final report

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Use of Italian Ryegrass to Improve Meat Production on Yorke Peninsula, SA.

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Abstract

The Yorke Peninsula of SA is typically a medium to low rainfall cropping district in which an ideal pasture species is one which provides early rapid growth and can withstand high stocking rates and does not persist into the following year. The project aimed to determine the suitability of Italian ryegrass species in this production system. Two pastures were planted; ryegrass (cereal medic pasture over-sown with Italian ryegrass species *Tetila* & *Winter Star)* and a control pasture (cereal / medic / pasture). Merino ewes with lambs were rotationally grazed on the ryegrass and continuously grazed on the control pasture. Results indicated livestock production and sustainability measures did not differ greatly between the treatments. Italian ryegrass species in combination with rotational grazing management did increase pasture production by up to twice that of the control, however despite increased growth the extra cost of production resulted in similar gross margins for both treatments. Limited stock available for the projected reduced the ability to graze the ryegrass pasture to its full potential and if grazed harder, end results may have differed. Despite this it was concluded that Italian ryegrass species could be used as pasture species on the YP however the project highlighted to the group the importance of grazing management and in the short term effectively managing existing pasture may result in increased production and be more cost effective than looking to alternative species.

Executive Summary

The Yorke Peninsula (YP) of South Australia (SA) is a medium to low rainfall cropping district (375 – 480mm average annual rainfall) with minimal livestock production. An average enterprise in the area is either continuos cropping or 90 to 95% cropping and 5 to 10% pasture / livestock production. Common pastures species for the area include cereals or legumes (i.e. medics or clovers), however it is recognised that fast winter growing species that provide large quantities of high quality vegetation early and continuously through out the growing season would best suit this farming system. In the higher rainfall areas of South Australia Italian ryegrass species have proven to be important pasture species in livestock production, providing early growth (ready to graze approximately 6 weeks after seeding) that responds to high stocking pressure when rotationally grazed. There has been limited use of the Italian ryegrass in lower rainfall areas of the state particularly in cropping systems. The project was initiated by several livestock producers of the Arthurton Agricultural Bureau who whished to determine the suitability of Italian ryegrass to their farming system & environment.

The overall objective of the project was to determine the suitability of Italian ryegrass as a pasture species in a typical York Peninsula farming system (i.e.90% cropping, 10% livestock). Initially it was felt this would be best done by using two groups of animals that would graze a control plot and a Italian ryegrass plot. The final lamb weights along with other measurements of pasture and environment sustainability would determine the success of Italian ryegrass in this system. However while the overall objective remained constant, the focused shifted from analysing livestock production (i.e. final lamb weights and condition scores) to focussing on pasture production i.e. growth, grazing days and using this to determine gross margins for the treatments and the suitability of Italian ryegrass to the YP. Increasing producer knowledge on grazing management and assessing environmental factors to determine sustainability of system were also final objectives of the project.

The project was conducted at Maitland on a property typical of the district. One 56ha paddock assigned to pasture for the 2005/2006 season was planted to cereal, medic and clover (typical pasture mix for the area). Post seeding the area was slipt into 4 16ha paddocks and one section over sown with the Italian ryegrass varieties *Tetila* & *Winter Star.* Two mobs of merino ewes, mob 1 & mob 2 were used to graze the ryegrass and control pastures respectively. Merino hogget's and Hereford calves were also used on the ryegrass pasture to increase stocking pressure. Pasture quality (energy, protein, % DM), pasture quantity (kg/Dm available, growth rates), sustainability measures (ground cover, proportion of productive species, soil surface, percentage plant litter) and livestock production (ewe faecal worm egg counts, ewe & lamb weights and condition scores, stocking rates, gross margins) were all measured at various intervals across the project.

Livestock production and sustainability data showed little difference between the Italian ryegrass pasture and the traditional pasture (control). However stocking rates and pasture growth of the ryegrass pasture was considerably higher than that of the control (in some instances 4 times greater). This result however may be more attributable to the grazing management (rotational verus continuous) than the species composition. When comparing income between treatment groups the ryegrass pasture was up to $151/ha higher than the other treatments. However when taking into account that the ryegrass had the additional costs of two extra fertiliser applications and higher seed cost and gross margins for the ryegrass and control where the same. Available for the project was a limited number of stock and as a result the ryegrass pasture was not grazed to its full potential. The

group unanimously agreed that the number of DSE/ha grazing the ryegrass could have dramatically increased which in turn would have an impact on the gross margin results. The effect this would have had on the sustainability measures and long-term viability of the system is unknown however is thought not to be extreme.

The two treatments where also compared against the normal practise for the property. It is worth noting that the gross margins for the two treatments were $45/ha higher than that of the normal practise for the property. This highlighted to the group the potential to increase production purely through better pasture management.

Ultimately the project showed Italian ryegrass could be used in farming systems on the YP, however as alternative pasture species such as Italian ryegrass are costly to grow, unless they can be effectively grazed to take advantage of the extra growth there is no added benefit over current pasture species. Increasing grazing management skills to fully utilise existing pasture would be most beneficial in the short term with the view to introduce alternative species with superior growth into the system further down the track once pasture management could maximise livestock production.

