated from these paddocks when compared to standard farmer practice (leaving Lucerne sward alone with self-regenerating grass weeds). This economic analysis has been conducted using the increase in stocking rate on Site 1 in 2018.

Table 16. Varieties trialled, additional costs, management tips and income generated.

| Variety | Soil Type | Weed Control | Management tips | Additional System cost/ha* | Stocking rate (d.s.e./ha) | Additional Income✦ | Increased profit /ha |
|---|---|---|---|---|---|---|---|
| Lucerne (standard practice) | Modified sands Sandy Soils | None | | $0 | 5.7 | | |
| Scope CL | Modified sands | Chemical (very high levels of control) | Can take through to grain - remove stock prior to GS30 | $86.65 | 6.7 | $180 | $93 |
| Ryecorn | Modified sands Sandy Soils | Crop Competition (reduction in numbers) | Best when strip grazed with high numbers | $128 | 8.3 | $468 | $340 |

* Based on contract seeding and sowing costs, and seed at commercial rates (not retained on-farm)

✦Based on additional stocking rate @ $180/lamb

## 4.6 Extension and Communication

The extension and communication activities involved a mixture of meetings, media articles and publications to increase adoption and also awareness around the issue. The activities are shown in Table 17.

Table 17. Extension and Communication plan 2016-2019

| Date | Activity | Details / Location | Participants |
|---|---|---|---|
| 16/04/2016 | Planning meeting | Sherwood | PMS Group |
| 7/10/2016 | Workshop Keith | Keith | Public event |
| 14/10/2016 | Site visit | Sherwood | PMS Group |
| 3/11/2016 | Publication | Stock Journal | Wider audience |
| 1/03/2017 | Results update & Review | Sherwood<br>MFMG Trial Results | PMS Group<br>MFMG |
| 3/04/2017 | Publication | Book | Membership |
| 21/09/2017 | Field day | Sherwood | Public event |
| 13/10/2017 | Field day | Sherwood | PMS Group |
| 9/02/2018 | JBS Tour | Bordertown | Public event |
| 9/02/2018 | Results update & Review | Sherwood<br>MFMG Trial Results | PMS Group<br>MFMG |
| 1/04/2018 | Publication | Book | Membership |
| 1/04/2018 | Publication | Case Studies | MFMG<br>Membership |
| 27/09/2018 | Field day | Field | Public event |
| 19/10/2018 | Field day | Sherwood | PMS Group |
| 6/03/2019 | Final Review Session & Survey | Sherwood | PMS Group |

## 4.7 Monitoring and Evaluation

The monitoring and evaluation plan was developed prior to the program beginning and has been utilised to ensure data has been collected and collated to try and capture the benefits of the program in delivering outcomes – both at a practice change and knowledge increase level.

Participant feedback sheets were collected at the Keith workshop. At this event, 100% of participants rated the session relevant to highly relevant to their business. 55% of participants identified the need to implement different management strategies and to use a number of different tools in the quest to manage the issue of grass seeds in lambs, and increased their knowledge around some of the tools available.

At the JBS site visit, 100% of producers increased their knowledge around the impact of grass seeds on the industry; particularly on supply chain efficiencies and the financial impacts to the processing sector. Majority of producers that attended were core producers who were actively involved in the project and already implementing different strategies to manage grass seeds in lambs, they came away even more determined to ensure that they didn't deliver infected stock going forward.

# 5 Discussion

## 5.1 Outcomes in achieving objectives

### 5.1.1 Understanding current herbicide resistance status

Five producers now understand the current herbicide resistance status of barley grass on their farm, and also the importance of testing plants that survive spraying to ensure effective herbicide use and that money isn't being spent unnecessarily.

### 5.1.2 Demonstrated effectiveness of Clearfield technologies in a grazing system

The effectiveness and role of Clearfield cereal varieties in a grazing system have been demonstrated and implemented by producers with Scope CL having the best fit. Weed control in these systems was effective (with initial barley grass plant populations being reduced by 85% after herbicide application). No herbicide resistance to the imidazolinone group of herbicides was detected.