Benefits to come out of the project include increased knowledge on grazing management and the realisation that extra pasture growth is of little benefit if it is not utilised and converted into increased livestock production.

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1 Background

The Yorke Peninsula (YP) of South Australia (SA) is typically a medium to low rainfall cropping district (375 – 480mm average annual rainfall). With the advent of continuous cropping, livestock numbers in the district are dramatically lower than they were thirty years ago, however more recently herbicide resistance and lower grain prices have seen some producers once again include livestock in their farming enterprises. An average enterprise containing livestock on the Yorke Peninsula would crop 90 to 95% of the property and plant one to two paddocks to pasture per year. A small flock of merino ewes (200 –1000) mated to British bread rams would typically graze the pasture from June / July through to December (depending on the season) at which time they would graze stubbles until April / May (depending on the season), and then enter a feedlot prior to grazing next seasons pasture paddock. Time of lambing varies through out the district from April through to late July, however the majority of lambs are produced for the domestic market. It is not uncommon for lambs to be lot fed to finishing weight prior to selling. Traditionally cereal / legume mixes are used as pasture species in this system i.e. oats, medics and clover, however it is recognised that fast winter growing species that provide large quantities of high quality vegetation through out the growing season would best suit this farming system. In the higher rainfall areas of South Australia (South East and KI) Italian ryegrass species have proven to be important in livestock production, providing early growth (ready to graze approximately 6 weeks after seeding) that responds to high stocking pressure when rotationally grazed. There has been limited use of the Italian ryegrass in lower rainfall areas of the state particularly in cropping systems.

The Arthurton Agricultural Bureau is a branch of the Agricultural Bureau of South Australia and has approximately 50 members of which half have livestock as apart of there farming enterprise. The group attends monthly meetings at which members are addressed by speakers on a variety of topics. Several of the members of the Arthurton Ag bureau where previously involved in an ‘Edge Network’ Prograze course which comprised of seven half day sessions through out a season. The program focused on strategic grazing and matching pasture and livestock production. Throughout the program participants were introduced to the idea that nutritional requirements of livestock should be matched (as best as possible) to pasture growth. Alternative pasture species (of which Italian ryegrass varieties were one) that could better fulfil this requirement were also discussed. As a result several producers were interested in determining the suitability of Italian ryegrass in their farming system. Other interested produces from the Arthurton area who where not members of the Arthurton Agricultural Bureau or original prograze course were also included in the project.

2 Project Objectives

2.1 Outline

The overall objective of the project was to determine the suitability of Italian ryegrass as a pasture species in a typical York Peninsula farming system (i.e.90% cropping, 10% livestock). Initially it was felt this would be best done by using 2 groups of animals that would graze a control plot and a Italian ryegrass plot and the final lamb weights along with other measurements of pasture and environment sustainability would determine the success of Italian ryegrass in this system. However while the overall objective remained constant, the focused shifted from analysing livestock production (i.e.

final lamb weights and condition scores) to pasture production i.e. growth, grazing days and use this to determine gross margins for various systems and the suitability of Italian ryegrass to the YP.

2.2 Objectives

Below are the four final objectives the group set out to achieve.

2.2.1 Identify the suitability

Identify the suitability of Italian ryegrass as a pasture species in a farming system typical to the Yorke Peninsula of SA i.e. 1 year of pasture, several years of cropping. Assess the ability of Italian ryegrass to give high quality feed early in the season to better fit livestock requirements and the farming system of the area.

2.2.2 Increase knowledge

Increase the groups knowledge on strategic grazing of pastures to improve & increase livestock production and to better understand how various grazing management (rotational versus continuous) can effect both pasture and livestock production.

2.2.3 Compare productivity

Compare the productivity (i.e. grazing day, kg DM/ha pasture produced & gross margins) between the Italian ryegrass and the control pastures, and assess the differences in livestock production from each.

2.2.4 Asses land management benefits

Assess the land management benefits (if any) of using Italian ryegrass pastures and there management.

3 Methodology

3.1 Site Location

The project was conducted at 'Loudoun Hill' owned by Roger and Kaye Francis, 7Km east of Maitland, South Australia. Maitland is situated in the centre of the Yorke Peninsula SA, approximately 105km North West of Adelaide.

3.1.1 Climate

The Yorke Peninsula is typical of a Mediterranean climate with the majority of rainfall falling in the months of April to October.

3.1.2 Rainfall

The ten-year average rainfall for Maitland (1996-2005) was 480mm. Loudoun Hill annual rainfall for 2005 was 491mm. While the annual rainfall for 2005 was slightly above average, the season did not

break until extremely late and as at 31st of May only 50mm of rain had been recorded for the year (see appendix 1, Loudon Hill Rainfall 2005).

3.1.3 Farming system

The Francis's run a farming system typical to the area (as descried in the background). Their farming enterprise is predominantly cropping with a small merino ewe flock for prime lamb production. 29 steers where also run on the property in 2005 and used in the project. Minimum tillage cropping practises are used on the property with stubble retained for paddock cover. Good weed control is practised on the property. There are several scrub blocks on the property and soil structure would be described as good.

3.2 Paddock Characteristics

3.2.1 History

One 56ha paddock assigned as the pasture paddock for 2005/2206 season was used for the project. The paddock had been planted to barley the previous year and the stubble had been slashed prior to seeding but retained as ground cover. The paddock had not been burnt. On 1/6/05 the paddock was planted (as planed) to a traditional pasture mix (see below). After seeding the paddock was split into 4 (P1, P2, P3, P4) 14ha paddocks using portable electric fencing (refer to map appendix 1). The four sections were planted to:

- P1- Barley, Vetch, Medic (*Paraggio & Cavalier*) & sub Clover (*Dalsa & Dalkeith*)
- P2- Barley, Vetch, Medic (*Paraggio & Cavalier*) & sub Clover (*Dalsa & Dalkeith*)
- P3 - Barley, Vetch, Medic (*Paraggio & Cavalier*) & sub Clover (*Dalsa & Dalkeith*)
- P4- Barley & Vetch

On the 8/6/2005 P2 was over sown with the Italian ryegrass varieties*Tetila & Winter Star* (see section 3.3).

3.2.2 Soil Type & ph

The paddocks soil type could be described as slightly alkaline heavy red brown earth over clay.

3.2.3 Slope

The 56 ha paddock was undulating with a rise to the north (P4) and a flat to the south at the dam in the corner of P2 & P1 (refer to map- appendix 2). Shallower soils are present on the rise and slope grading to deeper heavier clays on the flat.

3.3 Italian Ryegrass

3.3.1 Sowing Rate

On 8/6/2005 Section 2 (refer to map appendix 2) was over-sown to two different varieties of Italian ryegrass; *Tetila & Winter Star.* The Italian ryegrass was sown at

- *Tetila* @ 17kg/ha on 4.8 ha & 25Kg/ha on 3ha
- *Winter star* @ 14kg/ha

NB. It was intended that both species of ryegrass be seeded at 25kg/ha but problems with cultivator calibration prevented this (above is actual rate sown).

The Ryegrass was sown with a cultivator at 11inch row spacings and rolled with crimp roller immediately post seeding (See photo 1, appendix 4).

3.3.2 Fertiliser

Two additional applications of fertiliser were applied to the ryegrass pasture (P2).

1. 61 kg /ha N33:P8 was applied at seeding on 8/6/05.
2. 66 kg/ha N46:P0 was applied just prior to the first graze on 5/8/05.

3.4 Grazing Management

3.4.1 Livestock

Available for the project were 2 mobs of merino ewes (the majority mated to merinos, 30 to White Suffolk), mob 1 and mob 2 consisted of 172 and 256 ewes plus lambs respectively. Both mobs had been running together on stubbles prior to commencement of the project and ewe weight was assumed to be the same prior to splitting into mobs. 140 merino hogget's (born June 2004) and 29 Hereford steers (approx 9months old) were also available.

3.4.2 Grazing

Initially it was intended that the ewes would be split into two mobs and one mob assigned to P2 and the other mob to P1, P3 & P4. These mobs would then only graze there assigned pasture. However due to the late season and the inability to split existing mobs into appropriate sized groups once the ewes had lambed it was decided that the ryegrass paddock (P2) would be rotationally grazed to the 3 to 5 leaf stage. Mob 1 (172 ewes) would graze P2 and any of the other paddocks when P2 was rested. Mob 2 would only ever graze the control paddocks of P1, P3 & P4. The hogget's and steers were used to maintain grazing pressure when required. As mob 1 would not be solely grazing the ryegrass resulting livestock production data can only be used as a guide.

- All paddocks were first grazed on the 5/8/05 (8weeks post seeding)
- P2 (Ryegrass)- 14ha
    - Grazing commenced 5/8/05
    - Total grazing days 60 (rested 28)
- P1, P3, P4 (control) - 42ha
    - Grazing commenced 5/8/05
    - Continuous grazing i.e. no rest days
- Project ended 1/1//05

3.5 Measurements

Four groups of measurements where recorded through out the period of the project as described below.

3.5.1 Pasture Quality

The below pasture quality measurements were record three times over the project; prior to first graze (rapidly growing), half way through grazing period (feed maturing) and at end (feed matured).

a. Digestibility / proportion of green (% DM)
b. Energy & protein

100 samples were taken along a common line dissecting each section (i.e. 100 samples taken from each P1, P2, P3, P4). Each sections samples were combined and sent to DPI Victoria for testing.

3.5.2 Pasture Quantity

a. Kg DM / ha (measured)
b. Growth Kg/DM/day (calculated)

Three pasture quadrant cuts were taken per section and results average. Growth rate of the pasture was calculated at completion of the project based on assumptions outlined in the results.