The project has highlighted the flexibility of Scope CL in being able to provide early winter feed of high quality that results in good growth rates of lambs (approximately 320g/day unsupplemented, and 450g/day supplemented), and effective weed control in established Lucerne stands, with the option to graze up until GS30 and then lock up for grain if seasonal conditions allow.

The use of Intervix herbicide is not a registered use in Lucerne, and in one case caused unacceptable levels of damage (Lucerne did not die, but growth was stunted for an unacceptable amount of time). It is therefore recommended that an imidazolinone herbicide that is registered for use in Lucerne be utilised when spraying out grasses to ensure no damage occurs to the Lucerne plants.

### 5.1.3 Demonstrated and assessed the potential of new forage ryecorn varieties

The newer forage ryecorn varieties have been demonstrated and they appear to have a very good fit in the grazing system, both in deep sandy soils and on heavier sandy ground in providing a large quantity of high quality feed that is suitable for finishing lambs early prior to the onset of seeds, with increases of biomass production of 1000Kg DM/ha occurring on deep sands when compared to traditional grazing barley varieties (Moby and Cape barley).

The level of weed control has been observed to depend largely on management of the forage ryecorn. Where the ryecorn canopy is kept fairly closed, it is more effective in reducing weed emergence and survival. Where the ryecorn is utilised and grazed more heavily, and the canopy is kept fairly open, the crop competition from the ryecorn is less effective with regards to weed control.

The feed quality produced by the forage ryecorn varieties was comparable to other fodder sources particularly ryecorn varieties was comparable to other fodder sources particularly the grazing barleys. Lamb growth rates achieved both with and without supplementary feeding were at the top end (20-30% above) what producers have historically achieved, with growth rates with supplementary feeding approximately 450g/day, and 295g/day unsupplemented.

### 5.1.4 Cost benefit analysis of the demonstrated activities

The additional fodder produced that allowed for an increase in stocking rate over standard practice, and high growth rates of lambs compared with historical growth rates were thought to far outweigh the costs of oversowing with favourable species shown in Table 15. Although the Scope CL didn't have the large increases in profit ($93/ha) that the ryecorn did ($340/ha), the weed control was far superior making it a good, economically viable option in the system – particularly in those paddocks that are likely to have an increased grass burden, or those paddocks that have resistance to other chemistries.

### 5.1.5 Eight producers implementing new practices

The ten core producers involved in the project turn off a total 22,200 lambs annually, and throughout the project, they have increased their knowledge and skills around management of crops and pastures with a focus on reducing the seed burden that has the potential to impact on lamb carcases.

Of these producers, eight have tried something new to improve fodder sources on the farm sowing 'improved' species – either Scope CL barley or forage ryecorn into their existing lucerne pastures to increase winter feed. Oversowing with Scope CL has provided the opportunity to spray out problem grasses that germinate naturally, and oversowing with forage ryecorn has increased competition to those grasses that have the potential to produce seeds that can damage lamb carcases.

These producers have increased their confidence in their ability to finish seed free lambs by 24% (from 61% confidence level to 85%). All core producers have successfully delivered lambs to slaughter (majority going to JBS at Bordertown) with no reported seed contamination since the inception of the project.

### 5.1.6 Fifty producers increase knowledge and skills

In addition to the ten core producers, there were another ten producers involved in the Sherwood PMS group that had direct contact with the project through project updates, project planning meetings and field site visits. In addition to this, thirty-seven producers attended events that were open to the wider audience allowing them to increase their knowledge and skills. Of these observer producers, 43% have demonstrated practice change and 5% have shown intent to change.

## 5.2 Promotion of results and its effectiveness

### 5.2.1 Engagement of producers

All of the core producers were engaged in the project, attending workshops, abattoir visits, field days and sharing their knowledge with the Sherwood PMS group and also the wider audience. At the final project meeting where post-PDS surveys were gathered, all of the core producers appreciated the opportunity to be involved and were thankful for the knowledge gained through the project and the benefits for their individual businesses as well as giving the group a focus and opportunity to develop new practices.