3.5.3 Sustainability assessment

a. Ground cover
b. Proportion of productive species
c. Soil surface (hard / soft)
d. Percentage of plant litter

Ground cover and proportion of productive species were recorded prior to first graze (rapidly growing feed), half way through grazing period (feed maturing) and at end (feed matured). Ground cover was an estimate of how much bare ground was inside a quadrant. Measurements were taken 5 times in each section and averaged. Proportion of productive species was recorded when collecting samples for pasture quality. 100 records of species composition where recorded across each section.

Soil Surface was a measurement of how easy or hard it was to push a pen into the surface and was conducted at seeding and pasture maturity. Similarly % plant litter was measured at seeding and pasture maturity and was measured by calculating the % of dead material inside a quadrant

3.5.4 Animal Production

a. Ewe weight and Condition Score
b. Lamb weight (weaning)
c. Ewe worm test (marking and weaning)
d. Grazing days and DSE/ha
e. Gross Margin comparison between control & ryegrass

Ewe weights and condition score (standard 5 score system as taught in Prograze) were recorded at marking and weaning along with lamb weights at weaning. Pooled worm faecal egg counts of the ewes were recorded at lambing marking and again at weaning. Pools of 15 faeces were collected and tested at Gribbles Laboratory, Adelaide. Grazing days were recorded for the entire period and

DSE/ha. Gross margins were subsequently calculated (assumptions for calculations detailed in results section).

4 Results and Discussion

4.1 Pasture Quality

For all pasture quality and quantity data the ryegrass pasture was measured twice, once each from *Tetila* and *winter star* (see map). As no significant differences were noted between the two and the section was grazed as one the data has been combined and reported as one.

4.1.1 Digestibility

As indicated in table 1 the digestibility of the ryegrass was fairly constant throughout the grazing period, whereas the control pasture dropped slightly from start to end. There was not a great difference between the control and ryegrass throughout the growing period although at maturity the digestibility of the ryegrass pasture was slightly higher than the control.

Table 1. Digestibility of Pasture over time (%DM)

Date	**Ryegrass**	**Control**
5/8/05	71.75	73.4
1/9/05	72.1	66.4
27/10/05	73.8	67.9

4.1.2 Pasture Energy & Protein

Table 2 displays' the differences in Energy (MJ/kg DM) and protein (% DM) for the two pastures at three intervals over the project. The ryegrass pasture increased energy over the growing period and was higher at the conclusion of the project than the control pasture. Similarly for the protein content the ryegrass pasture was higher than the control at pasture maturity. Interestingly the ryegrass pasture's protein at pasture maturity (27/10/05) was similar to that at rapid growth (5/8/05), were as the control pasture's protein had dropped.

Table 2. Pasture Quality Data over time

Date	**Energy (MJ /kg DM)**		**Protein (% DM)**	
	Ryegrass	Control	Ryegrass	Control
5/8/05	10.45	10.7	23.3	22.5
1/9/05	11.6	10.5	30.9	23.6
27/10/05	11.1	10.1	24.6	18.2
Average	**11.05**	**10.4**	**26.2**	**21.4**

4.2 Pasture Quantity

4.2.1 Pasture Growth

Pasture cuts were performed throughout the project and used to increase the group's skill at visually estimating pasture quantity in a paddock and also growth rate. As the ryegrass and control pastures were grazed differently (rotation versus continuous) direct comparisons in amount of pasture available (kg DM/ha) cannot be made. However pasture growth rates were calculated for both the ryegrass and control pasture. As a comparison to traditional practises a third pasture growth rate was calculated (normal). The hypothetical 'normal' pasture was based on what would have occurred on the trail site if the project had not occurred. That is 256 ewes with lambs grazed continuously on 56ha of planted cereal / medic pasture (same pasture species as control pasture).

Table 3. Pasture Growth Rates

	Ryegrass	**Control**	**Normal**
Kg DM of Feed consumed for period/ha	3234.8	1556	838
Remaining feed at end of trial (kg/ha DM)	3500	2000	2000
Total growth for period (Kg DM /ha)	6735	3556	2838
Pasture growth rate (kg DM/ha/day)	**45.5**	**24**	**19.2**

Assumptions for calculations
1. Animals eat 1kg green dm/dse/day
2. 'Kg DM feed consumed for period /ha' is calculated from total dse/ha x dm consumed per dse.
NB for calculation of dse/ha for each pasture see part 4.4.3 Grazing days and DSE/ha of report).

4.3 Sustainability assessment

4.3.1 Ground cover

Measurements of ground cover where recorded three times over the project and no real differences where seen between the two pasture types. As expected the percentage of bare ground decreased from time of sowing to late maturity of the pasture at which time average ground cover was 90 to 100%. As both pastures matured the ground cover began to decline slightly but again no significant differences were noted between the pasture types. While grazing methods differed between the two pastures (rotational and continuos) a higher percentage of bare ground was not seen in the ryegrass as this was one of the factors taken into consideration when determining when to commence and cease grazing.

4.3.2 Proportion of productive species

Proportion of productive species was recorded at the same time as ground cover. Species present were classified into one of six categories:

1. Ryegrass
2. Legumes (i.e. medic, clover)
3. Annual grasses (i.e. barley grass)
4. Capeweed & Board leaf weeds

5. Unpalatable i.e. Guildford grass, thistle
6. Cereal i.e. barley

At first measurement both pastures had fairly similar composition aside from the obvious finding that the ryegrass pasture had a higher percentage of ryegrass (35% opposed to 15% - Wimmera ryegrass). As the pastures matured the ryegrass pasture continued to have higher percentage of ryegrass (as expected) however the percentage of capeweed and broad leaf weeds was lower than that of the control (10% and 25% respectively). The grazing management of the ryegrass pasture could possibly explain this. By rotationally grazing the ryegrass the ability of the livestock to selectively graze the pasture was reduced, where as in the control, animals selected out medics and clovers over other species such as capeweed. The Italian ryegrass when rested tillered quite aggressively and spread to provide competition to other plant species.

4.3.3 Soil surface

No notable difference was seen between the two treatments in terms of soil surface. At the seeding the pasture was dry sown and soil could have been described as firm to hard in both treatments. Just prior to first graze both where soft to firm and at conclusion (November) soil was starting to dry out and was firm.

4.3.4 %Percentage plant litter

At seeding amount of plant litter and stubble was the same between treatments due to same paddock preparation. Plant litter percentage at the end of the project was greater in the control than ryegrass pasture. The different grazing management could again explain this, with rotational grazing reducing plant waste. Plant litter in the ryegrass pasture was still high however and grazing of the pasture could have been much harder. Photo 2 (appendix 4) shows excessive growth of ryegrass which was not utilised

4.4 Animal Production

4.4.1 Ewe & Lamb weight and Condition Score

As seen from Table 4 below no real differences were seen in either weights or condition score between the two treatment groups. This was an expected result as the ryegrass mob (mob 1) were also partially grazing pasture the control pasture when the ryegrass was rested. In addition the ryegrass pasture had a large percentage of other species present and any slight increase in production could be better explain by the management (rotational grazing versus set stocking) opposed to pasture composition. The Lambing percentage of the two groups of ewes used in the trial was similar and averaged 80%. Lambing percentage was below average for the property but not unexpected considering the season and the very late break. Ewes were in low body condition throughout mating and lambing.

Table 4. Weights and Condition Score of stock grazing trial site

Date	**Weight (kg)**		**Condition Score**	
	Ryegrass	Control	Ryegrass	Control
26/8/05	58.3	56.2	2.4	2.3
26/10/05	65.6	63.6	3.8	3.4
Lambs 26/10/05	29.2	27	-	-

4.4.2 Ewe worm test (marking and weaning)

Faecal worm egg counts recorded at marking were at low levels for both mobs of ewes and no drench was given. At weaning again faecal egg counts were in the low range for both mobs however mob 1 did have a higher total egg counts than the control (160 egg/gr & 50 egg/gr respectively). Again management of the pasture could possibly explain this and by rotationally grazing the stock are forced to graze closer to the ground and thus increase parasite burden.

4.4.3 Grazing days and DSE/ha

The number of days grazed and by what stock type was recorded for the two pasture types and grazing rate and stocking pressure calculated for each (table 5). As for pasture growth rates a third set of figures (Normal) were calculated for comparison, with normal being what usually would have occurred on the property (see assumptions below for details).

Table 5. Stocking Rate Comparison between ryegrass, control & normal

	Ryegrass	**Control**	**Normal**
Ha	14	42	100
Number Ewes (lambs at foot)	172	256	256
Number Hoggets	140	0	140
Number Calves	29	0	0
Grazing period (sowing to project completion)	148	148	148
Grazing days (number days pasture grazed)	60	88	88
Rest days	88	60	60
Total DSE for grazing period	45287.2	65331.2	83811.2
Total DSE for grazing period /ha	3234.8	1555.5	838.1
Grazing Rate (DSE/ha for grazing period)	21.9	10.5	5.7
Stocking pressure (DSE /ha per day grazed)	**53.9**	**17.7**	**9.5**

Assumptions

1. Ewes with lambs = 2.9 DSE, Hoggets = 1.5 DSE, Calves = 8 DSE
2. Outside project all grazing is same between groups
3. Grazing period= sowing to project end (i.e. 5/6/05 to 1/11/05)
4. 'Grazing Rate' equals 'Total DSE for grazing period/ha' divided by 'grazing period'.
5. 'Stocking Pressure' equals 'Total DSE for grazing period/ha' divided by 'grazing days'.
6. Normal = the Normal practice for that property i.e. 256 ewes grazing on 56ha sown to cereal / medic pasture mix.

NB For ryegrass pasture hoggets and calves did not graze for the same period of time as ewes with lambs. This is taken into account when calculating Total DSE for grazing period.