### 5.2.2 Participant knowledge

During the course of the project, all core producers increased their knowledge around the importance of the issue of seeds in lambs, the key species that contributed to these issues and ways to mitigate the issue, with an increase in the effectiveness of their grass seed management programs of 20% (from 65% to 86%). This increase in effectiveness was largely due to an increased focus on the issue and utilising more options to manage seeds within the system. The abattoir visit was a key component of understanding the issue from an industry perspective and the impacts on the supply chain of delivering infested lambs.

### 5.2.3 Participants attitude

The attitude to grass seeds changed over the course of the project. Initially the majority of core producers identified grass seed weeds as a big issue in their system. By the end of the project, there was acknowledgement that it was still a big issue, but in some cases, the issue on their individual

farm had decreased due to an increase in knowledge and skills to manage the issue, and other pasture weeds (e.g. skeleton weed) were being noted as the most important weed issue in pastures.

### 5.2.4 Producer practice change

The ability to introduce other fodder options into the farming system to either out-compete weeds or allow for good weed control in the farming system has allowed producers to change practices and manage their farms more effectively. There have been large levels of practice change both within the core group and also within the observers, with PGG Wrightsons currently being sold out of Southern Green Forage Ryecorn due to producer demand.

# 6 Conclusions/recommendation

With an increase in the importance of lamb production to their systems (largely due to an increase of farm gate prices), producers are keen to continue to learn about or explore ways that they can increase their farm productivity and profitability as they have in this project. New pasture species that are being developed – particularly those for sandy soils or with herbicide tolerances to expand the options available are always of interest to the group.

The project has provided information around the productivity of pastures, and ways to increase stocking rates and returns from paddocks by oversowing different varieties. The management of these pastures is however critical to ensuring success and that the full financial benefits are received, and this is an area that may need to be addressed going forward.

# 7 Bibliography

Lifetime wool energy values www.lifetimewool.com.au

PIRSA Enhanced abattoir surveillance program www.pirsa.sa.gov.au

Farm Gross Margin and Enterprise Planning Guide, 2018 https://pir.sa.gov.au/__data/assets/pdf_file/0008/235844/Farm_Gross_Margin_and_Enterprise_Planning_Guide_2018.pdf

# 8 Appendix

## 8.1 Pre-PDS Skills Audit

### MLA Producer Demonstration Sites

### Skills Audit Template – Pre-PDS

### Core Participants

**PDS Name** (to fill out by PDS coordinator):_____

**PDS Code** (to fill out by PDS coordinator):_____

The following questions are used to determine your level of understanding of *[insert topic]*. The knowledge and skills audit is used at the start and completion of the program to allow individuals to track their skill development and adoption of new practices. It will also be used:

1. To improve the content of future project meetings; and
2. As part of the evaluation process for the project

The information will be completely confidential and individuals will not be identified in the analysis of data.

**Name**: -

_____

**Date: / /**

MLA may contact me to further assess the impact of their programs? ☐ Yes ☐ No

MLA may send me newsletters and inform me of future events? ☐ Yes ☐ No

# Section A – Demographic Information

### A1. Your contact details

a. Property name .....

b. Business / trading name .....

c. Property address.....

d. Postal address .....

e. Email address .....

f. Phone.....

g. Mobile.....

### A2. What area do you manage? *(please write the number of hectares that you managed)*

a. Hectares.....

### A3. What numbers of livestock do you run? *(please write the number of head against each of the categories of livestock that you run)*

a. Number of beef breeders.....

b. Number of cattle turned off per year.....

c. Total number of cattle .....

d. Number of ewes.....

e. Number of lambs turned off per year.....

f. Total number of sheep.....

g. Number of goats turned off per year.....

h. Other .....