As seen above, the ryegrass pasture supported considerably higher grazing rates (i.e. DSE /ha divided by total period of the project) than the control or the normal practise for the property, that is two times or four times the DSE h/a respectively. Similar the stocking pressure (i.e. the DSE/ha on one given day) was a lot higher for ryegrass than for the control or normal practises. When assessing the pasture growth in the paddock it could be argued that the ryegrass could have also supported further stock. Due to limited stock available for the trail the pasture was not grazed as hard as liked and it was felt there was potential for further grazing (see photos- Appendix 4). This however may not be the case in other seasons. While the break to the season was extremely late the annual rainfall was slightly above average with extremely good pasture growing conditions occurring once the season broke in June.

4.4.4 Gross Margin comparison between control & ryegrass

From the pasture growth and stocking rate data, gross margins have been calculated for the various pastures. It was assumed that once the growing season was complete, the land management and stocking rates for the three pasture types wouldl be the same. Typical to the area the stock would be used to graze the pasture completely out as paddock preparation for cropping the following year. The stock would then graze stubbles and it is estimated that the average stocking rate for the district would be 5.7 dse/ha. The figure varies quite considerable from property to property and could be argued that should be a lot lower, however whatever the rate the relative difference between the pasture types would remain the same.

Table 6 Gross Margins for Ryegrass, Control and Normal pasture

	Ryegrass	**Control**	**Normal**
DSE/ha for grazing period (grazing rate)	21.9	10.5	5.7
Remaining grazing for year (days)	217	217	217
Ave dse/ha for remaining grazing	5.7	5.7	5.7
Ave dse/ha for year	**12.3**	**7.7**	**5.7**
Income ($/dse)	23	23	23
Total Income $/ha	281.8	176	130.8
Additional Costs /ha	105.95	0	0
Gross Margin $/ha	**175.8**	**176**	**130.8**

Assumptions

1. GM taken from 'Rural Solutions' 2006 Farm Gross margin guide, prime lamb production in cereal zone
2. 'Normal' stocking rate is 5.7 year round
3. Additional Cost- only includes seed and fertiliser. Electric fence not included as seen as capital investment (56ha = $35/ha)
4. APW Wheat 2.5t/ha GM $286/ha

As seen in table 6 the average annual stocking rate for the ryegrass pasture is a little over twice that of the normal practice of the property. An average total income /dse for the area was assumed at $23/dse which when multiplied by the dse/ha for each pasture resulted in the ryegrass pasture returning a $105.8 and $151 more than the control and normal pastures respectively. However when taking into account that the ryegrass had additional costs of two extra fertilise applications and added seed cost and gross margins for the ryegrass and control were the same. As mentioned above in section 4.4.3 it was noted by the group that the ryegrass pasture could have been grazed harder. This would have in turn affected the gross margin results possibly making the ryegrass pasture more attractive.

5 Success in Achieving Objectives

5.1 Identify the suitability

OJECTIVE- Identify the suitability of Italian ryegrass as a pasture species in a farming system typical to the Yorke Peninsula of SA i.e. 1 year of pasture, several years of cropping (typical to the region). Assess the ability of Italian ryegrass to give high quality feed early in the season to better fit livestock requirements and the farming system of the area.

The project showed that Italian ryegrass could be used as a pasture species on the YP. The pasture growth data indicated it is capable of high growth rates particularly early on, however the rotational grazing management would have also influenced this result. As a pasture species the ryegrass was easy to established and certainly provided early growth of high quality. Throughout the project some group members expressed concern over the use of ryegrass in a cropping rotation and the potential for being a weed in the following years crop. To date effective control has been achieved however over the 2006 growing season it is intended that the paddock be monitored to assess the problem of persistent plants.

The group also felt that due to the lack of stock and under grazing of the ryegrass pasture, the full potential and suitability of Italian ryegrass may have been underestimated. Variation in seasonal conditions and considering the very late break in 2005, continual use of the species would be needed to truly assess Italian ryegrass species in this farming system and area.

5.2 Increase knowledge

OBJECTIVE- Increase the groups knowledge on strategic grazing of pastures to improve & increase livestock production and to better understand how various grazing management (rotational versus continuous) can effect both pasture and livestock production.

Throughout the project three field days were held and at each there was a component focussing on pasture assessment and development of visual pasture assessment skills. Responses from group members at the final field day indicated that they felt they had a better understand and more confidence in pasture assessment as a result. As a whole the group were surprised at the growth rates achieved from both pastures but particularly the ryegrass and the response to strategic grazing. Many indicated that in the past they had been put off grazing large numbers of stock on small areas due to the need to re-fence and the problems associated with cropping the following year. Through the project members many saw the benefits and effectiveness of using portable electric fencing to divide larger paddocks into smaller sections and rotationally graze the area.

5.3 Compare productivity

OBJECTIVE- Compare the productivity (i.e. grazing day, kg DM/ha pasture produced & gross margins) between the Italian ryegrass and the control and assess the differences in livestock production from each.

Although livestock production data was collected, as the project changed focus from the initial proposal, differences in livestock production were used as a comparison bearing in mind that mob 1 was not solely grazed on the ryegrass pasture. This however didn't impact on the ability to calculate gross margins and compare overall productivity of the treatments and also against the normal

practise for the property. Many of the group members found the process of calculating gross margins most useful and highlighted the fact that while increase pasture production is desirable if it is not utilised it will be of little benefit practically if added cost is associated with the extra growth. In these situations low input systems grazed well are just as economic.

5.4 Asses land management benefits

OBJECTIVE- Assess the land management benefits (if any) of using Italian ryegrass pastures and their management.

Land management benefits were considered though out the project however no real differences were noted between the treatments. If the ryegrass treatment had been grazed harder this may not have been the case and is an important consideration to bear in mind when recommending increased grazing pressure.

6 Impact on Meat and Livestock Industry – now & in five years time

In an area that is typically cropping, livestock enterprises are continually competing with crops that generally have higher returns per hectare (long term average) for land area. If with better grazing management and alternative pasture species livestock production can reach gross margins comparable to that of cropping, producers will look at once again incorporating livestock back into their system. By maintaining a livestock component to the cropping enterprise farm income is spread across commodities and also has sustainability benefits such as reducing the reliance on herbicides for weed control and burning / slashing stubbles. If increased livestock production can be achieved through both increasing skills in grazing management and introducing new pasture species the impact on meat industry immediately is more efficient meat production and in 5 years time possibly higher out put of red meat from traditional cropping areas.

7 Conclusions and Recommendations

7.1 Conclusions

In conclusion the project had the following outcomes.

- Italian ryegrass in conjunction with rotational grazing increased pasture quality and quantity.
- Livestock production and sustainability measures from the two pasture types were similar
- The ryegrass growth rates (kg Dm/ha/day) were almost double that of the control pasture
- Italian ryegrass has added costs (seed more expensive and requires additional fertiliser applications)
- Gross margins similar between control and ryegrass, but both higher than the norm for the property

Overall it was determined that the pasture would have been able to run higher stocking rates than available in the project and that the pasture was not grazed hard enough. It was also recognised that the ryegrass pasture was not solely ryegrass but contained other species, and this may have masked livestock production or environmental differences. It is suggested therefore that by

increasing stoking rate of the ryegrass the gross margins would also increase, however increased faecal egg counts and sustainability factors such as ground cover many suffer as a consequence.

7.2 Recommendations

It would be recommended that Italian ryegrass should be considered as a possible pasture species in a cropping enterprise on the Yorke Peninsula of SA. However producers need to be aware of the extra cost involved in growing the pasture and that with out proper management extra return will not result and in some cases better management of existing pastures may be a more viable option.

Further investigation into the following areas could possible provide more conclusive results.

1. Planting Italian ryegrass species as the sole pasture species
2. Keeping grazing management the same between pasture types