## Section B – Knowledge and Skills *(If you do not know, please select the 'Unsure' option)*

### B1. How important do you think the issue of grass seeds in lambs is?

*(Please rate out of 10, with 1 being not an issue and 10 being a very important issue, by circling your choice below)*

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Unsure |
|---|---|---|---|---|---|---|---|---|---|---|
| Poor | | | | | | | | | Excellent | |

### B2. What is your biggest seed issue? *(Tick one of the options below)*

a. Barley Grass..... ☐

b. Silver Grass..... ☐

c. Brome Grass..... ☐

d. Geranium..... ☐

e. Other (Please describe)..... ☐

f. Unsure..... ☐

### B3. How effective do you feel your current seed control program is?

*(please rate out of 10, with 1 being poor control and 10 being excellent control, by circling your choice below)*

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Unsure |
|---|---|---|---|---|---|---|---|---|---|---|
| Poor | | | | | | | | | Excellent | |

### B4. What do you think are the reasons behind the effectiveness (or otherwise) of your current seed control program?

---

---

### B5. Do you know what your current herbicide resistance status of the weed identified in B2 is on your farm?

a. Yes - confirmed..... ☐

b. Yes - suspected..... ☐

c. Unsure..... ☐

**B6. What is the most important aspect in determining your time of joining?** *(Tick the answer that applies to you)*

a. Ewe condition ☐
b. Feed on offer at lambing ☐
c. Historical market signals ☐
d. Seed contamination ☐
e. Unsure ☐

**B7. What forage options are you currently using? (Tick all options)**

a. Cereals ☐
b. Lucerne ☐
c. Medic/Clover pastures ☐
d. Forage Ryecorn ☐
e. Summer Fodder Crops ☐
f. Unsure ☐

**B8. Are there any other forage options or seed strategies that you would like to see demonstrated?**

---

---

---

# Section C – Confidence and Practices

**C1. How confident are you in being able to finish lambs in a seed free environment?**

*(Please rate out of 10, with 1 being not confident and 10 being very confident, by circling your choice below)*

1 2 3 4 5 6 7 8 9 10 Unsure

Not Confident — Very Confident

**C2. Do you currently use the following practices?**

| | Normal practice | Sometimes | Rarely | Never | Not Applicable |
|---|---|---|---|---|---|
| Winter Cleaning Pastures | | | | | |
| Spray topping | | | | | |
| Direct drill cereals (barley/wheat) for feed | | | | | |
| Direct drill with improved pastures species for feed | | | | | |