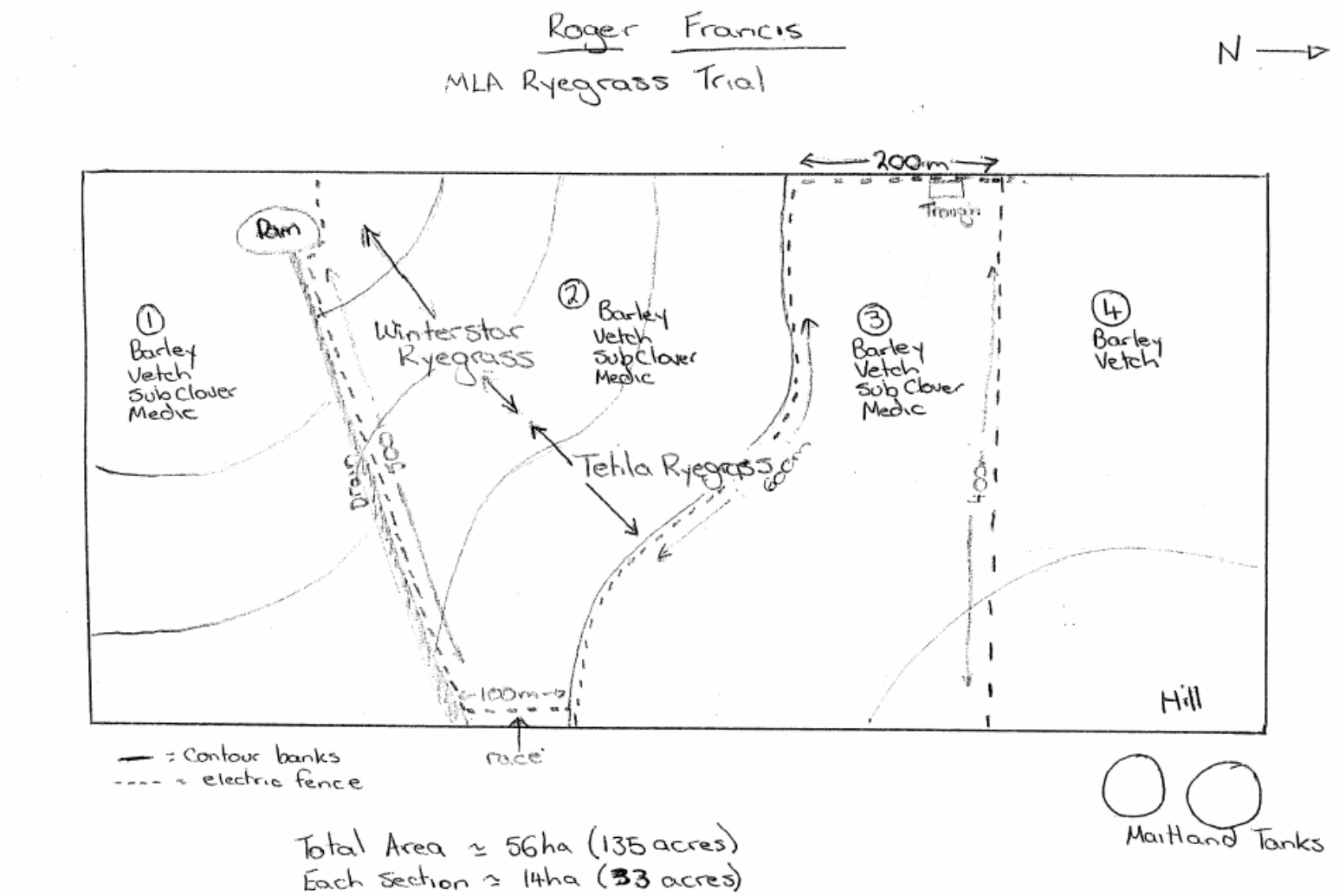
8 Appendices

8.1 Appendix 1- Loudoun Hill Rainfall 2005

Date	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1					1.8							
2		2					10					
3		1		2.6					23		7.4	
4	6							3.8	5.6			
5	1.8		7.4									
6												
7											36	
8							2.2				21.6	
9		2										
10		4.2				4.4		10.4	3	50.5	2.6	
11				0.4		18	1					
12									2			
13							13					
14				8.8			6.2					
15	0.2				0.8			14.6	2			
16			0.6			4.4	4					
17			1.2			8			4.2			
18										10.2		
19		0.6						9		2.6		
20	0.4					7.8	0.2	4				
21						19	0.8	3.8				
22						15.4	2.2	2.8	2.8	3.8		
23									3			
24							1.6		1.2	9		
25							0.8		4	4		
26							2.2		11.4			
27					2				2.4			
28	1.6				2.4				1.4			
29	2.2											
30								7.4		8.8		
31								3.4				
Total Rain	**12.2**	**9.8**	**9.2**	**11.8**	**7**	**77**	**44.2**	**59.2**	**66**	**88.9**	**67.6**	**38.4**
Progressive Total	**12.2**	**22**	**31.2**	**43**	**50**	**127**	**171.2**	**230.4**	**296.4**	**385.3**	**452.9**	**491.3**

NB. Daily rainfall not available for December.

8.2 Appendix 2- Farm Map



8.3 Appendix 3- Activity Time line

Date	Activity	Comments
1/6/05	Seeded pasture- vetch, barley, medic & clover	
8/6/05	Seeded Ryegrass	*Tetila* = 17kg/ha on 4.8ha & 25kg/ha on 3.1 ha *Winter Star* = 14kg/ha on 11ha
8/6/05	Fertilise	61kg / ha N33:P8
8/6/05	Paddock rolled with crimp roller	
29/6/05	Ewes lambing	NB not on pasture
21/7/05	Spray pasture	Broadstrike
3/8/05	Fertilise	66kg/ha 46N:P0
5/8/05	Electric fenced into 4 sections	
5/8/05	Feed test & pasture assessment	
6/8/05	Single ewes & hoggets onto ryegrass	
25/8/05	Hoggets drafted off single ewes	
26/8/05	Lambs marked & mob moved from pasture	
26/8/05	Worm Count, CS & weights ewes	
1/9/05	Feed test & pasture assessment	
7/9/05	Single ewes back into trial area	
12/9/05	Hoggets & 29 calves onto trial	
22/9/05	Calves removed from ryegrass	
10/10/05	All stock off ryegrass	
17/10/05	Sheep lambs hoggets and calves on trial	
19/10/05	All stock off	
26/10/05	Sheep & lambs on	
27/10/05	Feed test & pasture assessment	
30/10/05	All stock off	
1/11/05	246 ewes (no lambs) grazing	
2/11/05	460 Windemeare lambs grazing	
8/11/05	Worm count, CS & weight ewes & lambs	

8.4 Appendix 4- Photo's

Photo 1. Seeding 8/6/05. Dry sowing Italian ryegrass 11 inch row spacing

Photo 2. Under grazed ryegrass pasture

Photo 3. Ryegrass after hard grazing.

Photo 4. Final Field Day. Some of the group members and Rural Solutions consultant Tim Prance assessing pasture once died off and discussing grazing management of pasture paddocks which will be cropped the following year.