**C3. If Not Applicable, please provide the reason why**

_____
_____
_____
_____

**C4. Do you know your current % of lambs sold 'seed free'?** *(Please do not answer if you are unsure)*

_____
_____
_____
_____

**Thanks for your time.**

## 8.2 2017 Site 1Paddock Records

| agronomy summary | | |
|---|---|---|
| **date** | **paddock** | **operation** |
| 13-Feb | E3 | summer knock down |
| 3-May | C3 scope Cl (11.3 hec) | spray 170Gm diuron 17gms Sharpen 1.5 treflan 1.6 paraquat |
| 3-May | C3 scope Cl (11.3 hec) | sown 60Kg Scope CL 60 Kg DAP |
| 4-May | E3 | spray diuron 170 gm 1.5 treflan 10ml nail 1.5 round up 540 |
| 4-May | E3 | sown 92Kg compass 80Kg DAP |
| 3-May | southern green forage (14.5 hec) | spray 170Gm diuron 17gms Sharpen 1.5 treflan 1.6 paraquat |
| 4-May | Vampire ryecorn (13 hec ) | spray 170Gm diuron 17gms Sharpen 1.5 treflan 1.6 paraquat |
| 5-May | southern green forage (14.5 hec) | sown 60 Kg southern green forage 60 Kg DAP |
| 5-May | Vampire ryecorn (13 hec ) | sown 60 Kg vampire ryecorn 60 Kg DAP |
| 11-Jul | C3 scope Cl (11.3 hec) | spray 52 gm raptor |
| 14-Aug | E3 | spray 5gm ally 160m ldicamba 500 440ml MCP ALVE570 |
| | | 500ml fungicide 3L wilchem signature ZMC |
| 5-Oct | southern green forage (14.5 hec) | spray 800ml paraquat 100 ml lemat |
| 5-Oct | Vampire ryecorn (13 hec ) | spray 800ml paraquat 100 ml lemat |
| 9-Oct | E3 | spray fungicide |
| | | |
| **sheep feeding and moving** | | |
| **date** | **paddock** | **operation** |
| | | ewes were teased and lambed over 7 weeks |
| 18-Mar | | ewes merino ewes start lambing dorset cross lambs |
| 10-Jun | | ewes and lambs fed small quantity of grain 3 times a week |
| 11-Jul | E3 | weaned 800 XB lambs put in (graze and grain) |
| | | fed 6.0 ton ryecorn in a self feeder |
| | | fed 2.5 ton straw (hay) |
| 3-Aug | E3 | 800 lambs shiftted out |
| 3-Aug | C3 scope Cl (11.3 hec) | 160 lambs shiftted in A sample of 20 smaller weighed 40 Kg |
| | southern green forage (14.5 hec) | 310 lambs shiftted in A sample of 20 smaller weighed 40 Kg |
| | Vampire ryecorn (13 hec ) | 330 lambs shiftted in A sample of 20 smaller weighed 40 Kg |
| 13-Aug | rye corn | 640 lambs running in all ryecorn |
| 4-Sep | C3 scope Cl (11.3 hec) | 800 lambs in (added 640) |
| | | grain fed in the above period in C3 5 ton oats plus straw2 ton |
| 4-Sep | rye corn | all lambs out |
| 12-Sep | C3 scope Cl (11.3 hec) | 800 lambs out |
| 12-Sep | rye corn | 882 lambs in (lighter lambs from both mobs) |
| | | tops(in C3 until now)seconds(added to the mob) |
| 12-Sep | D12 | 861 top for sale 713 from tops 149 from seconds IN 12/9/17. |
| 20-Sep | C3 | killed 190 lambs 22.48Kg ave $152.40 per head |
| 21-Sep | C3 | killed 671 lambs 22.7 Kg Ave $155.72 per head |
| | | 7 ton barley fed from 13 september to 2 october plus straw 1 ton |
| 2-Oct | southern green forage (14.5 hec) | sheep out |
| | Vampire ryecorn (13 hec ) | sheep out |
| 5-Oct | D12 | weigh lambs 561 sold 51.5 kg ave weight sold OUT 5/10/17. |
| 5-Oct | C3 scope Cl (11.3 hec) | 320 lambs in( lighter lambs) |
| 10-Oct | C3 | 320 Lambs in all of the paddock |
| | | |

## 8.3 2018 Site 2 Paddock Records

| | H5 | 40 hectares |
|---|---|---|
| | | |
| | must graze hard | barley grass problem late spring |
| date | | |
| 3/10/2017 | spraytop 680 ml RU | a bit late for barley grass |
| 7-May | sown | 40 kg southern green |
| | diuron 171gm | 40 DAP |
| | treflan paraquat | protect lucern |
| 9-Jul | grazed | 900 ewes 1000 lambs |
| 15-Jul | taken out | |
| 26-Aug | grazed | 900 ewes 1000 lambs |
| 5-Sep | taken out | |
| 7-Sep | sprayed | broadstrike bromoxynile |
| 20-Sep | grazed | 1000 wether lambs |
| 2-Oct | taken out | |
| 2-Oct | grazed | 1370 ewes |
| 12-Oct | taken out | |
| 29-Oct | grazed | 600 hoggets |
| 9-Nov | taken out | |
| 9-Nov | grazed | 1250 ewes |
| 16-Nov | taken out | |
| | | |
| | | |
| | I4 | very good grass seed control |
| 3/10/2017 | spraytopparaquat 800ml | less growth. |
| 8-May | sown diuron treflan | scope 40 kg 40 kg dap |
| 25-Jun | grazed mistake | 780 ewes 850 lambs |
| 28-Jun | out | mistake |
| 9-Jul | grazed | 900 ewes 1000 lambs |
| 15-Jul | out | |
| 9-Aug | grazed | 780 ewews 850 lambs |
| 15-Aug | out | |
| 22-Aug | spray raxil? | |
| 3-Sep | spray epoxinol? | |
| 6-Oct | grazed | 1000 wth lambs |
| 30/10 | out | |
| 9-Nov | grazed | 1000 wth lambs |
| 23-Nov | still grazed | |
| | guess two weeks more feed | |

still shooting now.

Scope CL.